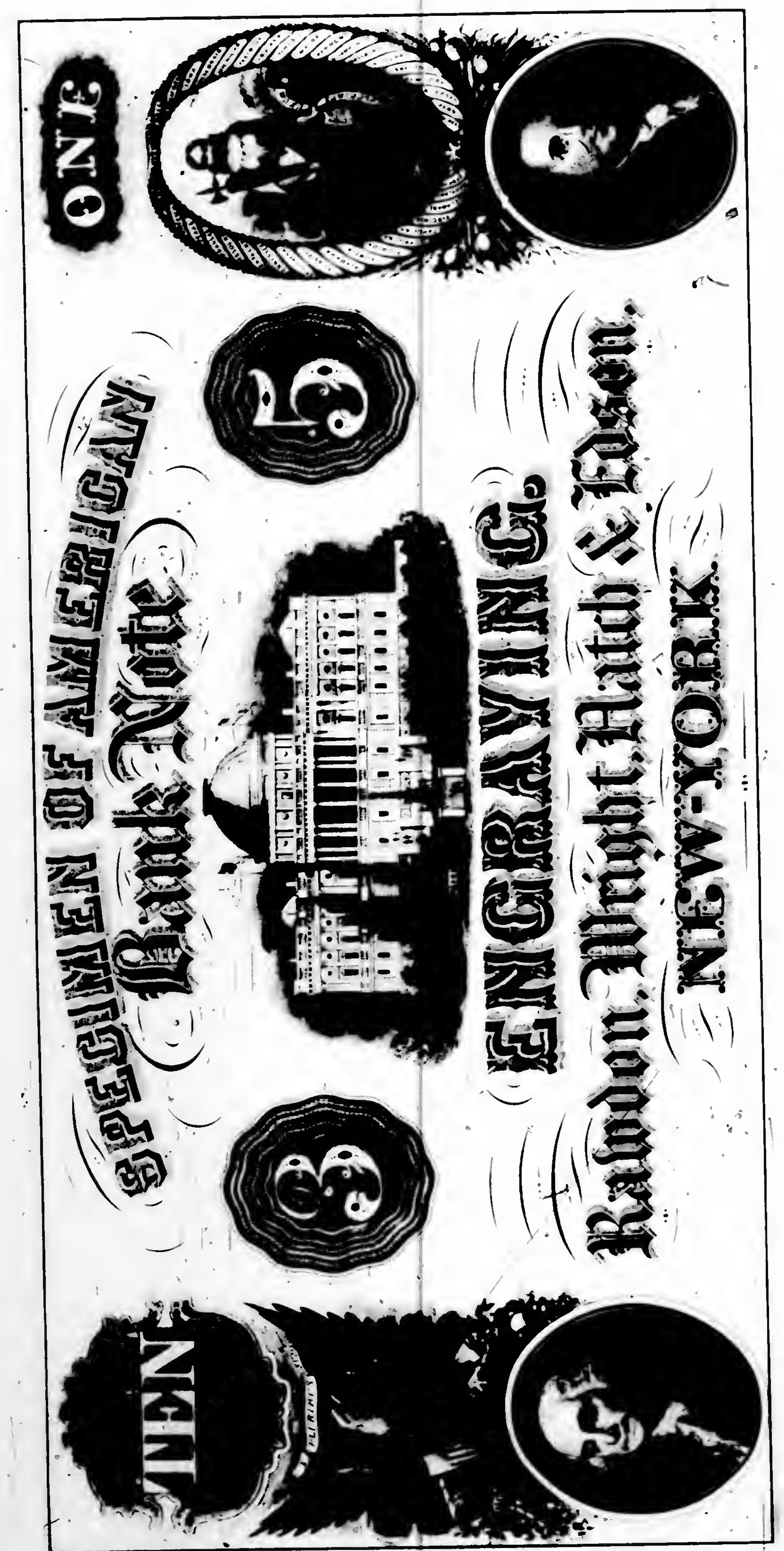
ANNUAL REPORT OF
THE COMMISSIONER
OF PATENTS

V.



31st Congress, 2nd Session. | [HO. OF REPS.] | Ex. Doc. No. 32.

REPORT

US Patent Office

OF THE

COMMISSIONER OF PATENTS,

FOR

THE YEAR 1850.

PART I.

ARTS AND MANUFACTURES.

CONTENTS:

WASHINGTON:
OFFICE OF PRINTERS TO HOUSE OF REPS.
1851.

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STEREOTYPED AT THE
BALTIMORE TYPE AND STEREOTYPE FOUNDRY,
FIELDING LUCAS, JR., PROPRIETOR.

REPORT

OF THE

COMMISSIONER OF PATENTS.

UNITED STATES PATENT OFFICE,
January, 1851.

SIR:—I have the honor to submit the Report of the proceedings of this bureau for the year 1850. [Part I., Arts and Manufactures.]

Most respectfully,
Your obedient servant,
THOMAS EWBANK.

To Hon. HOWELL COBB,
Speaker of the House of Representatives.

I.

FINANCIAL, STATISTICAL, &c.

The number of applications for patents received during the year ending December 31st, 1850, is twenty-one hundred and ninety-three; the number of caveats filed during the same period is six hundred and two.

The number of patents issued during the year 1850, is nine hundred and ninety-five; including twenty-seven re-issues, three additional improvements, and eighty-six designs. Three disclaimers have been entered during the year.

Within the year 1850, six hundred and eighty-four patents have expired, a list of which is annexed marked F. There were seventeen applications to extend patents, the terms of which were about to expire; seven of which were granted, and five rejected. Five are still pending. None have been extended by act of Congress within the year.

The receipts of the Office for the year 1850, on account of applications for patents, caveats, additional improvements, re-issues, extensions, recording assignments, powers of attorney, &c., and for copies, amount to $86,927.05, as per statement marked A. The expenses of the Office for the year 1850, are as follows, viz:

For salaries $29,260.94; contingent expenses $13,430.19; books for the library, $767.47; temporary clerks, $13,361.67; agricultural statistics, $3,-859.35; refunding money paid by mistake, $258.00; analysis of breadstuffs, $500.00; compensation of librarian, $500.00; Chief Justice of District of Columbia, sitting on appeals from Commissioner of Patents, $100; on applications withdrawn, $18,013.33; and restoring models, $50; amounting in the whole sum to $80,100.95, as per statement marked B:—leaving a balance to be carried to the credit of the Patent Fund of $6,826.10 as per statement C.

On the first day of January, 1850, the amount of money in the Treasury to the credit of the Patent Fund was $169,505.17. Of this sum, $90,000 was appropriated by Congress by the act approved May 15th, 1850, "towards the completion of the "east wing of the Patent Office," which has been drawn out and expended. By the act of Congress approved September 30th, 1850, the further sum of $110,000 was appropriated "for completing the east wing of the Patent Office building, &c., to be paid out of the Patent Fund, if so much of said fund remains unappropriated, and if not, the excess out of any money in the Treasury not otherwise appropriated." Of the amount last appropriated, $71,000 has been drawn from the Patent Fund, leaving a balance in the Treasury to the credit of the Patent Fund on the first day of January, 1851, of $15,331.27, as per statement D.

There were nine cases on the examiners' desks January 1st, 1850; the number of applications received during the year, twenty-one hundred and ninety-three; making the whole number of applications before the Office during the year, twenty-two hundred and two. Of this number, one hundred and sixty-nine cases remained unexamined on the 1st day of January, 1851.

The business of the Office for the past year shows the examination of two thousand and thirty-two applications, resulting in the issue of nine hundred and ninety-five patents, and ten hundred and thirty-eight rejections and suspensions as exhibited per statement E.

A statement is also appended showing the amount of fees received, applications and caveats filed, during each month in the year, marked F.

[A.]

Statement of receipts for patents, caveats, additional improvements, recording assignments, &c., and for copies.

Amount received for patents, caveats, re-issues, and additional improvements, ...	$80,750 00
Amount received for recording assignments, &c., and for copies, ...	6,177 05
Total, ...	$86,927 05

[B.]

Statement of expenditures and payments made from the Patent Fund by the Commissioner of Patents from January 1st, 1850, to December 31st, 1850 inclusive, under the act of March 3d, 1837, and subsequent acts of Congress making provision for the expenses of the Patent Office, viz:

For salaries, ...	$29,260 94
" Contingent Expenses, ...	13,430 19
" Books for Library, ...	767 47
" Temporary Clerks, ...	13,361 67
" Agricultural Statistics, ...	3,859 35
" Refunding money paid by mistake, ...	258 00
" Withdrawals, ...	18,013 33
" Compensation of Librarian, ...	500 00
" " District Judge, ...	100 00
" Analysis of breadstuffs, ...	500 00
" Restoring models, ...	50 00
	$80,100 95

[C.]

Statement of Receipts and Expenditures of the Patent Office for the year 1850.

Amount received from all sources, ...	$86,927 05
" of expenditures of all kinds, ...	80,100 95
Amount carried to the credit of the Patent Fund for 1850,	$6,826 10

[D.]

Patent Fund, January 1st, 1850.

Amount of fund January 1st, 1850, . . .	$169,505 17	
Amount drawn out per acts of Congress approved May 15th, and September 30th, 1850, . .	161,000 00	
		$8,505 17
Amount carried to the credit of the Patent Fund for 1850, .		6,826 10
Amount remaining in the Treasury to the credit of the Patent Fund, January 1st, 1851, ...		$15,331 27

The books of the Treasury show the balance to the credit of the Patent Fund, January 1st, 1851, to be somewhat less, which is explained by the following letter received from the 1st Comptroller, viz:

Treasury Department,
Comptroller's Office, January 21st, 1851.

Thomas Ewbank, Esq., Commissioner of Patents:

Sir:—In answer to your letter of inquiry of the 16th inst., I state that the balance in the Treasury to the credit of the Patent Fund at different periods has been as follows:

On the 31st December, 1842,	$170,559 39
" 30th June, 1849,	210,315 05
" 30th June, 1850,	106,224 89
There has come into the Treasury, funds deposited between the 1st July and 31st December, 1850, amounting to	40,807 22
	147,032 11
Amount drawn out from 1st July to 31st December, 1850,	131,925 00
Balance due the Patent Fund December 31, 1850,	$15,107 11

as appears now by the books of the Treasury. It is very likely, however, that some of the deposites made with depositories previous to December 31st, have not come in yet, which may, when they come in, swell the balance belonging to that fund on the 31st of December last, an hundred or two dollars, and possibly more than that.

Most sincerely yours,
ELISHA WHITTLESEY.

[E.]

Statement of applications on hand January 1st, 1850, and number received during the year and acted upon.

No. of cases on examiners' desks January 1st, 1850,		9
" applications received in 1850,		2,193
" before the Office during the year,		2,202
" of Patents issued during the year,	995	
" of applications remaining unexamined,	169	
" of rejections and suspensions,	1,038	
		2,202

[F.]

Statement showing amount of fees received, and number of applications and caveats filed during each month of the year 1850.

1850.	Cash Received.	Certificates Received.	Small Fees Received.	Total Received.	Applicat's Filed.	Caveats Filed.
January,	$3,780	$4,595	$402.47	$8,777.47	239	60
February,	3,705	3,070	464.26	7,239.26	176	60
March,	2,765	4,895	459.43	8,119.43	196	38
April,	2,990	3,095	598.72	6,683.72	177	48

1850.	Cash Received.	Certificates Received.	Small Fees Received.	Total Received.	Applicat's Filed.	Caveats Filed.
May,	3,465	3,450	674.43	7,589.43	196	60
June,	3,515	4,890	442.88	8,847.88	191	44
July,	2,820	2,695	673.23	6,188.23	161	31
August,	2,835	2,910	542.93	6,287.93	174	49
September,	2,375	4,065	544.00	6,984.00	151	34
October,	2,615	3,000	480.57	6,095.57	166	61
November,	3,060	2,865	467.81	6,392.81	165	52
December,	2,840	4,455	426.32	7,721.32	199	65
	$36,765	$43,985	$6,177.05	$86,927.05	2,193	602

Table exhibiting the business of the Office for the last ten years, and the necessity of an increase of clerical force.

Years.	Applications Filed.	Caveats Filed.	Patents Issued.	Amount of Cash Received.	Amount of Cash Expended.
1841	847	312	495	$40,413.01	$23,065.87
1842	761	291	517	36,505.68	31,241.48
1843	819	315	531	35,315.81	30,776.96
1844	1045	380	502	42,509.26	36,344.73
1845	1246	452	502	51,076.14	39,395.65
1846	1272	448	619	50,264.16	46,158.71
1847	1531	533	572	63,111.19	41,878.35
1848	1628	607	660	67,576.69	58,905.84
1849	1955	595	1076	80,752.78	77,716.44
1850	2193	602	995	86,927.05	80,100.95

During the first entire year (1840) after two assistants were added to the examining force (previously consisting of two examiners) the number of applications received was 765, and of caveats 228. By the act approved May 27th, 1848, two more examiners and two assistants were added to the corps, based upon the business of the Office for the year 1847, during which year there were 1531 applications and 533 caveats received.

Thus *the present* examining force of the Office was deemed necessary for the transaction of that amount of business.

From the foregoing table it will be observed that in 1848 there were received 1628 applications and 607 caveats; in 1849, 1955 applications and 595 caveats; and in 1850, 2193 applications and 602 caveats; an increase over 1847 of *six hundred and sixty-two applications* for Patents and sixty-nine caveats; and an increase over 1840 of *fourteen hundred and twenty-eight applications and three hundred and seventy-four caveats.* Thus the business of the Office has nearly trebled within the last ten years, while the corps of examiners has only been doubled during that period.

The foregoing facts clearly indicate that two chief and two assistant examiners are necessary to meet the present demands of the Office, and prevent the business, now two months behindhand, from falling still further in arrears.

[G.]

CLASSIFIED LIST OF PATENTS

THAT HAVE EXPIRED DURING THE YEAR 1850.

CLASS I.—AGRICULTURE, *including Instruments and Operations.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bee-hive	J. M. Hubbard	Canterbury, N. H.	Feb. 5, 1836
Bee-hive	Ebenezer Beard	New Sharon, Me.	Feb. 25, "
Bee-hive	Sturgess M. Judd	Danbury, Conn.	Mar. 30, "
Bee-hive	James M. Weeks	Salisbury, Vt.	June 30, "
Churn	Hezekiah Roberts	Seneca Falls, N. Y.	Feb. 5, "
Churn	Simon Whittier	Vienna	Feb. 10, "
Churn	John E. Thomas	Winchester, O.	Feb. 12, "
Churn	Amos Hanson	Windham, Me.	Mar. 2, "
Churn	Thomas Nicholson	Newmarket, Va.	Mar. 31, "
Churn	Charles Merriman	Middletown, Conn.	April 21, "
Churn	Amasa Wharff	New Gloucester, Me.	June 16, "
Churn	Samuel Tyler	New Gloucester, Me.	June 25, "
Churn	Davis Varnel	Minot, Me.	July 1, "
Churn, dash	Samuel Jackson	Jay, Me.	June 11, "
Corn hulling	Warren Carpenter	Newcastle, Pa.	Jan. 23, "
Corn sheller	Warren Carpenter	Newcastle, Pa.	Jan. 23, "
Corn sheller	Albert W. Gray	Middletown, Vt.	Mar. 31, "
Corn shelling	Isaac A. Hedges	Elmira, N. Y.	Feb. 3, "
Corn shelling	Henry G. Neal	Poultney, Vt.	Feb. 10, "
Corn shelling	Ira Smith	Downington	Feb. 13, "
Corn shelling	J. C. Baldwin	Staunton, Va.	Oct. 11, "
Cotton drying, &c.	John Philbrick	Cold Spring, Miss.	Feb. 12, "
Cultivator	James M. Garnett	Loretto, Va.	Feb. 3, "
Cultivator	J. S. Eastman	Baltimore, Md.	June 30, "
Cultivator, or hoe harrow	N. J. Shull	Bensalem, Pa.	Nov. 26, "
Cutting grain &c. (harvesting machine)	H. Moore and J. Hascall	Kalamazoo, Mich.	June 28, "
Cutting grass	Henry Allen	Fayetteville, Tenn.	June 2, "
Cutting grass	John Drummond	Waterford, N. Y.	June 30, "
Cutting grass	William C. Greenleaf	Andover, Me.	July 1, "
Cutting and thrashing	E. Briggs and G. G. Carpenter	Fort Covington	Feb. 5, "
Cutting, scythe	Ezra Barnett	Warner, N. H.	June 16, "
Cutting, scythe	S. Lamson	Cummington, Mass.	Oct. 29, "
Harrow, press	John C. Concklin	Peekskill, N. Y.	Ap'l 21, "
Hoe	Adna Allen	Ramapoo, N. Y.	Jan. 23, "
Hoe, cast iron	Benjamin F. Boyden	Boston, Mass.	Mar. 31, "
Hoe, garden	Isaac Averill	Plymouth, Mich.	June 11, "
Hulling clover seed	J. B. and W. F. Poague	Lexington, Va.	Feb. 17, "
Hulling clover seed	Cyrus B. Baldwin	Faircastle, Va.	June 16, "
Hulling clover seed	Hildreth Robbins	Kennebec, Me.	June 20, "
Hulling clover seed	J. Hopper & A. Doughty	Moresborough, Pa.	June 30, "
Hulling cotton seed	Pierson Reading	Trenton, N. J.	Ap'l 13, "
Hulling rice	Lewis Cole	New Gloucester, Me.	June 16, "
Milk, preserving	John L. Granger	New York city	Mar. 19, "
Plough	John Dalkener	Canton, O.	Jan. 15, "
Plough	Samuel Witherow	Gettysburg, Pa.	Jan. 15, "
Plough	J. J. Chandler and P. Ranger	Milton, Me.	Jan. 20, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Plough	William P. Cannon	Monroe co., Tenn.	Mar. 4, 1836
Plough	D. Prouty and J. Mears	Boston, Mass.	Mar. 4, "
Plough	John Farlee	Mercer county, Ky.	Ap'l 21, "
Plough	Nathan Locklin	Sparta, N. Y.	Ap'l 28, "
Plough	Jacob Plank	Carlisle, Pa.	June 2, "
Plough	Joshua Gibbs	Canton, O.	June 16, "
Plough	Timothy Miller	Pittsburg, Pa.	July 2, "
Plough	Isaac Snider	Mount Pleasant, Pa.	July 2, "
Plough	T. M. Tilford	Murfreesboro', Te.	July 1, "
Plough	B. Woodcock	Mount Pleasant, Pa.	Nov. 23, "
Plough, cotton	Harvey W. Pitts	Wilsonville, Ala.	Mar. 31, "
Plough, wheel	J. C. Ferguson	Hydesville, Mass.	June 22, "
Rake, horse	James W. Webb	Mount Morris, N. Y.	Feb. 5, "
Rake, horse	Erastus S. Root	Mount Morris, N. Y.	May 17, "
Seeding, corn planter	Charles R. Belt	Washington, D. C.	Jan. 15, "
Seeding, corn planter and cotton	George C. Boyd	New London, Pa.	April 11, "
Seeding, cotton planter	Michael Beam	Buffalo, N. C.	Mar. 30, "
Seeding, cotton planter	Henry Allen	Fayetteville, Tenn.	June 16, "
Seeding, cotton planter	Henry Blair	Glenross, Md.	Aug. 31, "
Seeding, grain, sowing	William C. Greenleaf	Andover, Me.	July 1, "
Smut machine	Abraham Mudge	Canajoharie, N. Y.	Feb. 25, "
Smut machine	M. P. Spafford	Gainesville, N. Y.	Mar. 8, "
Smut machine	W. B. Ryan	Mount Morris, N. Y.	April 28, "
Smut machine	Robert Engle	Burlington co., N. J.	June 2, "
Smut machine	J. T. Town	Mount Morris, N. Y.	June 16, "
Smut machine	Rufus Dennison	Wilton, Me.	July 2, "
Smut machine	Jonas Pratt	Otsego, N. Y.	July 2, "
Smut machine, and hulling	Samuel Richardson	Elmira, N. Y.	Feb. 5, "
Straw cutter	Isaac S. Wright	Elbridge, N. Y.	Feb. 3, "
Straw cutter	C. D. Skinner and D. Read	Haddam, Conn.	Feb. 10, "
Straw cutter	Joseph Everett	Geneva, N. Y.	Feb. 10, "
Straw cutter	James M. Wolfolk	Oldham county, Ky.	Feb. 21, "
Straw cutter	James Hyde	Darien, N. Y.	Feb. 23, "
Straw cutter	E. Tarbox and C. F. Kneeland	Ogden, N. Y.	June 22, "
Straw cutting box	Mallory M. Marshall	Smithfield, Va.	July 1, "
Thrashing and cleaning clover seed	John Goodyear	S. Middletown, Pa.	June 2, "
Thrashing clover seed	William Loomis	Ashford, Conn.	July 2, "
Thrashing machine	Eleazer Brown	Chenango, N. Y.	Jan. 20, "
Thrashing machine	Lewis H. Mans	Danville, Pa.	Feb. 5, "
Thrashing machine	Thomas Bedee	Sandwich, N. H.	Feb. 10, "
Thrashing machine	James Cooper	Greene county, O.	Feb. 20, "
Thrashing machine	Hugh and J. W. Edgar	Wayne county, O.	Mar. 23, "
Thrashing machine	Hugh Barclay	Lexington, Va.	April 28, "
Thrashing machine	Nicholas Goldsborough	Easton, Md.	May 6, "
Thrashing machine	George Beaumont	Mount Pleasant, Pa.	May 6, "
Thrashing machine	Jacob S. Rollins	New Gloucester, Me.	June 2, "
Thrashing machine	J. Bailey and J. Sprinkle	Rockingham co., Va.	June 20, "
Thrashing machine	Porter Cleaveland	Yancey Mills, Va.	June 25, "
Thrashing machine	Aaron Parsons	Rockfield, Me.	July 2, "
Winnowing clover seed	James Manning	Lambertville, N. Y.	Jan. 6, "
Winnowing machine	David Wilson	Johnston, Vt.	Feb. 20, "
Winnowing machine	Jonathan Beane	Mountville, Me.	Mar. 31, "
Winnowing wheat	D. Flanders and C. Rathburn	Ft. Covington, N. Y.	Feb. 13, "

CLASS II.—METALLURGY *and Manufacture of Metals.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Andirons, bars	J. Cockran	Batavia, N. Y.	July 1, 1836
Anvil block	S. Van Tiers	Hanover iron works, Penn	Mar. 19, "
Awl haft	David M. Smith	Gilsum, N. H	Mar. 31, "
Awl haft	William Campbell	Gilsum, N. H	July 1, "
Axes	Elisha K. Root	Canton, Conn.	Mar. 30, "
Bit, spiral, for cutting screws	George Page	New Hampshire	Nov. 17, "
Bolts and spike, drawing	Richard Haynes	Portsmouth, Va	July 2, "
Columns, cast iron, &c., for buildings	Jordan L. Mott	New York	June 11, "
Door plates	J. S. Richardson	Boston, Mass	Oct. 15, "
Drills for metal	William R. Jones	Granville, N. Y	Jan. 11, "
Fire-proof chest	James Matthews	New York	June 16, "
Fire-proof safe	Daniel Harrington	Philadelphia, Pa	Mar. 2, "
Forge, blacksmith	Charles Richardson	Greenfield, N. H	Mar. 12, "
Furnace, blast	Benjamin Kugler	Philadelphia, Pa	June 2, "
Furnace, smelting ore	Arundius Tiers	Kensington, Pa	April 11, "
Gouges, making	M. M. Brainard	Great Barrington, Mass	Mar. 4, "
Hinges, butt, &c.	Welcome Whittaker	Troy, N. Y	Mar. 12, "
Hinges, butt	James Rouse	Troy, N. Y	May 17, "
Iron and Steel, making	William P. Boyden	New York	June 11, "
Knobs, glass, &c. for doors, &c.	E. Robinson, F. Draper and J. H. Lord	Cambridge and Boston, Mass	Oct. 20, "
Knobs, glass, &c., for doors, (antedated, Sept. 20, 1836)	E. Robinson, F. Draper and J. H. Lord	Cambridge and Boston, Mass	Dec. 8, "
Latch, mortise	William Coover	Erie, Pa	Feb. 17, "
Locks	P. B. Quimby	Belfast, Maine	May 23, "
Lock, door	Solomon Andrews	Perth Amboy, N. J.	Jan. 11, "
Lock, door	Abel Conant	Lowell, Mass.	Mar. 12, "
Lock, door	James McClory	New York	Mar. 18, "
Lock, door	Benjamin Smith	Canton, Conn.	Apr. 13, "
Lock, door	Almon Reoff	New York	July 1, "
Lock, door	James McClory	New York	July 2, "
Locks, and lever key	Augustus Prutzman	Philadelphia, Pa	Mar. 4, "
Locks, mortise	P. and E. W. Blake	New Haven, Conn.	Feb. 5, "
Ores, sweeping and washing	William Davis	New York	Apr. 28, "
Patterns for casting	L. H. Mann	Danville, Pa	Feb. 5, "
Polishing iron and brass wire for weavers' reeds	Arnold Wilkinson	Providence, R. I.	Aug. 31, "
Saw, filing teeth of	Elijah Stoker	Sent to Georgetown.	Nov. 8, "
Saw teeth, cutting	Samuel G. Merriman	Southington, Conn.	Apr. 11, "
Screws, cutting and heading, wire.	J. H. Pierson	Ramapo, N. Y.	Nov. 26, "
Screws, cutting notches in heads.	J. H. Pierson	Ramapo, N. Y.	Nov. 28, "
Screws, cutting, wood, &c. threads of	H. Cram	Clarkstown, N. Y.	Nov. 14, "
Screw, manufacturing	William Keane	Monroe, N. Y	Feb. 13, "
Spoons, casting	William Mix	Prospect, Conn	June 28, "
Spoons, silver, mill	J. Brockway	Troy, N. Y	Sep. 20, "
Tew iron	John Shugert	Elizabethtown, Pa.	Mar. 31, "
Window blinds, fastener	Jonathan Bacon	Bedford, Mass	Apr. 28, "
Window fastening	Marcus Merriman, Jr.	New-Haven, Conn.	June 20, "
Window shutter, fastening	Neal Hall and Jotham Chase	Cumberland & York County, Maine	Oct. 11, "
Wire, cap	Melville Kelsey	New York	Mar. 12, "
Wrench, rack	Alonzo G. Hull	Troy, N. Y	June 20, "

CLASS III.—MANUFACTURES *of Fibrous and Textile Substances, including Machines for preparing Fibres of Wool, Cotton, Silk, Fur, Paper, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Cordage and rope	William Fanning	New York	Feb. 3, 1836
Cordage, rope, making	J. Whiteman	Philadelphia, Pa	Jan. 15, "
Cordage, rope, serving	Adam Montgomery	New York	Mar. 18, "
Cordage, rope, serving	Charles Parke	New York	Apr. 13, "
Cordage, rope yarn, putting up	James H. Echols	Lynchburg, Va	Oct. 20, "
Flax and hemp, and Manilla grass, combing, &c.	S. Couillard, Jr.	Boston, Mass	Oct. 19, "
Gin, cotton	W. and J. McCreight	Winsborough, S. C.	Feb. 5, "
Gin, cotton	Henry Clark	New London, Conn.	Feb. 25, "
Gin, cotton	Pierson Reading	Trenton, N. J	Apr. 13, "
Gin, cotton	James McCreight	Winsborough, S. C.	July 2, "
Gin, cotton, grates	Edwin Keith	Bridgewater, Mass	Mar. 4, "
Hats, blocking	W. W. Jemeson	Wheeling, Ohio	Mar. 30, "
Hats, bodies, stiffening	J. P. Kettell and J. Wright	Worcester Co., Mass	June 11, "
Hats, bodies, stiffening	E. P. Spear	Lexington, Mass	July 2, "
Hats, elastic, ventilating	Daniel Greenleaf	Vicksburg, Miss	Nov. 26, "
Hats, napping	L. Lyon, 2d	Needham, Mass	Apr. 13, "
Hats, palm leaf	Frederick Groening	Brooklyn, N. Y	June 25, "
Hats, water proof, silk	George B. Dexter	Boston, Mass	Jan. 6, "
Hemp, breaking	John Pursell	Perryville, Ky	Mar. 18, "
Loom, harness for	John Blackmar	Killingly, Conn	Oct. 20, "
Loom, power	F. C. Lewis	Grafton, Mass	Mar. 30, "
Loom, power	Benjamin Lapham	Waterford, N. Y	June 28, "
Loom, power, and taking up motion	H. Hendrick	Killingly, Conn	Sep. 22, "
Loom, power, and taking up motion	John P. Comins	Killingly, Conn	Oct. 20, "
Loom, reeds, machine for making.	Jeptha A. Wilkinson	Providence, R. I	May 23, "
Loom, weaving	Cullen Whipple	Douglass, Mass	June 11, "
Loom, weaving cloth for stocks	Conrad Kile	Philadelphia, Pa	Oct. 11, "
Napping cloth	Stephen Marsh	Jericho, Vt	Jan. 11, "
Oakum and hair picking	R. B. Lewis	Hallowell, Maine	June 25, "
Paper, cylinders for drying	H. P. Howe	Shirley, Mass	Sep. 20, "
Paper, drying	Henry Howe	Shirley, Mass	Mar. 12, "
Paper, making	Charles Forbes	East Hartford, Conn.	Feb. 20, "
Picking and breaking wool	John Shly	Augusta, Ga	Oct. 27, "
Rags, cleaning	William Debit	Hartford, Conn	July 1, "
Rags, dusting	E. Burt and Geo. Carriel	Manchester, Conn.	Nov. 28, "
Silk, winding	Adam Brooks	South Scituate, Mass	June 20, "
Silk, winding, gimp or cord	Adam Brooks	South Scituate, Mass	June 20, "
Spinning cotton	William P. Brayton	New York City	June 25, "
Spinning, fliers	Samuel Ladd	Waltham, Mass	Feb. 20, "
Spinning, fliers	Samuel Ladd	Waltham, Mass	May 6, "
Spinning, fliers, cotton	John Morse	Newton, Mass	June 25, "
Spinning hemp, &c.	Moses Day	Roxbury, Mass	June 2, "
Spinning machine	John Morgan	Manayunk, Pa	May 14, "
Spinning, roping, cotton	William Fowler	Fishkill, N. Y	Mar. 23, "
Spinning, spindle, and flier	W. T. Eddy	Ithica, N. Y	Feb. 10, "
Spinning wool	Sykes and Conradt	Fredericktown, Md.	Mar. 3, "
Spinning wool	J. Withered	Baltimore, Md	Mar. 30, "
Wool, combing	S. Couillard's assignees.	Boston, Mass	June 16, "
Wool, or flax, comber	William W. Calvert	Lowell, Mass	July 2, "
Wool, hair, &c., forming web without spinning, &c.	J. Arnold & G. G. Bishop	Norwalk, Conn	Oct. 20, "
Yarn, woollen	William B. Walker	Hillsborough Bridge, N. H	July 1, "

CLASS IV.—CHEMICAL PROCESSES, MANUFACTURES, AND COMPOUNDS, *including Medicine, Dying, Color-making, Distilling, Soap and Candle making, Mortars, Cements, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Blood, equalizing the	S. R. Terrell	Burton, Miss.	Feb. 5, 1836
Candles, moulds	Jefferson Dunlap	New Holland, Pa.	Mar. 8, "
Caoutchouc, application to cloths	E. M. Chaffee	Roxbury, Mass	Aug. 31, "
Caoutchouc, dissolving	Patrick Mackie	New York City	Mar. 23, "
Cement, hydraulic	Levi Kidder	New York City	Jan. 15, "
Cement, hydraulic	John White	Syracuse, N. Y.	Jan. 23, "
Distilling	Peter Swartz, jr.	Muncey, Pa	June 25, "
Distilling	A. R. Kerr & H. Hoover	Waynesborough, Pa.	July 1, "
Distilling, cold	A. V. H. Webb	Utica, N. Y.	May 14, "
Distilling, still for	John Wright	New York	Feb. 20, "
Dying hats	Aaron Gould	Washington, Conn	Jan. 11, "
Extracts, making	T. Close & J. C. Sanford	Rye, N. Y.	Mar. 18, "
Fermenting and distilling spirits	Isaiah Stowell	Manchester, N. H.	Feb. 5, "
Gypsum, applied to cisterns	J. Flint and Clark Mills	New York, N. Y.	Mar. 4, "
Lead, white	Homer Holland	Westfield, Mass	Mar. 18, "
Lead, white	Edward Clark	Saugerties, N. Y.	June 20, "
Lead, white	Joseph Richards	Philadelphia, Pa	Dec. 2, "
Light, and heat, generating	H. L. Barnum	New York	June 2, "
Matches, friction	Alonzo D. Phillips	Springfield, Mass	Oct. 24, "
Medicine, botanic	Samuel Thompson	Boston, Mass	May 6, "
Mineral water, soda fountain	Jos. Boston & T. Bryant	New York	Apr. 11, "
Ointment, for cancer	Elias Gilman	Licking, Ohio	Mar. 31, "
Paint, composition	H. Hibbard	Darien, N. Y.	Sep. 20, "
Pearl ash	J. and N. Paree	Linklean, N. Y.	May 14, "
Pitch, composition	Thomas H. Sherman	Scriba, N. Y.	Mar. 4, "
Pitch, making	Henry Ruggles	New York	Mar. 19, "
Potash, and pearl ash	Elijah Williams	Erie, Pa	Mar. 8, "
Salt, manufacturing	Richard K. Cralle	Lynchburg, Va	Mar. 18, "
Salt, supplying	Peter Cooper	New York	Feb. 20, "
Sores, curing	Reuben Rood	Centre Lisle, Brown county, N. Y.	Feb. 20, "
Starch, rice	W. and T. Liversidge	Dorchester, Mass	Feb. 17, "
Turpentine, spirits, extracting	J. Jennings	New York	July 1. "

CLASS V.—CALORIFIC, *comprising Lamps, Fire-places, Stoves, Grates, Furnaces for heating Buildings, Cooking Apparatus, Preparation of Fuel, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Baker, reflecting	L. B. Olmstead	Binghampton, N. Y.	Jan. 20, 1836
Chimneys, ovens, &c.	Elihu Smith	Ithica, N. Y.	July 1, "
Cooking stove	R. G. Cochran	Francistown, N. H.	Feb. 3, "
Cooking stove	Daniel Williams	Scaghticoke, N. Y.	Feb. 3, "
Cooking stove	B. and A. Titus	Marshall, N. Y.	Feb. 25, "
Cooking stove	John Liddle	Schoharie, Ohio	Mar. 12, "
Cooking stove	Charles Vale	Newark, N. J.	Mar. 18, "
Cooking stove	O. Wilson	Concord, Mass	Mar. 23, "
Cooking stove	B. H. Pearson	Warner, N. H	Mar. 31, "
Cooking stove	Charles Vale	Newark, N. J.	April 13, "
Cooking stove	Jonas Kendall, assignee of J. Perkins	Ipswich, Mass	April 28, "
Cooking stove	E. G. Currier	Warner, N. H	June 2, "
Cooking stove	E. G. Currier	Warner, N. H	June 2, "
Cooking stove	Charles Higgins	Turner, Me.	June 2, "
Cooking stove	William A. Arnold	Northampton, Mass.	June 1[illegible], "
Cooking stove	Gould Thr[illegible]	New York city	June 25, "
Cooking stove	Thomas Sh[illegible]	N. Yarmouth, M[illegible]	Jun. 25. "
Cooking stove	Seb[illegible]n H. Lacter	M[illegible]y, Pa.	June 28, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Cooking stove	P. F. Perry	Rockingham, Vt.	June 28, 1836
Cooking stove	Beriah Douglas	Albany, N. Y.	June 30, "
Cooking stove	Asahel Lear	Wendall, N. H.	July 1, "
Cooking stove	E. Andrews and S. Austin	Bradford, N. H	July 1, "
Cooking stove	Elisha N. Pratt	Albany, N. Y.	July 1, "
Cooking stove	Chester Granger	Pottsford, Vt.	July 2, "
Cooking stove	P. C. Traver	West Troy, N. Y.	July 2, "
Cooking stove	Elisha Lyman	E. Hampton, Mass.	July 2, "
Cooking stove	John Whiting	Boston, Mass.	Oct. 20, "
Cooking stove	S. B. Spalding	Brandon, Vt.	Nov. 17, "
Cooking stove, and parlor	Nicholas Smith	New Hampton, N.H.	Oct. 27, "
Fire, extinguishing	Isaac Clowes	Norfolk, Va.	July 2, "
Fire place	Elijah Skinner	Sandwich, N. H.	Mar. 12, "
Fire place	William Burgess	Middleboro', Mass.	Mar. 12, "
Fire place	William R. Prescott	Hallowell, Me.	Mar. 19, "
Fire place	Reuben Buck	Acton, Me.	July 1, "
Fire place, or stoves	Foster Stevens	Springfield, Mass.	Mar. 2, "
Fuel, saw-dust, drying, &c.	William Avery	Syracuse, N. Y.	Oct. 11, "
Furnaces and boiler combined	Alexander Harrison	New Haven, Conn.	Mar. 2, "
Furnaces for warming buildings	F. A. Fickhardt	Easton, Pa.	Sept. 8, "
Grates	James Bennett	New York	May 14, "
Grates, cooking	John James Giraud	Baltimore, Md.	Feb. 10, "
Grates, parlor	William Anderson	New York	June 25, "
Grates, pendulum	Nathan Winslow	Portland, Me.	July 2, "
Grates, portable	James Williamson	Washington, D. C.	Nov. 8, "
Grates, sliding	John C. Howard	Hampton, Conn.	Feb. 13, "
Gridirons and spider	A. and George Sizer	Meriden, Conn.	Nov. 14, "
Heat, applying from lime, &c.	Peter Wenn	Philadelphia, Pa.	Mar. 8, "
Heat, evolution and management of	Lovell Lewis	Lewistown, N. Y.	Mar. 2, "
Heating chocolate ingredients	G. W. Waite	Baltimore, Md.	June 25, "
Heating water machines	D. B. Barnum	New Fairfield, Conn.	June 25, "
Kitchen ranges	George Johnson	Philadelphia, Pa.	May 23, "
Lamps	Isaiah Jennings	New York city	Sept. 22, "
Lamps, hanging, (antedated August 13, 1836)	Alonzo Platt	Middletown, Conn.	Oct. 8, "
Lamps, light-house burner	Isaac Dunham	Bristol, Me	June 20, "
Lamps, reflecting	John C. Fletcher	Springfield, Ohio	Mar. 30, "
Ovens	Samuel Pollard	Orono, Maine	Feb. 3, "
Ovens	William H. Akins	Berkshire, N. Y.	June 2, "
Ovens, baker	Eben B. Strong	Buffalo, N. Y.	April 11, "
Ovens, heating by anthracite	F. C. Treadwell	Brooklyn, N. Y.	June 16, "
Ovens, heating rooms	J. A. Pitts	Winthrope, Maine	July 2, "
Ovens, reflecting	C. D. Van Allen	Pen Yan, N. Y.	Mar. 31, "
Ovens, reflecting	Benjamin Ames	Ithica, N. Y.	June 25, "
Smoke, consuming	Nathan Lockling	Sparta, N. Y.	Mar. 4, "
Stoves	William M. Carmichael	Hempstead, N. Y.	Mar. 23, "
Stoves	John H. B. Swanzey	Lynn, Mass	Mar. 30, "
Stoves	Frazier, Blanchard & Gill	New York	April 28, "
Stoves	Frederick A. Fickhardt	Eaton, Pa.	April 28, "
Stoves	Nathaniel Russell	Waterville, Maine	May 14, "
Stoves	Howell Parmelee	Watervleit, N. Y.	July 2, "
Stoves, air-tight	Isaac Orr	Washington, D. C.	Jan. 20, "
Stoves, air warmer	J. J. Heintzelman	Philadelphia, Pa.	June 16, "
Stoves, anthracite coal	Adrian Jones	Hartford, Conn	June 2, "
Stoves for carriages	Alexander McWilliams	Washington, D. C.	April 21, "
Stoves, conical	Robert Robertson	Albany, N. Y.	June 16, "
Stoves, and fire place	C. Hendricks and W. Elwell	Gardner, Maine	Feb. 25, "
Stoves, and fire place	Jordan L. Mott	New York	Oct. 11, "
Stoves, foot	Ezekiel Daboll	Canaan, Conn.	July 1, "
Stoves, Franklin	John Harryman	Haverhill, Mass.	Sept. 29, "
Stoves, parlor	Beriah Douglas	Albany, N. Y.	June 30, "
Stove pipes	Ezra Ripley	Albany, N. Y.	Jan. 23, "
Stoves, rotary caps	Maynard French	Albany, N. Y.	Mar. 2, "
Stoves, ventilating	Clement Woodward	Washington, D. C.	July 2, "
Ventilating and supplying houses with cold or hot air	R. Mayo and Robt. Mills	Washington, D. C.	Oct. 24, "

CLASS VI.—STEAM AND GAS ENGINES, *including Boilers and Furnaces therefor, and parts thereof.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Boilers, steam	J. W. and E. Strange	Taunton, Mass.	Sept. 29, 1836
Boilers, steam, purifying water	Moody Park	Madison, Indiana	Oct. 4, "
Spark catcher	A. McDonough	Philadelphia, Pa.	Feb. 17, "
Spark catcher	Francis Milo	New York city	Feb. 26, "
Spark catcher	William Shultz	Philadelphia, Pa.	Mar. 31; "
Spark catcher	James F. Curtis	Boston, Mass.	Apr. 13, "
Spark catcher	A. Whitney & L. L. Burr	Albany, N. Y.	May 23, "
Spark catcher	Gabriel Winter	Donaldsonville, Pa.	July 1, "
Steam engine	A. S. Dawley	Boston, Mass.	May 23, "
Steam engine, safety	Edward D. Tippet	Washington, D. C.	Nov. 23, "
Steam engine, locomotive	H. R. Campbell	N. L. Philad'a, Pa.	Feb. 5, "
Steam engine, locomotive, for inclined planes, (ante dated July 13, 1836)	John Ruggles	Thomaston, Maine	July 28, "
Steam engine, locomotive and rail roads	Isaac W. Edgar	Wayne county, Ohio	July 2, "
Steam engine, rotary	Aaron Clark	Bangor, Maine	Feb. 16, "
Steam engine, rotary	David Ulard	Greenburg, Pa.	Mar. 23, "
Steam engine, rotary	Shepherd Whitman	New Albany, Ind.	June 25, "
Steam engine, rotary	F. Carpenter	Cazenovia, N. Y.	July 2, "
Steam engine, rotary reacting	John Ingham	Apulia, N. Y.	Nov. 28, "
Steam, generating	Job Carr	Springborough, Ohio	Mar. 12, "
Steam, generating	John Ames	Springfield, Mass.	Mar. 12, "
Steam, generating	E. Nott	Schenectady, N. Y.	Mar. 19, "
Steam, generating	J. Jennings	New York	July 1, "
Steam, generating	M. W. Baldwin	Philadelphia, Pa.	Oct. 15, "
Valve, puppet, raising, &c	Wm. Duff & T. Murphy	Baltimore, Md.	Feb. 17, "
Valve, slide	A. McCausland, Jr.	Philadelphia, Pa.	Feb. 10, "

CLASS VII.—NAVIGATION *and Maritime Implements, comprising all Vessels for conveyance on water, their construction, rigging and propulsion, Diving Dresses, Life Preservers, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Anchor, cast iron	James S. Stoddard	Palmyra, N. Y.	July 2, 1836
Blocks, sheaves of	Cyrus Alger	Boston, Mass.	July 1, "
Blocks, ships', cutting sheaves, &c.	Thomas Blanchard	New York	Aug. 31, "
Blocks, ships', and dead eyes, &c.	Thomas Blanchard	New York	Aug. 10, "
Blocks, ships', finishing wooden sheaves	Thomas Blanchard	New York	Aug. 1, "
Blocks, ships', forming end pieces &c	Thomas Blanchard	New York	Aug. 10, "
Blocks, ships', forming or shaping cheeks, &c	Thomas Blanchard	New York	Aug. 31, "
Blocks, ships', mortising and boring, &c	Thomas Blanchard	New York	Aug. 10, "
Blocks, ships', riveting plank, &c.	Thomas Blanchard	New York	Aug. 10, "
Blocks, ships', rounding edges, &c.	Thomas Blanchard	New York	Aug. 10, "
Blocks, ships', tackle, countersinking, &c	Thomas Blanchard	New York	Aug. 31, "
Boats, passing over dams	Stephen Underwood	Bath, N. H.	Mar. 19, "
Boats, and rafts, passing, &c	Benning Sanbord	Lyman, N. H.	Apr. 11, "
Boats to be used under water	Edward Fitzpatrick	Mount Morris, N.Y.	Feb. 12, "
Capstan	Andrew Morse	Boston, Mass.	Mar. 12, "
Constructing vessels	Daniel Gerrish	Boston, Mass.	July 2, "
Dead eyes, for cutting and boring laniard scores	Thomas Blanchard	New York	Aug. 10, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Ice breaker	Michael Freytag	Philadelphia, Pa.	July 2, 1836
Ice cutting machine	Samuel Trask	Hallowell, Maine	Apr. 21, "
Propelling boats, &c.	Gideon Hotchkiss	Windsor, N. Y.	June 2, "
Propelling boats	Philander Noble	Westfield, Mass.	Jan. 20, "
Propelling paddles for boats	John Cochran	Baltimore, Md.	Apr. 28, "
Raising vessels	Tobias Cook	Scituate, Mass.	June 30, "
Rudders	Samuel Kepner	Harrisburg, Pa.	Mar. 4, "
Sails for ships, &c. making and furling	John Wade	Boston, Mass.	Dec. 6, "
Thimbles, ships'	Prentiss White	Yarmouth, Mass.	July 2, "

CLASS VIII.—MATHEMATICAL, *Philosophical and Optical Instruments, including Clocks, Chronometers, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Clocks	Joseph Ives	Bristol, Conn.	July 1, 1836
Compass, quadrant, and protractor	Francis Whiteley	Standardsville, Va.	Dec. 6, "
Compass, surveying	Nathan Basset	Wilmington, Del.	June 28, "
Distance, measuring	Rufus Porter	Billerica, Mass.	June 11, "
Glasses, for spectacles	Isaac Schnaitman	N. L. Philadel'a, Pa	Feb. 20, "
Maps, charts, &c., apparatus for exhibition	Nathaniel K. Lombard	Boston, Mass.	Oct. 27, "
Spring for clocks	James S. Ives	Bristol, Conn.	May 23, "
Time piece	William Pardie	Poughkeepsie, N.Y.	Feb. 20, "
True meridian, finding, &c	William A. Burt	Mount Vernon, Mich	Feb. 25, "

CLASS IX.—CIVIL ENGINEERING *and Architecture, comprising works on Rail and Common Roads, Bridges, Canals, Wharves, Docks, Rivers, Wiers, Dams, and other Internal Improvements, Buildings, Roofs, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bridges, frame	Stephen H. Long	U. S. Topograph Eng	Jan. 23, 1836
Buildings, constructing	Lewis Knapp	New York	June 28, "
Buildings, stores, &c.	Isaac Knight	Baltimore, Md.	May 23, "
Canals, locks	David Wilkinson	Cahoes, N. Y.	May 14, "
Canals, locks, gate	Valentine Brown	Clifton Park, N. Y.	May 14, "
Canals, locks, indicator	Valentine Brown	Clifton Park, N. Y.	May 14, "
Dock, dry	J. Houston, A. Hinman and J. Ingraham	Buffalo, N. Y.	June 22, "
Dock, hydraulic	Zebedee Ring	New York	Feb. 13, "
Drilling stone	Andrew Turney	Reading, Conn.	Mar. 3, "
Excavating from rivers	Sylvanus Russell	Buffalo, N. Y.	Apr. 28, "
Marsh drainer	Jean Blanc	New Orleans, La.	July 2, "
Railroad	Nathan Reed	Belfast, Maine	Mar. [illegible], "
Railroad plates, jointing	A. M. McCaine	Montgomery, Ala.	Mar. 31, "
Railroad, turn out	John Talbot	Portsmouth, Va.	Oct. 11, "
Roads, constructing	John S. Williams	Fulton, Ohio	July 1, "
Sewer, of hydraulic cement	Obadiah Parker	New York city	July 2, "
Tunnelling rivers	J. B. Bucklin & J. Jacobs	West Troy, N. Y.	July 11, "
Wharves, piers, &c., constructing	John G. Pray	Brooklyn, N. Y.	Jan. 6, "
Window frieze and covering	William Woolley	New York	July 1, "

CLASS X.—LAND CONVEYANCE, *comprising Carriages, Cars, and other Vehicles used on roads, and parts thereof.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Axletrees for carriages and cars..	Spencer Coleman........	Mount Pleasant, Va.	Mar. 2, 1836
Breakers, cylindrical, for retarding machinery	Smith Cram........	New York........	June 2, "
Car, door fastening............	John K. Smith	Port Clinton, Pa.....	Feb. 12, "
Car, railroad............	J. Davis and W. Ashdown	Baltimore, Md......	Mar. 4, "
Car, railroad, attaching..........	L. Pickering & J. Lightner	Boston, Mass........	June 28, "
Car, taking over elevators..........	Smith Cram........	New York city......	June 11, "
Springs, carriage..........	Newel Hungerford......	Ithica, N. Y.......	Mar. 31, "
Sulkey seat............	O. H. Capron and G. Barton, jr.........	Shaftsbury, Vt.....	Jan. 23, "
Tire for wheels..........	James H. Rogers	Mount Morris, N.Y.	Feb. 17, "
Wagon, coaches, and breaks for..	Henry West	Quincy, Mass......	Sept. 29, "
Wagon, hanging..........	Henry Mellish........	Walpole, N. Y......	Jan. 11, "
Wagon, tilting..........	Stephen Beebe........	Norwich, Conn......	June 22, "
Wheels, boxes fitting to..........	J. & C. Putnam........	Hallowell, Maine....	April 28, "
Wheels, cart and carriage..........	William Woodbridge....	Kennebec, Maine....	May 17, "
Wheels, confining carriage to.....	Clark Force..........	Baltimore, Md......	April 28, "
Wheels, horse detaching..........	Philip T. Share	Baltimore, Md......	Mar. 18, "
Wheel hubs..........	John Atherton........	Philadelphia, Pa....	June 2, "

CLASS XI.—HYDRAULICS AND PNEUMATICS, *including Water-wheels, Windmills, and other implements operated on by air or water, or employed in raising and delivery of fluids.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Blow-pipe for furnace..........	J. Barker..........	Baltimore, Md......	Feb 12, 1836
Faucets, molasses..........	Charles W. Peckham....	New Haven, Conn..	Feb. 10, "
Gate, flume..........	Harvey Frink........	Chautauque co, N.Y.	Feb. 25, "
Hydrants..........	S. T. Walker........	Baltimore, Md......	July 1, "
Hydrants..........	S. T. Walker........	Baltimore, Md......	July 2, "
Hydrants..........	David Horne........	Baltimore, Md......	Mar. 31, "
Hydrostatic press..........	Thomas Baxter........	Petersburg, Va......	April 13, "
Pumps..........	J. F. Walker........	Easton, Pa........	May 6, "
Pumps..........	Abner T. Mixwell......	Oxford, N. J......	June 30, "
Pump, forcing, double..........	Levi Newton........	Alexander, N. Y....	Mar. 8, "
Pump, forcing, double..........	John G. White........	Dryden, N. Y......	July 1, "
Pump, forcing..........	Benjamin Egbert........	Lansing, N. Y......	Jan. 23, "
Pump, forcing..........	W. W. Lesner........	Venice, N. Y......	Mar. 12, "
Pump, forcing..........	John F. Rodgers........	Waterford, N. Y....	Mar. 30, "
Pump, forcing..........	Nathan Chapin........	Penn Yan, N. Y....	Mar. 30, "
Pump, frictionless..........	Edward Whitfield........	New York........	June 2, "
Pump, frictionless..........	Charles V. Card........	New Bedford, Mass.	Nov. 26, "
Pump, suction..........	Thomas C. Barton........	Washington, N. J..	Feb. 20, "
Pump, vibrating..........	Sampson Davis........	Derby, Vt........	Feb. 25, "
Raising water..........	Joseph Turner........	Poland, Maine......	May 6, "
Raising water..........	Jesse C. Wood........	Ephrata, N. Y......	June 22, "
Raising water by weight..........	David Hess........	Shepardstown, Va..	July 1, "
Water, applying..........	J. Hinds, M. B. Ball, and S. Pike........	Troy, N. Y........	May 14, "
Water, conveying..........	Samuel Hant........	Baltimore, Md......	Mar. 31, "
Water-wheel..........	William L. Elgar........	Winchester, N. H..	Feb. 10, "
Water-wheel..........	Frederick Wingate........	Augusta, Maine....	Mar. 4, "
Water-wheel..........	Abraham Straub........	Milton, Pa........	Mar. 12, "
Water-wheel..........	Carey S. Mercer........	Franklin, Md......	Mar. 30, "
Water-wheel..........	J. T. Towne........	Mount Morris, N.Y.	April 11, "
Water-wheel..........	William Hitchcock........	Spencer, N. Y......	May 23, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Water-wheel..........	Henry Allen..........	Fayetteville, Tenn..	June 2, 1836
Water-wheel..........	Orson Waldo..........	Newark, N. Y......	June 25, "
Water-wheel..........	Charles Kenzie..........	Troy, N. Y........	July 1, "
Water-wheel..........	Samuel Garrett..........	Loudonville, Ohio..	July 2, "
Water-wheel..........	William F. Brown......	Augusta, Maine....	July. 2, "
Water-wheel, propelling..........	Aretas A. Wilder......	Warsaw, N. Y......	Mar. 8, "
Water-wheel, &c., regulating the motion of..........	Nathan Scholfield......	Norwich, Conn......	May 17, "
Wells, covers of..........	Levi Kidder..........	New York city......	Jan. 15, "
Wind wheel..........	Job Wilbur..........	Fall River, Mass...	Mar. 30, "

CLASS XII.—LEVER, SCREW, AND OTHER MECHANICAL POWER, *as applied to Pressing, Weighing, Raising and Moving Weights.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Balance..........	Jirah Vaughn..........	Rutland, Vt........	May 6, 1836
Balance, platform..........	C. P. Ladd..........	Strasburg, Vt......	May 17, "
Balance, platform..........	James M. Peck..........	Lyndon, Vt........	May 23, "
Balance, platform..........	John Horton..........	Madrid, N. Y......	July 2, "
Condensing cotton..........	Arlon Man..........	Smithfield, R. I....	April 28, "
Crane..........	Elias Marsh..........	Oswego, N. Y......	Feb. 12, "
Crane..........	Gilbert Sherwood..........	Erie, Pa........	June 30, "
Lever power, sawing, &c. by	Jeremiah Walker..........	Phillips, Maine....	Feb. 25, "
Packing flour..........	Jonathan F. Barrett....	Granville, N. Y....	Jan. 23, "
Packing screw, inverted..........	Stephen Terry..........	Decatur, Geo......	June 11, "
Packing tobacco..........	J. B. Allen..........	Richmond, Va......	Jan. 15, "
Press, cotton..........	J. Mitchell..........	Rutherford, Tenn..	Mar. 12, "
Press, hay..........	A. R. Chamberlin and A. Cleflin..........	Richmond, Va......	Mar. 30, "
Press, lever..........	H. G. Guyon..........	New York........	July 2, "
Press, tobacco..........	A. M. McLean..........	Russellville, Ky....	Feb. 5, "

CLASS XIII.—GRINDING MILLS, *and Mill-gearing, containing Grain Mills, Mechanical Movements and Horse-Powers, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Chocolate, grinding..........	Geo. W. Waite..........	Baltimore, Md......	June 25, 1836
Chocolate, moulding..........	James Mathews..........	Baltimore, Md......	June 25, "
Cider mill..........	Christian Sheaffer..........	Lebanon, Pa......	Mar. 19, "
Cider mill..........	Elias Jenkins..........	Harmony, Pa......	May 17, "
Coffee mill..........	C. W Peckham..........	New Haven, Ct....	April 13, "
Cooler, flour..........	Josiah Pope..........	Windham, Me......	Feb. 5, "
Grist mill..........	W. and J. McCreight....	Winnsborough, S.C.	Feb. 5, "
Grist mill..........	Oliver Wyman..........	Watertown, Mass..	July 1, "
Grist mill, for cutting..........	William Gerrish..........	Portsmouth, N. H..	Jan. 11, "
Horse power..........	Daniel Fitzgerald..........	New York city......	Oct. 19, "
Horse power..........	Samuel Newton..........	Dayton, Ohio......	Jan. 20, "
Horse power..........	Dudley Marvin..........	New York city......	Feb. 5, "
Horse power..........	Joseph Musten..........	Franklin county, Vt.	Feb. 12, "
Horse power..........	Richard Skinner..........	Williamson, N. Y....	Mar. 31, "
Horse power..........	Amos Adams..........	Augusta, Maine....	May 6, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Horse power	Isaac Straub	Lewistown, Pa	May 14, 1836
Horse power	C. Coster and D. Pennypacker	Upper Providence, Penn	May 23, "
Horse power	Rufus Porter	Billerica, Mass	June 11, "
Horse power	Wm. Whitman	Haverhill, N. H	June 20, "
Horse power	John Abbott	S. Reading, Mass	June 30, "
Horse power	Charles G. Gilbert	Leeds, Maine	July 2, "
Horse power	Daniel Fitzgerald	New York city	Oct. 19, "
Horse power, endless chain, &c	O. Badger	Cooperstown, Conn.	Oct. 15, "
Mill	John Harman, jr	New York	Mar. 30, "
Mill, metallic	Joseph C. Gentry	Dayton, Ohio	Mar. 18, "
Mill stones, cooling	Autin Taylor	Littleton, N. H	Mar. 31, "
Mill stones, picks	Samuel Etheridge	Tecumseh, Mich	Mar. 2, "
Mill wheel, dresser	John Turk	Columbus, Pa	July 1, "
Motion, reciprocating, &c	Benjamin Babbet	Bangor, Maine	Oct. 11, "
Power, endless chain propeller	Lewis Chevrier	Philadelphia, Pa	July 11, "
Power, alternate motion, by contraction and expansion of metals	Hazard Knowles	Hartford, Conn	Sept. 8, "
Power, self-motive	J. J. Giraud	Baltimore, Md	Mar. 31, "
Regulating speed, wheel for grist mills	S. H. Freeman	Cecilton, Md	May 17, "

CLASS XIV.—LUMBER, *including Machines and Tools for Preparing and Manufacturing; such as Sawing, Planing, Mortising, Shingle and Stave, Carpenters and Coopers' Implements.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bit stocks	Jeremy Taylor	Hebron, Conn	June 30, 1836
Boring wood	John B. Pell	New York	Mar. 2, "
Casks, machine	Sumner King	Suffield, Conn	Mar. 23, "
Casks and barrel headings	Hiram Andrews	Canaan, Conn	Mar. 2, "
Drawing knife	Edward Richards	Hingham, Mass	June 28, "
Dye woods, cutting and shaving	B. Swift	Washington, N. Y	Aug. 10, "
Fence pickets, cutting	J. Tichenor, S. Goodrich, and G. A. Hart	Ithica, N. Y	June 22, "
Gimlet, forging	De Grass Fowler	Wallingford, Conn	July 2, "
Gimlet, &c	William M. Fowler	N. Brandford, Conn	April 28, "
Joint, of wood work	S. C. Batchelor and N. S. Thomas	Watertown, N. Y	Mar. 30, "
Lathe	Enos and Nelson Avord	Westfield, Mass	Oct. 2, "
Lathe, gripe chuck for	David Peeler	Boston, Mass	Mar. 31, "
Laths, machine	Elihu Smith	Ithica, N. Y	April 28, "
Mortising machine	George Page	Keene, N. H	Mar. 18, "
Mortising machine	Erastus M. Shaw	Wilbraham, Mass	Mar. 23, "
Mortising machine	J. C. Channell	Dunstable, N. H	June 16, "
Mortising machine	Samuel B. Babcock	Oldstead, N. H	June 16, "
Mortising machine	John Hawkins	Stockbridge, Mass	June 20, "
Mortising machine	David Clark	Brooklyn, Conn	Sept. 14, "
Mortising and boring machine	George Page	Keene, N. H	Mar. 13, "
Mortising timber	George Page	Keene, N. H	Mar. 21, "
Pegs, shoe	R. H. Thompson	Rochester, N. Y	Mar. 23, "
Plane	J. T. Jones	Philadelphia, Pa	May 14, "
Plane, revolving	Lemuel Hedge	Brattleboro', Vt	June 28, "
Planing machine	Melzer Tuells	Milo, N. Y	Feb. 10, "
Planing machine	Lorrain Curtis	Sherburne, N. Y	June 16, "
Planing machine	P. M. Martz	Marion county, Ia	June 25, "
Planing machine	Ira Gay	Dunstable, N. H	June 25, "
Planing machine	William Woodworth	New York	Nov. 15, "
Saw belt	William Carey	Poughkeepsie, N. Y	Feb. 17, "
Saw belt, for timber	Benjamin Barker	Ellsworth, Me	Jan. 6, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Saw for felling trees	Walter Hunt	New York city	Jan. 6, 1836
Saw, rotary	Robert S. Thomas	Rockingham, N. C.	July 1, "
Saw, straightening	E. Rathbun and W. Tinker	Conneaut, Ohio	July 1, "
Sawing machine	Joseph Peevy	Levant, Maine	May 14, "
Sawing timber	Joshua Webb	Brooklyn, Conn	May 14, "
Sawing wood	Joseph Pinno, jr	Hanover, N. H	April 21, "
Saw-mills	G. W. Black	Montgomery co., Te.	Feb. 3, "
Saw-mills	David Washington	Peru, Mass	Feb. 25, "
Saw-mills	Isaac Read	Marshfield, Mass	Mar. 2, "
Saw-mills	Daniel Gerrish	Boston, Mass	April 11, "
Saw-mills	James Sanders	Alleghany co., Md	April 28, "
Saw-mills	W. J. McGhee	Columbus, Geo	May 14, "
Saw-mills	T. B. Naylor	Jonesville, N. C	June 2, "
Saw-mills	Simon Willard	New York city	June 30, "
Saw-mills	Samuel Gondy	Greensburg, Ky	July 2, "
Saw-mill, blocks for	Erastus Rathburn	Conneaut, Ohio	April 11, "
Saw-mill, crank	Benjamin F. Snyder	Elmira, N. Y	Sept. 29, "
Saw-mill, cross-cutting	Rufus Riker	Dexter, Maine	Feb. 20, "
Saw-mill, dogs	Martin Rich	Ithica, N. Y	Feb. 25, "
Saw-mill, dogs	Phineas Bennett	Ithica, N. Y	Feb. 25, "
Saw-mill, endless side chain, carriages for	James Murray	Baltimore, Md	Oct. 11, "
Saw-mill, saw	B. K. Barker	Johnsbury, N. Y	Feb. 5, "
Screws, cutting wooden	Joseph Peevy	Levant, Mo	Jan. 6, "
Shingles, dressing	N. P. Hawk and J. Keyes	Union, N. Y	April 21, "
Shingle machine	Tunis J. Burhyte	Barton, N. Y	July 1, "
Shingles, sawing	Jonathan Hobbs, jr	Falmouth, Maine	Sept. 14, "
Slitting timber	R. Beale and M. Bucklin	Grafton, N. H	May 23, "
Staves, sawing	Charles M. Keller	Washington, D. C.	June 30, "
Staves, sawing	A. Bard and S. Heywood	Lunenburg, Mass	Feb. 20, "
Staves, sawing for barrels	Cyrus McGregor	Newport, N. H	July 2, "
Veneers, cutting	James Hamilton	New York city	Nov. 10, "
Veneers, laying on ogee and other mouldings	John Soule	New Bedford, Mass.	Aug. 31, "

CLASS XV.—STONE AND CLAY MANUFACTURES, *including Machines for Pottery, Glass making, Brick making, Dressing and Preparing Stone, Cements, and other Building Materials.*

INVENTIONS OR DICOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Brick machine	John Moffatt	Buffalo, N. Y	Mar. 8, 1836
Brick machine	Nathaniel Adams	Newburg, N. Y	April 13, "
Brick machine	Gooding Halloway	Montgomery co., Pa.	April 21, "
Brick machine	Calvin Waterman	Bath, Maine	July 2, "
Brick moulding	James Coppuck	Louisville, Ky	July 1, "
Brick press	Phineas Ball	Mount Vernon, O.	Mar. 2, "
Glass cases	Thomas W. Whitley	Paterson, N. J	April 21, "
Granite, cutting and dressing	John D. Buzzell	Cape Elizabeth, Me.	June 2, "
Granite, hammering and dressing	William Morse	Corinna, Maine	Sept. 5, "
Gypsum, applied to cisterns	J. Flint and Clark Mills.	New York city	Mar. 4, "
Moulding pottery	J. C. Mendall and R. B. Ricketts	Masonville, Ky	June 30, "
Stone, cutting	J. and J. Sutton	Reading, N. Y	June 20, "
Stone, cutting and planing	A. Clark and C. H. Boynton	West Stockbridge, Mass	June 20, "

CLASS XVI.—LEATHER, *including Tanning and Dressing, Manufacture of Boots, Shoes, Saddlery, Harness, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Boots, crimping, clamps for	E. G. Pomeroy	Newark, Ohio	Oct. 4, 1836
Boots, crimping, cramp for	Hubbard L. Pierce	St. Johnsbury, Vt.	June 25, "
Boots, crimping legs	William Gerrish	Poland, Maine	Feb. 10, "
Boots, machine for turning boot legs	Thomas N. Saddler	Spencer, Mass	Nov. 8, "
Boots, trees	M. Matthews	Wayne, Ohio	Feb. 25, "
Boots, tucking machine	Sherburne C. Blodget	Rowley, Mass	June 11, "
Boots, turning	Peletiah Stevens	Stoughton, Mass	Mar. 4, "
Boot and shoe soles, cutting	Jonathan Hill	Billerica, Mass	Mar. 31, "
Glazed leather	E. G. Adams	Decatur, Ga	June 30, "
Harness, horse collars	John Hopkinson	Warren county, O.	Jan. 23, "
Harness, horse collars, forming	G. Warner and Robinson	Canajoharie, N. Y.	June 22, "
Harness, nets, fly for horses	Henry Korn	Philadelphia, Pa	July 2, "
Harness, pad, elastic water proof	A. Deitz	Albany N. Y.	Oct. 14, "
Harness, riveting	William Dukehart	Baltimore, Md	Mar. 30, "
Hides, unhairing	James Banks	Dixmont, Maine	June 30, "
Mail bags, bolt for	Ira Atkins	Hanover, N. H	Feb. 17, "
Rolling leather	J. M. Laughlin & H. Hill	Sunderland, Vt	April 28, "
Saddles	Benjamin Kraft	Reading, Pa	June 20, "
Saddles	Otho W. S. Callihan	Staunton, Va	July 1, "
Saddles and collars	Ebenezer Hale	New York, N. Y	Jan. 29, "
Saddles, elastic	William McCormick	Bath county, Ky	June 20, "
Saddles, ladies'	M. Jenkins	Attica, N. Y	July 1, "
Saddles, side	E. Bridewell	Bardstown, Ky	Nov. 26, "
Saddles, spring	Peter Crim	Waynestown, Pa	April 28, "
Saddles, spring	William Duchman	Morgantown, Pa	Aug. 31, "
Saddles, trees	Andrew R. McBride	Williamson co., Te.	Feb. 5, "
Shaving leather	Herkimer Johnson	Brooklyn, Conn	June 16, "
Shoe making machine	J. Hall	N. Bridgewater, Mass	May 6, "
Shoe, over	Daniel H. Bond	Canterbury, Conn.	June 30, "
Tanning	Henry Lochier	Lancaster, Pa	Mar. 18, "
Tanning	Laban Emery	New York	Mar. 17, "
Tanning	Simeon Heath	Pike, N. Y	May 23, "
Tanning, bark for	Daniel Williams	Boston, Mass	Feb. 5, "
Trunks, travelling	Washington Sweetzer	Portsmouth, N. H.	July 1, "
Trunks, valises, &c	James W. Noble	Pittsfield, Mass	Jan. 15, "
Trunks, valises, &c	William Brown	Brooklyn, N. Y	July 1, "

CLASS XVII.—HOUSEHOLD FURNITURE, *Machines and Implements for Domestic Purposes including Washing Machines, Bread and Cracker Machines, Feather Dressing, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bed-bug, destroying	Britain Garrand	Marysville, Tenn	Mar. 12, 1836
Beds, spring, spiral	M. F. Moody and B. Eastman	Northampton, Mass.	April 13, "
Bedsteads	Jonas Maguire	Philadelphia, Pa	Jan. 15, "
Bedsteads	Christian Kniseley	Meadville, Pa	June 16, "
Bedstead, cot	Samuel Clarke	New York	Mar. 23, "
Bedstead fastenings	Ira McLaughlin	Sunderland, Vt	April 28, "
Chairs, easy	Andrew Wood	Charlestown, Va	June 28, "
Crackers and biscuit, cutting	Eph. Treadwell	New York	May 18, "
Crackers, cutting and rolling	W. R. Nivens	New York	Mar. 2, "
Cutting apples, and paring	John W. Hatcher	Bedford county, Va.	Feb. 3, "
Cutting meat	J. Masser and S. Smith	Megentown, Pa	June 2, "
Cutting sausage meat	Ambrose Henkel	New Market, Va	Feb. 13, "
Cutting vegetables	Austin H. Robbins	Denmark, N. Y	May 6, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Cutting vegetables	Henry Mellish	Walpole, N. H	June 25, 1836
Dough machine	D. and T. Shackford	Westbrook, Conn.	Mar. 2, "
Feathers, cleaning	Daniel K. Hall	New York	Feb. 12, "
Feathers, dressing	Samuel Keplinger	Baltimore, Md	Feb. 12, "
Feathers, dressing	Elam Wilbur	Geneva, N. Y	Mar. 18, "
Feathers, dressing	Billy and Alanson Todd	Marietta, Ohio	May 6, "
Feathers, dressing	George Reynolds	East Hartford, Ct	May 23, "
Feathers, dressing	Benton P. Coston	Philadelphia, Pa	June 28, "
Feathers, dressing	F. P. Knowlton	Clermont, N. H	July 2, "
Feathers, renovator	J. W. Post and R Collier	Baltimore, Md	Mar. 2, "
Mattresses, bolsters, &c	A. Salisbury and J. Uram	Troy, N. Y	July 1, "
Sacking bottom	L. L. Wells	Middletown, Conn.	April 13, "
Washing machine	Joab H. Hubbard	Bloomfield, Conn.	Jan. 6, "
Washing machine	Luther Davis	Norwich, Conn	Feb. 12, "
Washing machine	John S. Geer	Norwich, Conn	Mar. 2, "
Washing machine	Albion P. Arnold	Readfield, Maine	Mar. 12, "
Washing machine	E. Y. Watson	Albany, N. Y	Mar. 23, "
Washing machine	Charles Merriman	Middletown, Conn.	April 21, "
Washing machine	Henry Souder	Strasburg, Pa	April 21, "
Washing machine	L. R. Prince	Beverly, Mass	May 14, "
Washing machine	Amory Davidson	Littleton, "	June 11, "
Washing machine	Amos Larcum	Troy, N. Y	June 16, "
Washing machine	William Newton	Warren county, O.	July 1, "
Washing machine	James H. Little	Skaneateles, N. Y.	July 2, "
Water, pressing from clothes	Caleb Angevine	New York city	Feb. 25, "

CLASS XVIII.—ARTS, POLITE, FINE, AND ORNAMENTAL, *including Music, Painting, Sculpture, Engraving, Books, Paper, Printing, Binding, Jewelry, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Pencil case and pen	Henry Withers	New York city	Mar. 19, 1836
Pencil, everpointed, open case	Jacob J. Lounds	Philadelphia, Pa	Sept. 22, "
Piano-forte	John Pethick	Mt. Morris, N. Y	Feb. 12, "
Piano-forte	Isaac Clark	Cincinnati, Ohio	Mar. 2, "
Piano-forte	H. Hartye	Baltimore, Md	Mar. 12, "
Printing press	J. Lemuel Kingsley	New York	Mar. 2, "
Printing press	Hezekiah Camp	Trenton, Ohio	Mar. 4, "
Printing press, hand	F. J. Austin	New York	Oct. 8, "
Printing press, power	Isaac Adams	Boston, Mass	Mar. 2, "

CLASS XIX.—FIRE-ARMS *and Implements of War, and parts thereof, including the Manufacture of Shot and Gunpowder.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Cannon for chain shot	Edwin Gordon	Hingham, Mass	Feb. 17, 1836
Cannon, malleable iron	George W. Chapman	New York	June 16, "
Cannon, traverse board	William H. Bell	Washington, D. C.	May 14, "
Cannon, vent	John W. Cochran	Lowell, Mass	Mar. 23, "
Fire-arms	Samuel Colt	Hartford, Conn	Feb. 25, "
Lock, gun	Samuel Morrison	Milton, Pa	Feb. 10, "
Lock, gun and pistol	Johnson Marsh	East Dorset, Vt	July 1, "
Pistols	B. and B. M. Darling	Bellingham, Mass.	April 13, "
Stock, gun, lathe for	Abner Town	Woodbury, Vt	Feb. 25, "

CLASS XX.—SURGICAL AND MEDICAL INSTRUMENTS, *including Trusses, Dental Instruments, Bathing Apparatus, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bones, setting, apparatus for	James H. Willard	Brown Elm, Ohio	June 11, 1836
Lancet, revolving	T. H. Harrison	New Egypt, N. J.	June 20, "
Splints, for fractures	Enoch Thomas	New Athens, Ohio	Mar. 8, "
Syringe, injecting	Joseph Ralph	New York	Feb. 25, "
Thigh, fractured, apparatus for	Samuel Walston	Vincentown, N. J.	July 2, "
Tooth extractor	Moses R. Hanson	Bangor, Maine	Mar. 12, "
Truss	F. H. Newman	Huntsville, Ala.	Feb. 25, "
Truss	John W. Newson	New York	June 20, "
Truss for hernia	Wm. Adair	Pleasant Hill, Ky.	Feb. 17, "
Truss for hernia	Isaac Thompson	Brattleborough, Vt.	July 1, "

CLASS XXI.—WEARING APPAREL, *Articles for the Toilet, &c., including Instruments for Manufacturing.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Combs, metallic	H. Durell	New York	June 20, 1836
Combs, metallic	Richard A. Ives	Bristol, Conn	July 1, "
Corsets, rings, &c., grooves in	Charles Buckland	Middletown, Conn.	June 2, "
Razor case and sharpener	E. M. Pomeroy	Wallingsford, Conn.	Oct. 19, "
Shears, tailors'	Richard Fitzgerald	Elizabethtown, N. J.	April 28, "
Stock, for the neck, shaping	Thomas Goodrum	New York	July 1, "
Suspenders, manufacturing, gum-elastic	Ransom Warner	New York city	Mar. 18, "
Tailoring, art of	James Twisler, jr	Hagerstown, Md.	July 1, "

CLASS XXII.—MISCELLANEOUS.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Coffins, metallic	James A. Gray	Richmond, Va.	June 11, 1836
Corn husks, slitting	Asa Barrett	Baltimore, Md.	April 21, "
Traps, for rats, &c	Thomas Neill	Herkersville, Ohio	Jan. 23, "

[H.]

ALPHABETICAL LIST

OF PERSONS WHOSE PATENTS HAVE EXPIRED DURING THE YEAR 1850, WITH THEIR INVENTIONS OR DISCOVERIES AND CLASS.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Abbot, John	Horse power	XIII.
Adams, Amos	Horse power	XIII.
Adams, Nathaniel	Brick machine	XV.
Adams, E. G.	Glazed leather	XVI.
Adams, Isaac	Printing press, power	XVIII.
Adair, William	Truss for hernia	XX.
Akins, William H.	Ovens	V.
Allen, Henry	Cutting grass	I.
Allen, Adna	Hoe	I.
Allen, Henry	Seeding, cotton planter	I
Alger, Cyrus	Blocks, sheaves of	VII.
Allen, Henry	Water wheel	XI
Allen, J. B.	Packing tobacco	XII
Ames, Benjamin	Ovens, reflecting	V.
Ames, John	Steam, generating	VI.
Andrews, Solomon	Lock, door	II.
Andrews, E. and S. Austin	Cooking stove	V.
Anderson, William	Grate, parlor	V.
Andrews, Hiram	Casks and barrel headings	XIV.
Angevine, Caleb	Water, pressing from clothes	XVII.
Arnold, J. and G. G. Bishop	Wool, hair, &c., forming web, &c	III.
Arnold, Wm. A.	Cooking stove	V.
Arnold, Albion P.	Washing machine	XVII.
Atherton, John	Wheel hubs	X.
Atkins, Ira	Mail bags, bolt for	XVI.
Austin, F. J.	Printing press, hand	XVIII
Averill, Isaac	Garden hoe	I.
Avery, William	Fuel, saw-dust	V.
Avord, Enos and Nelson	Lathe	XIV.
Baldwin, J. C.	Corn shelling	I.
Barnett, Ezra	Cutting scythe	I.
Baldwin, Cyrus B.	Hulling clover seed	I.
Barclay, Hugh	Thrashing machine	I.
Baily, J. and J. Sprinkle	Thrashing machine	I.
Bacon, Jonathan	Window spring, fastener	II.
Barnum, H. L.	Light and heat, generating	IV.
Barnum, D. B.	Heating water machines	V.
Baldwin, M. W.	Steam, generating	VI.
Bassett, Nathan	Compass, surveying	VIII.
Barker, J.	Blowpipe, for furnace	XI.
Baxter, Thomas	Hydrostatic press	XI.
Barton, Thomas C.	Pump, suction	XI.
Barrett, Jonathan F.	Packing flour	XII.
Badger, O.	Horse power, endless chain, &c.	XIII.
Babbet, Benjamin	Motion, reciprocating	XIII.
Batchelor and Thomas	Joint of wood work	XIV.
Babcock, Samuel F.	Mortising machine	XIV
Barker, Benjamin	Saw, belt for timber	XIV
Barker, B. K.	Saw-mill saw	XIV.
Bard & Heywood	Staves, sawing	XIV
Banks, James	Hides, unhairing	XVI
Barrett, Asa	Corn husks, slitting	XXII.
Belt, Chas. R.	Seeding, corn planter	I

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Beam, Michael	Seeding, cotton planter	I.
Bedee, Thomas	Thrashing Machine	I.
Beaumont, George	Thrashing Machine	I.
Beane, Jonathan	Winnowing Machine	I.
Bennett, James	Grates	V.
Beebe, Stephen	Wagon, tilting	X.
Bennett, Phineas	Saw-mills, dogs	XIV.
Beale & Bucklin	Slitting timber	XIV.
Bell, William H.	Cannon, traverse board	XIX.
Blair, Henry, (colored man)	Seeding, cotton planter	I
Blake, P. and E. W.	Locks, mortise	II.
Blackmar, John	Loom, harness for	III.
Blanchard, Thomas	Blocks, ship's, cutting sheaves, &c.	VII.
Blanchard, Thomas	Blocks, ship's, and dead eyes, &c.	VII.
Blanchard, Thomas	Blocks, ship's, finishing wooden sheaves	VII.
Blanchard, Thomas	Blocks, ship's, forming end pieces, &c.	VII.
Blanchard, Thomas	Blocks, ship's, forming or shaping, &c.	VII.
Blanchard, Thomas	Blocks, ship's, mortising, &c.	VII.
Blanchard, Thomas	Blocks, ship's, riveting plank, &c.	VII.
Blanchard, Thomas	Blocks, ship's, rounding edges, &c.	VII.
Blanchard, Thomas	Blocks, ship's, tackle, &c.	VII.
Blanchard, Thomas	Dead eyes, &c.	VII.
Blanc, Jean	Marsh drainer	IX.
Black, G. W	Saw-mills	XIV.
Blodget, Sherburne C.	Boots, tucking machine	XVI.
Boyden, Benjamin F.	Hoe, cast iron	I.
Boyd, George C.	Seeding, corn planter, &c.	I.
Boyden, Wm. P.	Iron and steel, making	II.
Boston & Bryant	Mineral water, soda fountain	IV.
Bond, Daniel H.	Shoe, over	XVI.
Briggs & Carpenter	Cutting and thrashing	I.
Brown, Eleazer	Thrashing machine	I
Brainard, M. M.	Gouges, making	II.
Brockway, J.	Spoons, silver, mill	II.
Brooks, Adam	Silk, winding	III.
Brooks, Adam	Silk, winding, &c.	III.
Brayton, William P.	Spinning cotton	III.
Brown, Valentine	Canals, locks, gates	IX.
Brown, Valentine	Canals, locks, indicator	IX.
Brown, William F.	Water wheel	XI.
Bridewell, E.	Saddles, side	XVI.
Brown, William	Trunks, valises	XVI.
Burt & Carriel	Rags, dusting	III.
Burgess, William	Fire-place	V.
Buck, Reuben	Fire-place	V.
Burt, William A.	True meridian, finding	VIII.
Bucklin & Jacobs	Tunneling rivers	IX.
Burkhyte, Tunis, J.	Shingle machine	XIV.
Buzell, John D.	Granite, cutting and dressing	XV.
Buckland, Charles	Corsets, rings, &c.	XXI
Carpenter, Warren	Corn, hulling	I.
Carpenter, Warren	Corn, sheller	I
Cannon, William P.	Plough	I.
Campbell, William	Awl haft	II.
Calvert, William W.	Wool or flax, comber	III
Carmichael, William M.	Stoves	V.
Campbell, H. R.	Steam engine, locomotive	VI
Carpenter, F.	Steam engine, rotary	VI.
Carr, Job	Steam, generating	VI.
Capron, O. H., and G. Barton, jr	Sulky seat	X.
Card, Charles V.	Pump, frictionless	XI.
Carey, William	Saw, belt	XIV.
Callihan, Otho W. S.	Saddles	XVI.
Camp, Hezekiah	Printing press	XVIII.
Chandler & Ranger	Plough	I.
Chaffee, E. M.	Caoutchouc, application, &c.	IV
Chapin, Nathan	Pump, forcing	XI

PATENTEES.	INVENTIONS OR DISCOVERIES	CLASS.
Chamberlain & Cleffin	Press, hay	XII.
Chevrier, Lewis	Power, endless chain, &c.	XIII.
Channel, J. C.	Mortising machine	XIV.
Chapman, George W.	Cannon, malleable iron	XIX.
Cleaveland, Porter	Thrashing machine	I.
Clark, Henry	Gin, cotton	III.
Close & Sanford	Extracts, making	IV.
Clark, Edward	Lead, white	IV.
Clowes, Isaac	Fire, extinguishing	V.
Clark, Aaron	Steam engine, rotary	VI.
Clark, David	Mortising machine	XIV.
Clark & Boynton	Stone, cutting and planing	XV.
Clark, Samuel	Bedstead, cot	XVII.
Clark, Isaac	Piano forte	XVIII.
Concklin, John C	Harrow, press	I.
Cole, Lewis	Hulling rice	I.
Cooper, James	Thrashing machine	I.
Cockran, J.	Andirons, bars	II.
Coover, William	Latch, mortise	II.
Conant, Abel	Lock, door	II.
Couillard, S., jr.	Flax and hemp, &c., combing	III.
Comins, John P.	Loom, power, and taking up motion	III.
Couillard's, S., assignees	Wool, combing	III.
Cooper, Peter	Salt, supplying	IV.
Cochran, R. G.	Cooking stove	V.
Cochran, John	Propelling paddles for boats	VII.
Cook, Tobias	Raising vessels	VII.
Coleman, Spencer	Axletrees for carriages, &c.	X.
Coster & Pennypacker	Horse power	XIII.
Coppuck, James	Brick, moulding	XV.
Coston, Benton P.	Feathers, dressing	XVII.
Cochran, John W.	Cannon, vent	XIX.
Colt, Samuel	Fire-arms	XIX.
Cram, H.	Screws, cutting wood, &c	II.
Cralle, Richard K.	Salt, manufacturing	IV.
Cram, Smith	Breakers, cylindrical	X.
Cram, Smith	Car, taking over elevations	X.
Crim, Peter	Saddles, spring	XVI.
Currier, E. G.	Cooking stove	V.
Currier, E. G.	Cooking stove	V.
Curtis, James F.	Spark catcher	VI.
Curtis, Lorrain	Planing machine	XIV.
Dalkener, John	Plough	I.
Davis, William	Ores, screening and washing	II.
Day, Moses	Spinning hemp, &c.	III.
Daboll, Ezekiel	Stoves, foot	V.
Dawley, A. S	Steam engine	VI.
Davis & Ashdown	Car, rail-road	X.
Davis, Sampson	Pumps, vibrating	XI.
Davis, Luther	Washing machine	XVII.
Davidson, Amory	Washing machine	XVII.
Darling, B. and B. M.	Pistols	XIX.
Dennison, Rufus	Smut machine	I.
Dexter, George B.	Hats, water-proof, silk	III.
Debit, William	Rags, cleaning	III.
Deitz, A.	Harness pad, elastic water-proof	XVI.
Douglass, Beriah	Cooking stove	V.
Douglass, Beriah	Stoves, parlor	V.
Dunlap, Jefferson	Candles, moulds	IV.
Dunham, Isaac	Lamps, light-house burner	V.
Duff & Murphy	Valve, puppet, raising	VI.
Dukehart, William	Harness, riveting	XVI.
Duchman, William	Saddles, spring	XVI.
Durell, H.	Combs, metallic	XXI.
Drummond, John	Cutting grass	I.
Eastman, J. S.	Cultivator	I.
Echols, James H.	Cordage, rope yarns, &c.	III.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Edgar, H. and J. W.	Thrashing machine	I.
Eddy, W. T.	Spinning, spindle and flier	III.
Edgar, Isaac W.	Steam engine, locomotive and rail-roads	VI.
Egbert, Benjamin	Pump, forcing	XI.
Elgar, William L.	Water wheel	XI.
Emery, Laban	Tanning	XVI.
Eagle, Robert	Smut machine	I.
Etheridge, Samuel	Mill stones, picks	XIII.
Everett, Joseph	Straw cutter	I.
Farlee, John	Plough	I.
Fanning, William	Cordage and rope	III.
Ferguson, J. C	Plough, wheel	I.
Fickhardt, F. A.	Furnaces, for warming buildings	V.
Fickhardt, F. A.	Stoves	V.
Fitzpatrick, Edward	Boats, to be used under water	VII.
Fitzgerald, Daniel	Horse power	XIII.
Fitzgerald, Daniel	Horse power	XIII.
Fitzgerald, Richard	Shears, tailors'	XXI.
Flanders & Rathburn	Winnowing wheat	I.
Flint & Mills	Gypsum, applied to cisterns	IV.
Fletcher, John C.	Lamps, reflecting	V
Flint & Mills	Gypsum, applied to cisterns	XV.
Forbes, Charles	Paper making	III.
Fowler, William	Spinning, roping, cotton	III.
Force, Clark	Wheels, confining carriage to	X.
Fowler, De Grasse	Gimlet, forging	XIV.
Fowler, Wm. M	Gimlets, &c.	XIV.
French, Maynard	Stoves, rotary caps, &c.	V.
Freytag, Michael	Ice breaker	VII.
Frazier, Blanchard and Gill	Stoves	V.
Frink, Harvey	Gate flume	XI.
Freeman, S. H.	Regulating speed wheel for grist mills	XIII.
Garnett, James M	Cultivator	I.
Garrett, Samuel	Water wheel	XI.
Gay, Ira	Planing machine	XIV.
Garrand, Britain	Bedbug, destroying	XVII.
Gerrish, Daniel	Constructing vessels	VII.
Gerrish, Wm.	Grist mill, for cutting	XIII.
Gentry, Joseph C.	Mill, metallic	XIII.
Gerrish, Daniel	Saw, mills	XIV.
Gerrish, Wm.	Boots, crimping legs	XVI.
Geer, John S.	Washing machine	XVII.
Gibbs, Joshua	Plough	I.
Gilman, Elias	Ointment for cancer	IV.
Giraud, John J.	Grates, cooking	V.
Gilbert, Charles G.	Horse power	XIII.
Giraud, J. J.	Power, self-motive	XIII.
Goodyear, John	Thrashing and cleaning cloverseed	I.
Goldsborough, Nicholas	Thrashing machine	I.
Greening, Frederick	Hats, palm leaf	III.
Gould, Aaron	Dying hats	IV.
Goody, Samuel	Saw mills	XIV.
Gordon, Edwin	Cannon for chain shot	XIX.
Goodrum, Thomas	Stock for neck	XXI.
Gray, Albert W.	Corn sheller	I.
Greenleaf, Wm. C.	Cutting grass	I.
Granger, John L.	Milk, preserving	I.
Greenleaf, Wm. C.	Seeding grain, sowing	I.
Greenleaf, Daniel	Hats, elastic, ventilating	III.
Granger, Chester	Cooking stove	V.
Gray, James A.	Coffins, metallic	XXII.
Guyon, H. G.	Press, lever	XII.
Hanson, Amos	Churn	I.
Haynes, Richard	Bolt and spike, drawing	II.
Harrington, Daniel	Fire-proof, safe	II.
Hall & Chase	Window shutter, fastening	II.
Harrison, Alexander	Furnaces and boiler combined	V

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Harryman, John	Stoves, Franklin	V.
Hant, Samuel	Water conveying	XI.
Harman, John, jr.	Mill	XIII.
Hawkins, John	Mortising machine	XIV.
Hawk & Keyes	Shingles, dressing	XIV.
Hamilton, James	Veneers, cutting	XIV.
Halloway, Gooding	Brick machine	XV.
Hale, Ebenezer	Saddles and collars	XVI.
Hall, J.	Shoe making machine	XVI.
Hatcher, J. W.	Cutting apples, &c.	XVII.
Hall, Daniel K.	Feathers, cleaning	XVII.
Hartye, H.	Piano forte	XVIII.
Harrison, T. H.	Lancet, revolving	XX.
Hanson, Moses R.	Tooth extractor	XX.
Hedges, Isaac A.	Corn sheller	I.
Hendrick, H.	Loom, power, and taking up motion	III.
Heintzelman, J. J.	Stoves, air warmer	V.
Hendricks & Elwell	Stoves and fire-place	V.
Hess, David	Raising water by weight	XI.
Hedge, Lemuel	Plane, revolving	XIV.
Heath, Simeon	Tanning	XVI.
Henkel, Ambrose	Cutting sausage meat	XVII.
Hibbard, H.	Paint, composition	IV.
Higgins, Charles	Cooking stove	V.
Hinds, Ball & Pike	Water, applying	XI.
Hitchcock, Wm.	Water wheel	XI.
Hill, Jonathan	Boot and shoe soles, cutting	XVI.
Hopper & Doughty	Hulling cloverseed	I.
Howe, H. P.	Paper, cylinders for drying	III.
Howe, Henry	Paper drying	III.
Holland, Homer	Lead, white	IV.
Howard, John C.	Grates, sliding	V.
Hotchkiss, Gideon	Propelling boats, &c.	VII.
Houston, J. A. Hinman, and J. Ingraham	Dock, dry	IX.
Horne, David	Hydrants	XI.
Horton, John	Balance, platform	XII.
Hobbs, Jonathan, jr	Shingles, &c., sawing	XIV.
Hopkinson, John	Harness, horse collars	XVI.
Hubbard, J. M.	Beehive	I.
Hull, Alonzo G.	Wrench, screw	II.
Hungerford, Newell	Springs, carriage	X.
Hunt, Walter	Saw for felling trees	XIV.
Hubbard, Joab H.	Washing machine	XVII.
Hyde, James	Straw cutter	I.
Ingham, John	Steam engine, rotary, reacting	VI.
Ives, Joseph	Clocks	VIII.
Ives, James S.	Spring for clocks	VIII.
Ives, Richard A.	Combs, metallic	XXI.
Jackson, Samuel	Churn dash	I.
Jemeson, W. W	Hats, blocking	III.
Jennings, Isaiah	Turpentine, spirits, extracting	IV.
Jennings, Isaiah	Lamps	V.
Jennings, Isaiah	Steam, generating	VI.
Jenkins, Elias	Cider mill	XIII.
Jenkins, M.	Saddles, ladies'	XVI.
Jones, William R.	Drills for metal	II.
Jones, J. T.	Plane	XIV.
Johnson, Herkimer	Shaving leather	XVI.
Johnson, George	Kitchen ranges	V.
Jones, Adrian	Stoves, anthracite coal	V.
Keane, William	Screw, manufacturing	II.
Kelsey, Mellville	Wire cap	II.
Keith, Edwin	Gin, cotton, grates	III.
Kettell & Wright	Hats, bodies, stiffening	III.
Kerr & Hoover	Distilling	IV.
Kendall, Jonas, assignee of J. Perkins	Cooking stove	V.
Kepner, Samuel	Rudders	VII.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Kenzie, Charles	Water wheel	XI.
Keller, Charles M	Staves, sawing	XIV.
Keplinger, Samuel	Feathers, dressing	XVII.
Kile, Conrad	Loom, weaving stocks	III.
Kidder, Levi	Cement, hydraulic	IV.
Kidder, Levi	Wells, covers of	XI.
King, Sumner	Casks, machine	XIV.
Kingsley, J. Lemuel	Printing press	XVIII.
Knapp, Lewis	Buildings, constructing	IX.
Knight, Isaac	Buildings, stores, &c.	IX.
Knowles, Hazard	Power, alternate motion, by contraction and expansion of metals	XIII.
Knisely, Christian	Bedsteads	XVII.
Knowlton, F. P.	Feathers, dressing	XVII.
Korn, Henry	Harness, nets, fly, for horses	XVI.
Kraft, Benjamin	Saddles	XVI.
Kugler, Benjamin	Furnace, blast	II.
Lamson, S	Cutting scythe	I.
Lapham, Benjamin	Loom, power	III.
Ladd, Samuel	Spinning, fliers	III.
Ladd, Samuel	Spinning, fliers	III.
Lacier, Sebastian H	Cooking stove	V.
Ladd, C. P	Balance, platform	XII.
Laughlin & Hill	Rolling leather	XVI.
Larcum, Amos	Washing machine	XVII.
Leonard, William B	Loom, power	III.
Lewis, R. B.	Oakum and hair picking	III.
Lear, Asahel	Cooking stove	V.
Lewis, Lovell	Heat, evolution and management of	V.
Lesner, W. W	Pump, forcing	XI.
Liversidge, W. and T.	Starch, rice	IV.
Liddle, John	Cooking stove	V.
Little, James H	Washing machine	XVII.
Locklin, Nathan	Plough	I.
Loomis, Wm	Thrashing cloverseed	I.
Lockling, Nathan	Smoke, consuming	V.
Lombard, Nathaniel K.	Maps, charts, &c., apparatus for	VIII.
Long, Stephen H	Bridges, frame	IX.
Lochier, Henry	Tanning	XVI.
Lounds, Jacob J.	Pencil, ever-pointed, open case	XVIII.
Lyon, 2d. L	Hats, napping	III.
Lyman, Charles	Cooking stove	V.
Marshall, Mallory M	Straw cutting, box	I.
Mans, Lewis H	Thrashing machine	I.
Manning, James	Winnowing clover seed	I.
Mathews, James	Fire-proof chest	II.
Mans, L. H	Patterns for casting	II.
Marsh, Stephen	Napping cloth	III.
Mackie, Patrick	Caoutchouc, dissolving	IV.
Mayo & Mills	Ventilating houses	V.
Man, Arlon	Condensing cotton	XII.
Marsh, Elias	Crane	XII.
Mathews, James	Chocolate, moulding	XIII.
Marvin, Dudley	Horse power	XIII.
Martz, P. M	Planing machine	XIV.
Matthews, M	Boots, trees	XVI.
Maguire, Jonas	Bedsteads	XVII
Masser & Smith	Cutting meat	XVII
Marsh, Johnson	Lock, gun and pistol	XIX.
McClory, James	Lock, door	II.
McClory, James	Lock, door	II.
McCreight, W. & J	Gin, cotton	III.
McCreight, James	Gin, cotton	III.
McWilliams, Alexander	Stoves for heating carriages	V.
McDonough, A	Spark catcher	VI.
McCausland, A. jr	Valve, slide	VI.
McCain, A. M	Rail-road, plates, jointing	IX.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
McLean, A. M	Press, tobacco	XII.
McCreight, W. and J.	Grist mill	XIII.
McGhee, W. J	Saw mills	XIV.
McGregory, Cyrus	Staves, sawing for barrels	XIV.
McCormick, William	Saddles, elastic	XVI.
McBride, Andrew R.	Saddles, trees	XVI.
McLaughlin, Ira	Bedstead fastenings	XVII.
Merriman, Charles	Churn	I.
Merriman, Samuel G.	Saw teeth, cutting	II.
Merriman, Marcus, jr.	Window fastening	II.
Mellish, Henry	Wagon, hanging	X.
Mercer, Carey S	Water wheel	XI.
Mendall & Ricketts	Moulding pottery	XV.
Mellish, Henry	Cutting vegetables	XVII.
Merriman, Charles	Washing machine	XVII.
Miller, Timothy	Plough	I.
Mix, William	Spoons, casting	II.
Milo, Francis	Spark catcher	VI.
Mixwell, Abner T.	Pumps	XI.
Mitchell, J.	Press, cotton	XII.
Moore & Hascall	Cutting grain, &c.	I.
Mott, Jordan L.	Columns, cast iron, &c.	II.
Montgomery, Adam	Cordage, rope, serving	III.
Morse, John	Spinning fliers	III.
Morgan, John	Spinning machine	III.
Mott, Jordan L.	Stoves and fire place	V.
Morse, Andrew	Capstan	VII.
Moffatt, John	Brick machine	XV.
Morse, William	Granite, hammering, &c.	XV
Moody & Eastman	Beds, spring, spiral	XVII.
Morrison, Samuel	Lock, gun	XIX.
Mudge, Abraham	Smut machine	I.
Musten, Joseph	Horse power	XIII.
Murry, James	Saw mill, endless side chain, &c.	XIV.
Naylor, T. B	Saw mills	XIV.
Neal, Henry G	Corn sheller	I.
Newton, Levi	Pump, forcing	XI.
Newton, Samuel	Horse power	XIII.
Newton, William	Washing machine	XVII.
Newman, F. H	Truss	XX.
Newson, John W	Truss	XX.
Neill, Thomas	Traps for rats	XXII.
Nicholson, Thomas	Churn	I.
Nivens, W. R.	Crackers, cutting and rolling	XVII.
Nott, Eliphalet	Steam, generating	VI.
Noble, Philander	Propelling boats	VII.
Noble, James W	Trunks, valises, &c.	XVI.
Olmstead, L. B.	Baker, reflecting	V.
Orr, Isaac	Stove, air tight	V.
Parsons, Aaron	Thrashing machine	I.
Page, George	Bit, spiral, &c.	II.
Parke, Charles	Cordage, rope, serving	III.
Paree, J. & N.	Pearl ash	IV.
Parmalee, Howell	Stoves	V.
Park, Moody	Boilers, steam, purifying water	VI.
Pardie, William	Time piece	VIII.
Parker, Obadiah	Sewer of hydraulic cement	IX.
Page, George	Mortising machine	XIV.
Page, George	Mortising and boring machine	XIV.
Page, George	Mortising timber	XIV.
Perry, P. F	Cooking stove	V.
Peckham, Charles W	Faucets, molasses	XI.
Peck, James M	Balance, platform	XII.
Peckham, C. W	Coffee mill	XIII.
Pell, John B	Boring wood	XIV.
Peeler, David	Lathe, gripe chuck for	XIV.
Peevy, Joseph	Sawing machine	XIV.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Peavy, Joseph	Screws, cutting wooden	XIV.
Pethick, John	Piano-forte	XVIII.
Philbrick, John	Cotton, drying, &c.	I.
Phillips, Alonzo D	Matches, friction	IV.
Pitts, Harvey W	Plough	I.
Pierson, J. H	Screws, cutting, &c	II.
Pierson, J. H	Screws, cutting, &c	II.
Pitts, J. A	Ovens, heating rooms	V.
Pickering & Lightner	Car, rail-road, &c	X.
Pinno, Joseph, Jr	Sawing wood	XIV.
Pierce, Hubbard L	Boots, crimping, cramp for	XVI.
Plank, Jacob	Plough	I.
Platt, Alonzo	Lamps, hanging	V.
Poague, J. B. and W. F	Hulling clover seed	I.
Pollard, Samuel	Ovens	V.
Porter, Rufus	Distance, measuring	VIII.
Pope, Josiah	Cooler, flour	XIII.
Porter, Rufus	Horse power	XIII.
Pomeroy, E. G	Boots, crimping, clumps for	XVI.
Post & Collier	Feathers, renovator	XVII.
Pomeroy, E. M	Razor case and sharpener	XXI.
Prouty & Mears	Plough	I.
Pratt, Jonas	Smut machine	I.
Prutzman, Augustus	Locks, &c	II.
Pratt, Elisha N	Cooking stove	V.
Prescott, William R	Fireplace	V.
Pray, John G	Wharves, &c., constructing	IX.
Prince, L. R	Washing machine	XVII.
Pursell, John	Hemp, breaking	III.
Putnam, J. and C	Wheels, boxes, &c	X.
Quimby P. B	Locks	II.
Rathburn & Tinker	Saw, straightening	XIV.
Rathburn, Erastus	Saw mill, blocks for	XIV.
Ralph, Joseph	Syringe, injecting	XX.
Reading, Pierson	Hulling cotton seed	I.
Reoff, Almon	Lock, door	II.
Reading, Pierson	Gin, cotton	III.
Reed, Nathan	Rail-road	IX.
Read, Isaac	Saw mills	XIV.
Reynolds, George	Feathers, dressing	XVII.
Richardson, Samuel	Smut machine, and hulling	I.
Richardson, J. S	Door plates	II.
Richardson, Charles	Forge, blacksmith,	II.
Richards, Joseph	Lead, white	IV.
Ripley, Ezra	Stove pipes	V.
Ring, Zebedee	Dock, hydraulic	IX.
Richards, Edward	Drawing knife	XIV.
Riker, Rufus	Saw mill, cross cutting	XIV.
Rich, Martin	Saw mill dogs	XIV.
Roberts, Hezekiah	Churn	I.
Robbins, Hildreth	Hulling clover seed	I.
Root, Erastus S	Rake, horse	I.
Rollins, Jacob S	Thrashing machine	I.
Root, Elisha K	Axes	II.
Rouse, James	Hinges, butt	II.
Robinson, Draper & Lord	Knobs, glass, &c	II.
Robinson, Draper & Lord	Knobs, glass, &c	II.
Rood, Reuben	Sores, curing	IV.
Robertson, Robert	Stoves, conical	V.
Rogers, James H	Tire for wheels	X.
Rodgers, Jno. F	Pump, forcing	XI.
Robbins, Austin H	Cutting vegetables	XVII.
Ruggles, Henry	Pitch, making	IV.
Russell, Nathaniel	Stoves	V.
Ruggles, John	Steam engine, locomotive, for inclined planes	VI.
Russell, Sylvanus	Excavating from rivers	IX.
Ryan, W. B	Smut machine	I.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Sanborn, Benning	Boats and rafts, passing, &c	VII.
Sanders, James	Saw mills	XIV.
Sadler, Thomas N	Boots, machine for turning, &c	XVI.
Salisbury & Uram	Mattresses, bolsters, &c	XVII.
Schmutman, Isaac	Glasses for spectacles	VIII.
Scholfield, Nathan	Water wheel, &c., regulating, &c	XI.
Shull, N. J	Cultivator or hoe harrow	I.
Shugert, John	Tew iron	II.
Shly, John	Picking and breaking wool	III.
Sherman, Thomas H	Pitch, composition	IV
Shaw, Thomas	Cooking stove	V
Shultz, William	Spark catcher	VI.
Share, Philip T	Wheels, horse, detaching	X
Sherwood, Gilbert	Crane	XII
Sheaffer, Christian	Cider mill	XIII.
Shaw, Erastus M	Mortising machine	XIV
Shackford, D. and T	Dough machine	XVII.
Sizer, A. and George	Gridiron and spider	V.
Skinner & Kead	Straw cutter	I.
Skinner, Elijah	Fire place	V.
Skinner, Richard	Horse power	XIII.
Smith, Ira	Corn shelling	I.
Smith, David M	Awl haft	II.
Smith, Benjamin	Lock, door	II.
Smith, Elihu	Chimneys ovens, &c	V.
Smith, Nicholas	Cooking stove, and parlor	V.
Smith, Jno. K	Car, door fastening	X.
Smith, Elihu	Laths, machine	XIV.
Snider, Isaac	Plough	I.
Snyder, Benjamin F	Saw mill crank	XIV.
Soule, John	Veneers, laying on ogee, &c	XIV.
Souder, Henry	Washing machine	XVII.
Spafford, M. B	Smut machine	I.
Spear, E. P	Hats, bodies, stiffening	III.
Spalding, S. B	Cooking stove	V.
Stoker, Elijah	Saw, filing teeth of	II.
Stowell, Isaiah	Fermenting and distilling spirits	IV.
Stevens, Foster	Fireplace or stoves	V.
Strong, Eben B.	Ovens, baker	V.
Strange, J. W. and E	Boilers, steam	VI.
Stoddard, James S	Anchor, cast iron	VII.
Straub, Abraham	Water wheel	XI.
Straub, Isaac	Horse power	XIII.
Stevens, Peletiah	Boots, turning	XVI.
Sutton, J. and J	Stone cutting	XV.
Swartz, Peter, Jr	Distilling	IV.
Swainzey, Jno. H. B	Stoves	V.
Swift, Beriah	Dye woods, cutting and shaving	XIV.
Sweetzer, Washington	Trunks, travelling	XVI.
Sykes & Conradt	Spinning wool	III.
Tarbox & Kneeland	Straw cutter	I.
Talbot, Jno	Rail-road turn out	IX.
Taylor, Antin	Mill stones, cooling	XIII.
Taylor, Jeremy	Bit stocks	XIV.
Terrell, S. R	Blood, equalising the	IV.
Terry, Stephen	Packing screw, inverted	XII.
Thomas, Jno. E	Churn	I.
Thompson, Samuel	Medicine, botanic	IV.
Throp, Gould	Cooking stoves,	V.
Thompson, R. H	Pegs, shoe	XIV.
Thomas, Robert S	Saw, rotary	XIV.
Thomas, Enoch	Splints for fractures	XX.
Thompson, Isaac	Truss for hernia	XX.
Tilford, T. M	Plough	I.
Tiers, Arunthus	Furnace, smelting	II.
Titus, B. and A	Cooking stove	V
Tippet, Edward D	Steam engine, safety	VI.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Tichenor, J. S. Goodridge, and J. A. Hart	Fence, Pickets, cutting	XIV.
Town, J. T	Smut machine	I.
Towne, J. T	Water wheel	XI.
Todd, Billy and Alanson,	Feathers, dressing	XVII.
Town, Abner	Stock, gun, lathe for	XIX.
Traver, P. C	Cooking stove	V.
Treadwell, F. C	Ovens, heating by anthracite	V.
Trask, Samuel	Ice cutting machine	VII.
Treadwell, Ephraim	Crackers and biscuit, cutting	XVII.
Turney, Andrew	Drilling stone	IX.
Turner, Joseph	Raising water	XI.
Turk, John	Mill wheel, dresser	XIII.
Tuells, Melzer	Planing machine	XIV.
Tyler, Samuel	Churn	I.
Ulam, David	Steam engine, rotary	VI.
Underwood, Stephen	Boats, passing over dams	VII.
Variel, Davis	Churn	I.
Van Tiers, S	Anvil block	II.
Vale, Charles	Cooking stove	V.
Van Allen, C. D	Ovens, reflecting	V.
Vaughn, Jirah	Balance	XII.
Walker, Wm. B	Yarn, woollen	III.
Waite, G. W	Heating chocolate ingredients	V.
Wade John	Sails for ships, &c	VII.
Walker, S. T	Hydrants	XI.
Walker, S. T	Hydrants	XI.
Walker, J. F	Pumps	XI.
Waldo, Orson	Water wheel	XI.
Walker, Jeremiah	Lever power, sawing, &c., by	XII.
Waite, Geo. W	Chocolate, grinding	XIII.
Washington, David	Saw mills	XIV.
Waterman, Calvin	Brick machine	XV.
Warner & Robinson	Harness, horse, collars, &c	XVI.
Watson, E. Y	Washing machine	XVII.
Walston, Samuel	Thigh, fractured, apparatus for	XX.
Warner, Ransom	Suspenders, manufacturing, gum, &c	XXI.
Weeks, James M	Bee hive	I.
Webb, Jas. W	Rake, horse	I.
Webb, A. V. H	Distilling, cold	IV.
Wenn, Peter	Heat applying, from lime, &c	V.
West, Henry	Wagon, coaches, and breaks for	X.
Webb, Joshua	Sawing timber	XIV.
Wells, L. L	Sacking bottom	XVII.
Whittier, Simon	Churn	I.
Wharff, Amasa	Churn	I.
Whittaker, Welcome	Hinges, butt, &c	II.
Whiteman, J	Cordage, rope, making	III.
Whipple, Cullen	Loom, weaving	III.
White, John	Cement, hydraulic	IV.
Whiting, John	Cooking stove	V.
Whitney & Burr	Spark catcher	VI.
Whitman, Shepherd	Steam engine, rotary	VI.
White, Prentiss	Thimbles, ships	VII.
Whiteley, Francis	Compass, quadrant, &c	VIII.
White, John G	Pump, forcing, double	XI.
Whitfield, Edward	Pump, frictionless	XI.
Whitman, Wm	Horse power	XIII.
Whitley, Thomas W	Glass cases	XV.
Witherow, Samuel	Plough	I.
Wilson, David	Winnowing machine	I.
Wilkinson, Arnold	Polishing iron and brass wire for, &c	II.
Wilkinson, Jeptha A	Loom reeds, machine for making	III.
Withered, J	Spinning wool	III.
Williams, Elijah	Pot ash and pearl ash	IV.
Williams, Daniel	Cooking stove	V.
Winslow, Nathan	Grates, pendulum	V.
Williamson, James	Grates, portable	V.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Winter, Gabriel	Spark catcher	VI.
Wilkinson, David,	Canals, locks	IX.
Williams, John S	Roads, constructing	IX.
Wingate, Frederick	Water wheel	XI.
Wilder, Aretas A	Water wheel, propelling	XI.
Wilbur, Job	Wind wheel	XI.
Willard, Simon	Saw mills	XIV.
Williams, Daniel	Tanning, bark for	XVI.
Wilbur, Elam	Feathers, dressing	XVII.
Withers, Henry	Pencil case and pen	XVIII.
Willard, James H	Bones, setting, apparatus for	XX.
Woodcock, B	Plough	I.
Wolfolk, Jas. M	Straw cutter	I.
Woodward, Clement	Stoves, ventilating	V.
Woolley Williams	Window frieze and covering	IX.
Woodbridge, William	Wheels, cart and carriage	X.
Wood, Jesse C	Raising water	XI.
Woodworth, William	Planing machine	XIV.
Wood, Andrew	Chairs, easy	XVII.
Wright, Isaac S	Straw cutter	I.
Wright, John	Distilling, still for	IV.
Wyman, Oliver	Grist mill,	XIII.
Zwisler, James, Jr	Tailoring art of	XXI.

[I.]

CLASSIFIED LIST OF PATENTS,

GRANTED DURING THE YEAR 1850, WITH THE NAMES OF PATENTEES, PLACES OF RESIDENCE AND DATES OF PATENTS.

CLASS I.—AGRICULTURE, *including Instruments and Operations.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bee hives, entrance to	John E. Dalton and Thomas Stevens	New Vienna, O	April 9, 1850
Bee hive, working the doors of a	Jarvis Case	Selma, O	Nov. 19, “
Bee moth traps	George Fletcher, sr.	Greensburg, Ind	Mar. 26, “
Churns	Zenas C. Robbins	St. Louis, Mo	Jan. 8, “
Churns	Robert W. Davis	Rodgersville, N. Y.	April 2, “
Churns	John Andrews	Woburn, Mass	April 23, “
Churns, atmospheric	John Young	West Galway, N. Y.	Jan. 22, “
Churns, atmospheric	Simon F. Emerson	Canaan, O	April 2, “
Churns, atmospheric	Peter F. Ellicott	Philadelphia, Pa	June 25, “
Churns, atmospheric	John O'Neil	Xenia, O	July 30, “
Churn dashers	Isaac D. Garlic	Lyons, N. Y	Feb. 26, “
Churn dashers	Nathaniel Routzahn	Middletown, Md	Mar. 19, “
Churn dashers	Joseph Marsh	Petersburg, Ill	July 30, “
Churn dashers	Robert S. Sherman	Napanock, N. Y	Aug 6, “
Churn dashers	William and Matthew C. Walker	Lancaster, Pa	Aug. 6, “
Churn dashers, spiral	Cornelius R. and John Hight	Geneva, Ill	July 9, “
Churn dasher, working a rotary and vertical	William R. Nash	Bridgeport, Conn	May 7, “
Churns, rotary	Osbert B. Loomis	Windsor, Conn	Apr. 2, “
Clevises, plough	John B. Stoner	Southampton, Pa	Sept. 10, “
Clevis, plough	Gerrett Erkson	Hobart, N. Y	Sept. 17, “
Clevis, substitute for the	John and Wm. D. Howell and Joseph Sipe	Clark co., O	Jan. 15, “
Cotton, picking from the bowls in the field	Saml. S. Rembert & Jedediah Prescott	Memphis, Tenn	Sept. 10, “
Cotton stalks, cutting in the field	Fields Bradshaw	Clinton, Ala	Feb. 12, “
Coulters to ploughs, fastenings of	Austin and Austin K. Whittlesey	Springport, N. Y	Sept. 22, “
Cream, processes of preparing	Charles D. Birdseye	New York, N. Y	Sept. 17, “
Cultivators	Ashley Crafts and Ebenezer Weeks	Auburn, O	Jan. 8, “
Cultivator teeth	Lewis Lamborn	Kennett Square, Pa	Mar. 26, “
Cultivator, weed cutters of a	Charles Rodger	Montpelier, Vt	June 25, “
Drills, grain*	William Bullock	Philadelphia, Pa	Jan. 8, “
Fanning mills	Jesse Roberts	Penn's square, Pa	May 28, “
Fanning mills	John Weidman	Littlestown, Pa	May 28, “
Fanning mills	Eleazer Bless	Minerva, Ky	Dec. 17, “
Forks, hay	Alanzor Clark	Southfield, N. Y	Oct. 8, “
Forks, hay and manure, fastening for	Alanzor Clark	Southfield, N. Y	Mar. 5, “
Forks, hay, shanks of	David Anthony, sr.	Springport, N. Y	Oct. 8, “
Grain cleaning machine	Geo. W. Bowers	Leitersburg, Md	Sept. 24, “
Grain cradle	Isaac T. Grant and Daniel H. Viall	Schaghticoke, N. Y	Oct. 15, “
Grain cradle fingers	Joel Houghton	Ogden, N. Y	Dec. 17, “

* Antedated Oct. 8, 1849.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Grain, machine for raking and binding	John E. Heath	Warren, O	July 22, 1850
Grain screens, rotary	Dan Pease, jr	Floyd, N. Y	Oct. 29, “
Harvester, cutters and rakes of a grain and grass	Hazard Knowles & Henry C. Bevington	Washington, D. C. Holmes, O	July 2, “
Harvester, arrangement of cutters in a grain and grass	Jacob Pierson	Wilmington, Del	July 2, “
Harvesters, grain	Ebenezer Danford	Geneva, Ill	Sept. 17, “
Harvesters, grain and maize	Edmund Quincy	Lacon, Ill	Oct. 8, “
Harvester, maize	William Watson	Chicago, Ill	Oct. 15, “
Harvesters, hemp	William B. Coates	Big Lick, Va	Oct. 15, “
Harvesters, rice	John J. Herndon	Bonneetsville, S. C	Oct. 1, “
Harvesters, cotton stalk	Stephen Bowerman	Detroit, Mich	Oct. 1, “
Harvesting machines	John E. Heath	Warren, O	Jan. 15, “
Hay, machines for raking and loading	Benj. M. Townsend	Quincey, Ill	April 9, “
Hullers, clover	Robert Staddon	Milton, Pa	
Hulling clover seed	Joseph Pollock, Allen R. McGriff, adm'r of the estate of	Richmond, Ind	Feb. 19, “
Manure, carts for spreading	Joel K. Holland	Washington, N. C	July 9, “
Manure, preparation of animal and other	Robert Hare	Philadelphia, Pa	Jan. 29, “
Mowing machines	Homer Adkins	Round Prairie, Ill	Jan. 15, “
Mowing machines, mounting the cutters of a	Geo. Hart	Dillsborough, Ind	Oct. 8, “
Planting barrows, seed	Chas. A. Wakefield	Essex co., N. Y	Feb. 19, “
Planters, seed	William B. Willis	Charlestown, Va	Jan. 22, “
Planter, seed	Chas. A. Wakefield	Essex co., N. Y	Feb. 19, “
Planter, cultivating, seed	Wm. Flory & Geo. Grove	Chambersburg, Pa	Mar. 12, “
Planters, seed	John P. Groshon	Yonkers, N. Y	Mar. 19, “
Planter, seed, the seed roller of a	Edward Wicks	Bart Township, Pa	Mar. 26, “
Planters, seed	George Fletcher, sr. and Turner Barnes	Greensburg, Ind	Mar. 26, “
Planters, seed, construction of drill teeth in	Levi Haverstick	Manor Top, Pa	April 2, “
Planters, seed, gearing for	Jacob Pierson	Wilmington, Del	April 9, “
Planters, seed, attachment of harrow to	Marcus & Silas S. Sage	Windsor, N. Y	April 16, “
Planters, seed, gearing of	Anthony Sandoe	Mifflintown, Pa	April 16, “
Planters, seed, seeding apparatus of	Lewis Moore	Bart, Pa	July 2, “
Planters, seed, seeding apparatus of	Sam'l & Morton Pennock	Kennett Square, Pa	July 9, “
Planters, seed, seeding apparatus of	Geo. Rohr	Charlestown, Va	July 16, “
Planters, seed	Edson Hart	New Albany, Ind	Aug. 6, “
Planters, seed, seeding, roller of a	Aaron Palmer	Brockport, N. Y	Sept. 10, “
Planters, seed	Sam'l Cannon	New Richmond, Pa	Nov. 12, “
Planters, seed	Sam'l & Morton Pennock	Kennett Square, Pa	Dec. 10, “
Planters, seed	Deeter B. Rhodes	Concord, N. Y	Dec. 10, “
Planters, seed	John Signer and Thomas N. Shipton	Kishacoquillas valley Pa	Dec. 10, “
Planters, seed	Joseph W. Fawkes	Bart, Pa	Dec. 17, “
Plants, machines for fumigating	David S. Brown	Surry, England	Sep. 27, “
Ploughs, corn	Robert J. King	Lancaster, Pa	Mar. 25, “
Plough and clevis	Ira Reynolds	West Liberty, O	Mar. 26, “
Plough cleaners	James F. Reasin	Darlington, Md	Apr. 9, “
Plough, corn, adjustable shares of	David Wolf	North Lebanon, Pa	Apr. 23, “
Plough cleaners	Daniel D. Gitt	Butler Township, Pa	May 7, “
Ploughs, gang	Joseph D. Hope	Philadelphia, Pa	June 4, “
Ploughs, hill side	Mark L. Chase, ass'or to Wm. L. Chase	Frankfort, Me. Boston, Mass	July 16, “ July 16, “
Ploughs, fastening the shoes of hill side	Wm. L. Chase	Boston, Mass	July 22, “
Plough cleaner	David Warren	Gettysburg, Pa	Sept. 10, “
Ploughs, spring beams to	William Morrison	Carlisle, Pa	
Ploughs, sub-soil	Wm. C. Pagett	Xenia, O	Oct. 22, “
Ploughs, gang	Henry Cowing	New Orleans, La	Nov. 26, “
Rakes, hay, spring teeth of	Zephaniah Breed	Ware, N. H	June 18, “

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Rakes, hay fastenings of	Orange W. Hogle	Somerset, N. Y.	Sep. 3, 1850
Rakes, horse	Alvan Hovey	Brookfield, Vt.	Feb. 12, "
Rakes, horse	Harry W. Sabin	Canandaigua	Dec. 3, "
Seed planters, sliders for	Robert J. Colvin	Lancaster, Pa.	Oct. 1, "
Seed planters	David Eberly	Strasburg, Pa.	Oct. 8, "
Seeding apparatus, gearing and ungearing	David Eberly	Strasburg, Pa.	Jan. 22, "
Seeding, apparatus for, seed planter	Gervis S. Gardner, ass'or to G. S. Gardner & G. Rohr	Charlestown, Va.	Oct. 8, "
Seeding cylinders, oscillating	David E. Rohr	Charlestown, Va.	Dec. 17, "
Straw carriers	Wm. Pierpont	Salem, N. J.	May 7, "
Straw cutters	Reuben Daniels	Woodstock, Vt.	July 2, "
Straw cutters	Isaac Woodward	Mechanicsburg, O.	Oct. 1, "
Straw cutters	A. S. Macomber	Bennington, Vt.	Nov. 5, "
Straw cutters, mounting the knife of	John R. Nelson	Knoxville, Tenn.	June 25, "
Straw cutters, feeders of a	John E. Erb	Baltimore, Md.	July 21, "
Straw cutters, feeding apparatus of	David Stiles, jr.	Middleton, Mass	July 16, "
Straw machines, for cutting	Harry Camp	Newton, Ga.	Aug. 27, "
Straw cutters, adjustment of knives in	Joseph W. Webb, ass'or to Benj. Gould	Aurora, N. Y.	Oct. 8, "
Straw cutters, feeding apparatus for	Henry W. Berthoif	Sugar Loaf, N. Y.	Oct. 22, "
Thrasher, clover, setting the teeth on the concave of a	Jonathan Hibbs	Bristol, Pa.	July 2, "
Thrashers, endless for	Adkins Nash	Logansport, Ind.	Apr. 9, "
Thrashing harvesters	Samuel S. Renfwert	Memphis, Tenn.	Mar. 26, "
Thrashing machines	A. S. Pelton	Clinton, Conn.	May 14, "
Thrashing machines	Elisha S. Snyder	Charlestown, Va.	June 11, "
Thrashing machine	Darius W. Harris	Yorkshire, N. Y.	Sept. 24, "
Thrashing, machine, and grain cleaners, endless aprons for	Ashley Townsend	Pavilion, N. Y.	Oct. 1, "
Tobacco, stems, curing—see class XXII			
Vegetable cutter	Reuben Daniels	Woodstock, Vt.	Oct. 1, "
Winnowing machines	Abraham Straus	Milton, Pa.	Jan. 15, "
Winnowing machines	J. G. Goshen	Shirleysburg, Pa.	Oct. 29, "

CLASS II.—METALLURGY, *and Manufacture of Metals and Instruments therefor.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Alloys for points of lightning rods—see class IV			
Amalgamator, reimmersing	Joseph R. Miller	Fredericksburg, Va.	July 2, 1850
Auger, handle	Gideon Sanford	Ellenville, N. J.	Oct. 1, "
Blast pipes, for conveying heated air and gases to furnaces	Ransom Cook	Saratoga springs, NY	Mar. 26, "
Blind and shutter opener and fastener	Jabez F. Lawrence and Luke A. Farnsworth	Claremont, N. H.	April 2, "
Blind and slat operator	David R. Williams	Prospect, Conn.	Mar. 19, "
Blowers, hydraulic, for furnaces, &c.—see class XI, "Hydraulic, &c."			
Bolts, rivets, &c., machines for heading	John Van Bocklin	Middleport, N. Y.	Aug. 20, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bolt and rivet machine	William E. Ward	Port Chester, N. Y.	July 30, 1850
Buckles—see class XVI			
Car wheels, apparatus for regulating the construction of	Samuel Truscott	Columbia, Pa.	July 16, "
Casting large kettles, metallic flask for	William Kelly	Edyville, Ky.	Dec. 3, "
Casting rolls, method of giving rotary motion to fluid iron in	John C. Parry	Pittsburg, Pa.	May 21, "
Castings, hollow, method of loosening metallic cores from	John C. Parry	Pittsburg, Pa.	Dec. 24, "
Cores for castings, composition for making	Edward Rees	Cincinnati, O.	Dec. 17, "
Cores for casting, machines for making and holding	Luther H. Crocker	Cincinnati, O.	Oct. 22, "
Cutters, machines for forming rotary	Andrew Jennings	Fall River, Mass.	Mar. 26, "
Door spring	Amos Westcott	Syracuse, N. Y.	Oct. 1, "
Door springs, adjustable cord hook for	William B. Barnard	Bristol, Conn.	Mar. 5, "
Door springs and levers, arrangement of	William B. Barnard	Bristol, Conn.	April 9, "
Drilling machine, self-acting adjustable feed gear for	Allen R. Morrill and Hiram Baldwin	Nashville, N. H.	Aug. 27, "
Eaves, trough and gutter machine	John Lee	Wellsville, O.	Oct. 8, "
Eylets, machine for making	Lucien E. Hicks, ass'nor to Wm. A. Churchill and James Stanley	Berlin, Conn.	Dec. 17, "
Fastener and mover, blind and shutter	Wm. Maguire	Cincinnati, O.	Jan. 1, "
Fasteners, and window shutter openers, method of bolting in	Samuel B. Snedaker	Cincinnati, O.	Feb. 12, "
Fastener, combined shutter and sash	Thomas Harvey	Baltimore, Md.	April 16, "
Fastener, sash	William H. Lazell	Hartford, Conn.	Dec. 17, "
Gold, bullion, process of reducing	Richard S. McCulloh	Princeton, N. J.	Sep. 24, "
Gold, machine for beating	Wm. Vine and James H. Ashmead	Hartford, Conn.	Aug. 6, "
Gold, processes for amalgamating; see class IV			
Gold, process for refining	James C. Booth	Philadelphia, Pa.	Sep. 24, "
Gold washer, cylinder and trough	Thomas M. Collins	Marion, Ark.	May 14, "
Gold, washers, method of constructing the sections of	Russel Burton	Rome, N. Y.	Mar. 26, "
Gold washing, double acting rocker for	Arnold Buffum and Philip Thorpe	New York	Oct. 1, "
Hammer, direct action, steam	John H. Towne, ass'nor to S. V. Merrick	Philadelphia, Pa.	Sep. 3, "
Hammer, forge, attachment of the to its helve	Daniel Hicks	Duncansville, Pa.	April 2, "
Horse shoe, machinery	Samuel S. Greene	Lowell, Mass.	Nov. 12, "
Iron, coating with copper or its alloy	Ebenezer G. Pomeroy	St. Louis, Mo.	Jan. 8, "
Iron, wrought, method of making directly from the ore	Alexander Dickerson	Newark, N. J.	July 22, "
Jack, chains, machine for making	Charles Atwood and Geo. Kellogg	Birmingham, Conn.	Nov. 12, "
Knives, spiral, machine for grinding	Silas Stevens, ass'nor to Geo. Forbes	E. Brookfield, Mass.	May 21, "
Lathe for turning a peculiar species of curve	Henry G. Thompson	New York, N. Y.	Apr. 23, "
Lock, bolt for shutters	Joseph Nock	Philadelphia, Pa.	July 2, "
Locking, portable safes to the floor—see class XXII			
Lock, revolving plate and tumbler	Lewis Jennings	New York, N. Y.	April 2, "
Locks, prison, attachment of	Edward Kershaw	Boston, Mass.	July 30, "
Metal, sheet, &c., machine for cutting	Stephen P. Ruggles	Boston, Mass.	Aug. 20, "

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Metal, sheet, machinery for cutting and bending	Joseph F. Flanders	Newburyport, Mass.	Dec. 17, 1850
Nail plate, feeder and turner	Melville Otis	E. Bridgewater, "	Dec. 3, "
Nail plate, machines for feeding	Frederick J. Ayers	St. John, N. B.	Nov. 26, "
Nails, method of making by rolling*	Elisha H. Collier	London, England	June 16, "
Punching between rollers	Richard Montgomery	New York, N. Y.	Feb. 5, "
Rocker, submerged for separating ores	Oliver Edes	Plymouth, Mass.	April 23, "
Sash, balancing	Hiram C. Brown	Xenia, Ohio	May 14, "
Sash, bearer elastic roller	Julius A. Pease	Philadelphia, Pa.	April 9, "
Sash stopper	George H. Gray, Sr.	Clinton, Miss	April 2, "
Sash stopper	Charles C. Cameron	Harper's Ferry, Va.	July 2, "
Sash stopper, arrangement of	Nathaniel Myers & Frederick C. Smith	Charlestown, Va. Harper's Ferry, Va.	June 25, "
Sash, stopper, spiral spring	William R. Barnard	Bristol, Conn.	Mar. 12, "
Sash, stopper, spring inclined plane and roller	Seth E. Winslow	Kensington, Pa.	Apr. 2, "
Sash stopper, friction roller	Joseph Haynard	Philadelphia, Pa.	Feb. 5, "
Screws, machines for cutting	Thos. J. Sloan	New York, N. Y.	July 9, "
Screws, wood, machines for nicking the heads of	Thos. J. Sloan	New York, N. Y.	Oct. 29, "
Screw threading machines	Thos. J. Sloan	New York, N. Y.	Nov. 26, "
Shafts, etc., of sheet iron, method of making	Chas. F. Fisher	New Orleans, La.	June 4, "
Shutters, the hinge of rolling iron	A. Livingston Johnson	Baltimore, Md	June 25, "
Shutters, window chain and flanges apparatus for opening and closing	George Welsh	Washington, D. C.	Jan. 22, "
Smiths, strikers	Melchi Scott	Claysville, Pa.	Sept. 10, "
Spike machine	Ammi M. George	Nashua, N. H	June 18, "
Spike machines	Moore Hardaway	Troy, N. Y.	July 16, "
Spike machines	William Blake	Boston, Mass	Sept. 17, "
Spike machines	Horatio N. Swift	Boonton, N. J.	Oct. 29, "
Spike machines, movement of the pointing die in	Edmund Sawyer	Boston, Mass.	Mar. 19, "
Steel cast, process for making	Joseph Dixon	Jersey City, N. J.	April 9, "
Tacks, carpet, machine for forming washers and attaching them to	Jason G. Howard	North Easton, Mass.	June 25, "
Tin cutting and bending machines, arrangement of the bending rollers in	William H. Horton	Newbury	
Tubes, copper, machinery for making	Edward Hamilton	Bridgeport, Conn	May 28, "
Tubes, method of forming sheet metal	Wm. Ostrander and Wm. Webster	New York, N. Y.	Mar. 17, "
Tubes, of sheet metal, machine for forming	Joseph Stout and Jas. T. Staunton	Waynesville, O.	July 30, "
Tuyere	John Pawling	Morgantown, Pa.	Jan. 22, "
Tuyers, devices for discharging ashes from	James A. Maynerd	Boston, Mass	May 21, "
Vises, parallel method of working the pawl in	Jasper Johnson	Genesee, N. Y	April 9, "
Window blinds and their slats, apparatus for operating	John Jones	Clyde, N. Y.	Dec. 24, "
Wrench, revolving jaw	Nathl. Colver ass'or to N. Colver and William S. Damrell	Boston, Mass. Dedham, Mass	May 14, "

* In England, September 11, 1845.

CLASS III.—MANUFACTURES OF FIBROUS AND TEXTILE SUBSTANCES, *including Machines for Preparing Fibres of Wool, Cotton, Silk, Fur, Paper, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Bobbins upon spindles, driving	Oliver Pearl	Essex Co., Mass.	Jan. 29, 1850
Carding and mixing wool and cotton	Stephen H. Adams and John A. Wood	Cohoes, N. Y.	June 11, "
Carding and drawing wool, engines for	Charles Jackson and Jas. Moir	Cazenovia, N. Y.	Feb. 5, "
Carding, machines for preparing bats for felting	Samuel G. Blackman	Norwalk, Conn.	Feb. 5, "
Carpets, manufacture of two and three ply	Alexander Smith	West Farms, N. Y.	Dec. 10, "
Cloth, apparatus for stretching and smoothing	John Butcher	Lowell, Mass	Nov. 5, "
Cloth, instruments for measuring	E. F. Whiton	West Stafford, Conn.	April 23, "
Cloth, machinery for folding	Augustus C. Carey and Dan'l C. Bagley	Amesburg, Conn.	Feb. 12, "
Cloth, machines for shearing	Amasa Woolson	Springfield, Vt.	May 28, "
Cloth, measuring on looms	John G. Webster, ass'r to John W. Robertson and John G. Webster	Lowell, Mass	Feb. 19, "
Cloth, wide machinery for double folding	Zachariah Allen	Providence, R. I.	July 16, "
Cordage, cotton, machinery for making	Franklin Slaughter and David Perry	Fredericksburg, Va.	Jan. 1, "
Cordage, cotton, machinery for making	Franklin Slaughter and David Perry	Fredericksburg, Va.	Jan. 8, "
Cordage, processes for rendering uninflammable	M. Y. Johnson, adm'r of James H. Johnson	Galena, Ill	Nov. 26, "
Cotton batting, apparatus for sizing and drying	Elias P. Rider	New York, N. Y.	July 30, "
Cotton, machinery for ginning or picking	Francis A. Calvert	Lowell, Mass	Sept. 17, "
Drawing rollers, regulators for	Whiting Hayden	Windham, Conn.	Mar. 12, "
Electricity, removing from wool in the process of manufacture	Joseph Metcalf	Worcester, Mass	Sept. 24, "
Flax and hemp, machinery for dressing	William W. Grant	Providence Co., R.I.	Mar. 5, "
Fliers and spindle, arrangement of	John Dermond,	Paterson, N. Y.	Feb. 12, "
Fulling cloth, machinery for	Chas. A. Reed and Thos. Cotter	Wash'n Mills, N. Y.	Sept. 24, "
Fulling mills	John C. Millar	Springfield, Mass	Aug. 20, "
Gins, cotton	John Du Bois	Greensboro', Ala.	Jan. 8, "
Gins, cotton	Stephen R. Parkhurst	New York, N. Y.	April 23, "
Harness, weavers, machinery for dressing	Kasimir Vogel	Westbrook, Me.	Aug. 6, "
Heddles, wire, machinery for making	Milton Finkle	Utica, N. Y.	April 9, "
Hemp brakes	Jonathan Crane and F. H. Hamilton	Schenectady, N. Y.	Jan. 1, "
Hemp, drawing and parting fibres of	O. S. Leavitt	Maysville, Ky	Sept. 24, "
Hemp, machines for cutting	J. Locke Hardeman	Arrow Rocke, Me	Aug. 20, "
Hemp, scutchers	Farwell H. Hamilton and Thos. Bullock	Schenectady, N. Y.	Jan. 1, "
Knitting machines	Joseph Hollen	White township, Pa.	July 16, "
Loom	Halvor Halvorson, ass'or to Wm. M. Chase	Northampton, Mass.	Oct. 1, "
Loom, power	Enoch Burt	Hartford, Conn.	
Looms	Amos H. Boyd	Saco, Me.	Oct. 15, "
Looms for figured fabrics*	Samuel Eccles	Kensington, Pa.	Mar. 5, "
Looms for piled fabrics	James Turnbull, Jr., and John Turnbull	Simsbury, Conn.	Jan. 29, "
Looms for weaving out pile fabrics	Mertown C. Bryant	Lowell, Mass	June 25, "

* Antedated Dec. 22, 1849.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Looms for weaving figured fabrics	Samuel T. Thomas and Edwd. Everett	Lowell, Mass; Lawrence, Mass	Dec. 24, 1850
Looms for weaving figured goods	Avery Babbett	Auburn, N. Y	Oct. 8, "
Looms for weaving piled fabrics*	John Johnson, ass'or to Elias Johnson	Troy, N. Y	Mar. 12, "
Looms for weaving piled fabrics	Mertown C. Bryant	Lowell, Mass	Mar. 19, "
Looms for weaving tapestry and Brussels carpets	Erastus B. Bigelow	Clinton, Mass	Sept. 24, "
Looms, hand	John G. Garretson	Salem, Iowa	May 21, "
Looms, let off motion of	Jonathan Knowles	Buffalo, N. Y	April 30, "
Looms, operating shuttle boxes in	Robert Burns Goodyer & Benj. Twist, ass'or to Alfred Jenks	Philadelphia, Pa; Manayunk, Pa; Bridesburgh, Pa	Jan. 1, "
Looms, power	John Shuttleworth	Frankford, Pa	May 21, "
Looms, shuttle motion of	Oliver A. Kelly	Woonsocket, R. I	June 4, "
Looms, shuttle motions in	Thomas T. Wilcox	Norwich, Conn	Nov. 26, "
Looms, stop motion for	Elijah Hall	Cabotsville, Mass	Sept. 24, "
Paper, machinery for measuring pulp in the manufacture of	Henry Pohl	Paterson, N. J	July 9, "
Pile for rugs, &c., preparation of†	James Taylor, ass'or to John Joseph and Francis Crossley	Loch Winnock, Scotland; Halifax	May 28, "
Ropes, machinery for making	Henry Evans	N. Bedford, Mass	Sep. 24, "
Sewing machines	David M. Smith, ass'or to Thomas Chadbourne	Springfield, Vt; Concord, N. H	April 16, "
Sewing machines	O. L. Reynolds	Dover, N. H	May 14, "
Sewing machines	Bartholomy Thimonnier, Sr., ass'or to Philip May	France; London, England	Sept. 3, "
Sewing machine	John Bacheider	Boston, Mass	Sept. 24, "
Sewing machines	Allen B. Wilson	Pittsfield, Mass	Nov. 12, "
Sewing machines	Frederick R. Robinson	Boston, Mass	Dec. 10, "
Shuttle, weavers'	Wm. Markland and Jos. Milner	Lowell, Mass	Oct. 1, "
Silk, &c., machinery for doubling and twisting	Joseph Conant & Lucius Dimmock	Northampton, Mass	Dec. 17, "
Speeder, counter twist	Jesse Whitehead	Manchester, Va	July 30, "
Spindles and bobbins for spinning	Josiah G. Reed	Paterson, N. J	Jan. 15, "
Spinners cop, operating the coping rail of	Warren Rouse	Taunton, Mass	Nov. 5, "
Spinners, hand	David Current	Crittenden, Ky	Sep. 3, "
Spinning machines, preventing fibres from winding on drawing rollers in	John C. Dodge	Dodgeville, Mass	May 14, "
Spooling, machinery for	Avery Babbett	Auburn, N. Y	Feb. 5, "
Temples used in weaving double cloth	Stephen Everett	Biddeford, Me	April 2, "
Yarn, machinery for doubling and twisting	Moses Hey	Springfield, Pa	Oct. 8, "

* In England, Mar. 9, 1849. † In England, Oct. 10, 1845.

CLASS IV.—CHEMICAL PROCESSES, MANUFACTURES, AND COMPOUNDS, *including Medicine, Dying, Color-making, Distilling, Soap and Candle making, Mortars, Cements, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Alloys for points and lightning rods	James Spratt	Cincinnati, O	Jan. 8, 1850
Alum, process for manufacturing	Jacob H. Wurtz	New York, N. Y	Oct. 22, "
Candles, mould apparatus	Herman Camp	Dunkirk, N. Y	Jan. 22, "
Candles, manufacture of	James G. Davis, ass'or to A. B. Warner and Jas. G. Davis	Buffalo, N. Y	Aug. 13, "
Composition of, covering hams	Hosea Billings	Beardstown, Ill	April 9, "
Composition for enamelling hollow ware*	Chas. E. & Chas H. Paris	Paris, France	Mar. 5, "
Compound for imparting a gloss to cloths†	Wm. D. Beaumont	Baltimore, Md	Oct. 8, "
Compounds for sizing, for warps on yarns	Wm. Mallerd	Providence, R. I	July 16, "
Curing meat, process for	George Starkweather	Hartford, Conn	Nov. 5, "
Curing tobacco stems—see class XXII, "Tobacco"			
Distilling oleaginous matter‡	Anthony M. Poisat and David C. Knabb	Paris, France	Feb. 26, "
Distilling spirits of turpentine	Chas. J. Meinicke	New York, N. Y	July 30, "
Fats and oils, hardening	Carl W. Schindler	New York, N. Y	Nov. 5, "
Gas, coal, purifying	Joseph A. Sabbaton	Albany, N. Y	July 30, "
Gases, preparing illuminating‖	Stephen White	Manchester, Eng	Jan. 22, "
Gas generating apparatus	Christopher F. Brown	Baltimore, Md	Feb. 26, "
Gas, manufacture of illuminating from bitumen	Abraham Gesmer	Halifax, N. S	Jan. 29, "
Gas metres	James Long	Chicago, Ill	Mar. 5, "
Gas metres	Thomas W. Lane	Woburn, Mass	Oct. 8, "
Glucose, process in the manufacture of	George Riley	New York, N. Y	Mar. 5, "
Gold, process for amalgamating	Calvin C. Knowles	Lowell, Mass	Aug. 6, "
Gutta Percha, process of working	Samuel F. Armstrong and Chas. J. Gibbert	New York, N. Y	Sept. 17, "
India rubber cloth, process of rolling	Francis D. Hayward and John C. Bickford	Colchester, Conn	Mar. 19, "
India rubber springs for cars, &c., manufacture of	Fowler N. Ray	New York, N. Y	April 2, "
Indian rubber, use of oxide of tin in the manufacture of	John Pridham, ass'or to Horace H. Day	N. Brunswick, N. J; New York, N. Y	Mar. 19, "
Indian rubber, vulcanising	Jonathan T. Trotter	New York, N. Y	Dec. 3, "
Oils, filter for	Thomas Antisell	New York, N. Y	Nov. 12, "
Oxide of zinc, manufacture of the§	Edme Jean Leclaire and Jean Joseph Ernest Barnrel	Paris, France	May 17, "
Paint, process of making from bituminous coal	Charles Mortimer	Philadelphia, Pa	April 9, "
Paints, drying	Aquilla Jones	New York, N. Y	Nov. 12, "
Particoloring yarn, apparatus for	Alexander Smith	West Farms, N. Y	June 18, "
Pill boxes, machinery for making—see class XIV			
Preparing wheat for grinding	Joseph W. Carpenter	Pontiac, Mich	Sept. 17, "
Preserving wood, process for ¶	Chas. Payne	Sth. Lambeth, Eng	May 28, "
Stannates of potash and soda, process for making**	James Young	Manchester, Eng	Aug. 20, "
Starch from maize, manufacture of	Thomas Bragg	West Milton, O	Dec. 24, "
Sugar, defecating	Robert de Massy	Bocourt, near Saint Quentin, France	May 7, "
Sugar, manufacture of ††	Louis Henry F. Nelsens, ass'or to Louis de Saulles	Lorain, Belgium; New Orleans, La	Jan. 29, "
Sugars, draining‡‡	Conrad W. Finsel	Bristol, England	Sept. 3, "

*In England, Jan. 23, 1849. †Antedated July 26, 1850. ‡In France, Mar. 9, 1849 ‖In England, Mar. 28, 1849. §In France, Dec. 31, 1845. ¶In England, Jan. 9, 1842. **In England, Dec. 9, 1848. ††In Belgium, Aug. 15, 1849. ‡‡In England, Oct. 18, 1849.

CLASS V.—CALORIFIC, *comprising Lamps, Fire-places, Stoves, Grates, Furnaces for heating Buildings, Cooking Apparatus, Preparation of Fuel, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bagasse, machine for drying	James H. Dakin	Baton Rouge, La.	May 21, 1850
Blast pipes, for conveying heated air and gases to furnaces—see class II			
Burning fluid	Ephraim Howe	Brooklyn, N. Y.	Sep. 24, "
Chimney caps	Edward Whitley	Boston, Mass.	Mar. 5, "
Chimney caps	Michael H. Collins	Boston, Mass.	
Chimney caps	Augustus M. Rice, ass'or to H. Lombard and A. M. Rice	Boston, Mass.	Apr. 9, "
Dampers for cleaning stove pipes and regulating the draft in the same	Frederick Bleier	Pittsburg, Pa.	Jan. 15, "
Dryers, grain	Martin C. Dudley	New Orleans, La.	Apr. 30, "
Dryers, grain	John R. Hoopes	W. Philadelphia, Pa.	Aug. 27, "
Dryers, grain	Charles S. Snead	Louisville, Ky.	Oct. 1, "
Fire, apparatus for extinguishing*	William H. Phillips	Langton Place, Eng.	April 9, "
Fire places and throats of chimnies—construction of	Charles W. Russell	Washington, D. C.	Mar. 5, "
Firing kilns for pottery ware, black lead crucibles	Joseph Dixon	Jersey city, N. J.	Mar. 5, "
Furnaces, air heating	Henry Adolph Engles	Cincinnati, O.	Feb. 12, "
Furnaces, air heating	James McGregor	Wilton, N. Y.	Mar. 5, "
Furnaces, air heating	Gardner Chilson	Boston, Mass.	Nov. 19, "
Furnaces for calcinizing gypsum	Benj. Fowler	Lubec, Me.	June 18, "
Furnaces for heating sad irons	John T. Davy	Troy, N. Y.	Mar. 12, "
Furnaces, hot air	George E. Waring	Stanford, Conn.	Dec. 24, "
Furnaces, portable	John P. Hayes	Boston, Mass.	Nov. 5, "
Furnaces, portable	Merritt F. Potter	Charlemont, Mass.	Jan. 22, "
Furnaces, steam boiler	Benj. Crawford, ass'or to Wm. B. English, J. J. Bennett, A. D. Frisbee and B. Crawford	Alleghany, Pa.	Jan. 29, "
Grate, apparatus for raising the, in cooking stoves	Benj. K. Maltby, ass'nor to Ira M. Mead	Cleveland, O. / Mogadore, O.	June 18, " / June 18, "
Grates, coal	Chauncey D. Greene	West Troy, N. Y.	Jan. 1, "
Grates, coal, agitating	Abel Keeney	Carlisle, Pa.	April 2, "
Grates, coal, agitating	John B. Chollar	West Troy, N. Y.	Aug. 27, "
Grates, fire place	Gardner Chilson	Boston, Mass.	June 4, "
Grates for cooking stoves	John T. Davy	Troy, N. Y.	April 16, "
Grates, furnaces, coal stirrers for	William R. Nichols and Barritt C. Boyes	Philadelphia, Pa.	April 23, "
Heating air by hot water, apparatus for	Adrian Janes	New York, N. Y.	Jan. 29, "
Lamps for lighting gas burners	Robert Thompson	Lowell, Mass.	Dec. 17, "
Lamps, gas, self-generating	Sharpless Clayton and Yarnall Bailey	West Chester, Pa.	Aug. 27, "
Lamps, metallic, making the reservoirs of	P. J. Clark	Meriden, Conn.	May 28, "
Lamps, safety	John W. Hoffman	Southwark, Pa.	April 23, "
Lamps, safety, tubes for	Franklin Stewart	Philadelphia, Pa.	July 2, "
Lamp tubes	Isaiah Jennings	New York, N. Y.	July 9, "
Lids for boiler holes of cooking stoves	Tho's G. Clinton & Geo. H. & Edw'd H. Knight	Cincinnati, O.	Feb. 19, "
Oil cans—see class XIII			
Ovens, bake	Hosea Ball	Philadelphia, Pa.	Nov. 19, "
Ovens, heating, elevated	P. A. Palmer	Le Roy, N. Y.	Sep. 24, "
Ranges, cooking	Frederick H. Stimpson	Boston, Mass.	Mar. 5, "
Ranges, cooking and air heating, furnaces connected therewith	James MacGregor, jr.	New York, N. Y.	Mar. 5, "
Ranges, cooking, and heating air	Elias T. Beers	Honesdale, Pa.	Apr. 2, "
Ranges, cooking, water backs for	Herbert H. and Frederick H. Stimpson	Boston, Mass.	May 28, "

* In England, December 4, 1844.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Registers, hot air	George Pollock	Roxbury, Mass.	Aug. 20, 1850
Registers, warm air	Peter G. Woodside	Philadelphia, Pa.	Oct. 8, "
Stove pipes, joints of	James N. Warner	Buffalo, N. Y.	May 14, "
Stoves	Peter Sweeney	Buffalo, N. Y.	Feb. 26, "
Stoves	Anson Atwood	Troy, N. Y.	May 14, "
Stoves	Sherman S. Jewett and F. H. Root	Buffalo, N. Y.	Sep. 3, "
Stoves, air heating	Perry Goodhue	Cincinnati, O.	Mar. 12, "
Stoves, air heating	James L. Cathcart	Washington, D. C.	May 17, "
Stoves, coal, for roasting, baking and boiling	Tho's G. Clinton, Geo. H. and Edward H. Knight	Cincinnati, O.	Aug. 27, "
Stoves, cooking	Charles M. Nelson	Cincinnati, O.	Mar. 5, "
Stoves, cooking	Hosea H. Hartley	Cincinnati, O.	Mar. 19, "
Stoves, cooking	William Abendroth	Port Chester, N. Y.	April 23, "
Stoves, cooking	Jordan L. Mott	New York, N. Y.	May 7, "
Stoves, cooking	James R. Hyde	Troy, N. Y.	May 7, "
Stoves, cooking	Jordan L. Mott	New York, N. Y.	May 14, "
Stoves, cooking	Abraham Keagy	Mid. Woodbury, Pa.	June 25, "
Stoves, cooking	James White	Milton, Pa.	Aug. 6, "
Stoves, cooking	Samuel Pierce	Troy, N. Y.	Nov. 12, "
Stoves, cooking	Loftes Wood	New York, N. Y.	Nov. 26, "
Stoves, cooking, arrangement of dampers in	Henry L. Sheperd	Dayton, O.	Aug. 6, "
Stoves, cooking, construction of	S. H. Ransom	Albany, N. Y.	July 2, "
Stoves, double, cooking	Henry Jackson	Evansville, Ind.	Apr. 23, "
Stoves, double oven, cooking	James MacGregor, jr.	Wilton, N. Y.	Mar. 19, "
Stoves, Franklin, blowers of	David Steuart, ass'nor to Wm. P. Cresson	Philadelphia, Pa.	Aug. 27, "
Stoves, parlor	Gardner Chilson	Boston, Mass.	June 18, "
Stoves, parlor, air heating	Lemuel W. Gosnell	Baltimore, Md.	April 2, "
Stoves, with circular shaking grate	Edward B. Finch	Peekskill, N. Y.	Aug. 27, "
Ventilating railroad cars	James Cunningham	Reading, Pa.	Mar. 12, "
Ventilating railroad cars	Hezekiah Bradford and Ephraim Morris	New York, N. Y.	June 4, "
Ventilators, ship	Warren Robinson	Lebanon, Conn.	Aug. 13, "
Ventilators, ship	Ralph Bulkley	New York, N. Y.	Nov 26, "

CLASS VI.—STEAM AND GAS ENGINES, *including Boilers and Furnaces therefor, and parts thereof.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Air engines, method of distributing the air over the heating and cooling surfaces of	Ernst Buckup	New York, N. Y.	July 2, 1850
Boiler, cupola and grate combined	Loftes Wood	New York, N. Y.	Nov. 26, "
Boiler feeder, balanced	William D. Allen	Durhamville, N. Y.	Dec. 10, "
Boiler, steam*	Richard E. Dibble	New York, N. Y.	Aug. 21, "
Boilers, corrugated	Richard Montgomery	New York, N. Y.	Oct. 29, "
Boilers, method of applying fusible metal to	Edward H. Ashcroft	Boston, Mass.	Mar. 17, "
Boilers, steam	Frederick P. Dimpfel	Philadelphia, Pa.	July 16, "
Boilers, steam, galvanic regulators for—see class VIII, "Galvanic regulators, &c."			
Boilers, steam, registers for	James D. Rice	Philadelphia, Pa.	Aug. 20, "

* Antedated July 20, 1850.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Boilers, steam, the alarm and indicator for	Joseph Dilks	Philadelphia, Pa	Dec. 3, 1850
Condensers of steam engines	Ethan Baldwin	Philadelphia, Pa	July 9, "
Condensers, surface for steam engines	Joseph P. Poisson	New York, N. Y	Apr. 2, "
Cut off motion for puppet valves	Samuel H. Gilman	Cincinnati, O	Dec. 10, "
Cylinder, steam, exhaust passages for	George Shield	Cincinnati, O	Sep. 10, "
Engines, horizontal, expansion gear for	Samuel H. Gilman	Cincinnati, O	Dec. 17, "
Engine, steam, arrangement of	Richard F. Loper & John W. Nystrom	Philadelphia, Pa	Dec. 17, "
Furnaces—see class V.			
Furnaces for steam boilers	F. P. Dimpfel	Philadelphia, Pa	Nov. 5, "
Locomotive engines, apparatus for reversing or stopping	James Cunningham	Reading, Pa	Oct. 22, "
Locomotive engines for working heavy grades, boilers and gearing of	George Escol Sellers	Cincinnati, O	July 9, "
Packing metal, compound, hard and soft	Andrew Fulton	Pittsburg, Pa	Mar. 25, "
Safety apparatus for steam boilers	John C. Sement and John Workman	Philadelphia, Pa	Aug. 13, "
Spark arresters	James Radley and John W. Hunter	New York, N. Y	Jan. 22, "
Spark arresters	Samuel Swett	New York, N. Y	Nov. 19, "
Steam boilers, interior arrangement of	Sylvanus Knight	Winchester, Ind	Mar. 12, "
Steam, method of employing the exhaust	Geo. H. Hoagland	Piermont, N. Y	Mar. 19, "
Valve gear for steam engines	Geo B. Milner	Houston, Texas	July 30, "
Valve gridiron slide	William W. Hubbard	Boston, Mass	Jan. 22, "
Valves for governors	Junius and Alfred Judson ass'rs to Junius Judson	Rochester, N. Y	Nov. 5, "
Valves, oscillating of steam engines	Thomas C. Thenker	Mansfield, O	May 7, "
Valves, puppet, expansion gear for	Thomas McLaughlin	New York, N. Y	Jan. 29, "
Valves, slide, arrangement of several in the same steam chest	Cyrus Richardson	Woburn, Mass	May 7, "

CLASS VII.—NAVIGATION *and Maritime Implements, comprising all Vessels for conveyance on water, their construction, rigging and propulsion, Diving Dresses, Life Preservers, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Cordage, &c.—see class III.			
Grummet strap	Eli F. Southward	Wellfleet, Mass	Oct. 8, 1850
Paddle wheels, opening and closing bucket for	George Tingle	New York, N. Y	Aug. 20, "
Propeller, centripetal	John W. Nystrom	Philadelphia, Pa	Mar. 19, "
Propeller, shell	James Trees	Salem, Pa	May 14, "
Propellers and chimneys for canal boats, arrangement of	Benjamin M. Smith	Ridgeway, N. Y	April 23, "
Propellers, screw arrangement and connection of	Patrick L. Derlan	Reading, Pa	May 21, "
Propelling boats in shallow water, method of	John Dougherty	Mount Union, Pa	Aug. 20, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Sewing mallets	Thomas Batty	New York, N. Y	Aug. 20, 1850
Ship's timbers, instruments for laying down curves of	Charles Scales	Bath, Me	Dec. 17, "
Steering apparatus	Phineas P. Quimby	Belfast, Me	Mar. 19, "
Steering apparatus	Charles F. Brown	Warren, R. I	July 22, "
Steering apparatus, parallelogram	Jesse Reed	Marshfield, Mass	Feb. 26, "
Stoppers, cat head and shank painter	Charles Perley	New York, N. Y	April 2, "
Trusses, method of attaching yards to	Tilgath Odeon	Portsmouth, Va	Aug. 27, "
Vessels, apparatus attached to for indicating the depth of water	Henry B. Sommers	Ithaca, N. Y	Dec. 10, "
Vessels, apparatus for trimming	Evan L. Evans	Mount Holly, N. J	Mar. 19, "
Vessels' holds, apparatus for measuring the depth of water in	Nelson Edwards	Chittenden Co., Vt	Mar. 5, "
Vessels, method of carrying over shoals	J. A. Winslow	Roxbury, Mass	Aug. 20, "
Vessels, method of fitting the bows of	Benjamin Barstow	New York, N. Y	July 2, "
Vessels, model for	Solomon Andrews	Perth Amboy, N. J	June 25, "
Vessels, submarine	Lambert Alexander	France	Sep. 3, "
Windlass jigger—see class XII.			

CLASS VIII.—MATHEMATICAL, *Philosophical and Optical Instruments, including Clocks Chronometers, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Calculating machines	Du Bois D. Parmelee	New Paltz, N. Y	Feb. 5, 1850
Callipers	Wm. W. Smith	Boston, Mass	
Compasses for measuring, joints for	Theodor Altenedor	Philadelphia, Pa	July 16, "
Compasses, surveyors'	John Locke	Cincinnati, O	July 16, "
Dividers, or compasses	Dexter H. Chamberlain, ass'or to Charles W. Homer, S. J. M. Horner, and W. G. Ladd	Boston, Mass. Cambridge, Mass. Boston, Mass	Apr. 9, "
Electro magnetic engines	John H. Lillie	Joliet, Ill	Apr. 16, "
Electro magnetic machines, for shocks	Samuel B. Smith	New York, N. Y	June 4, "
Enunciators, electro magnetic, for signals in hotels, &c	Charles S. Bulkley	Macon, Ga	Oct. 29, "
Galvanic regulators for steam boilers *	Arthur Dunn	Dalston, Eng	May 28, "
Gauge for water casks—see class XI, "Water casks, &c."			
Level, fluid	William G. Ladd, jr	Cambridge, Mass	Apr. 9, "
Levels, collimating	John Locke	Cincinnati, O	July 2, "
Lightning conductors, attachments for	James Spratt	Cincinnati, O	Feb. 5, "
Magnetic needles, correcting	Calvin Guiteau	Syracuse, N. Y	Mar. 26, "
Rules, board and log	Charles B. Hutchinson	Waterloo, N. Y	June 4, "
Rules, board and log	Benj. M. Van Der Neer	Clyde, N. Y	Apr. 30, "
Telegraph, electric, manipulator	Austin F. Park	Troy, N. Y	Aug. 27, "
Telegraphs, electric	Wm. S. Thomas	Norwich, N. Y	Feb. 12, "
Telegraphs, electric	Geo. H. Horn	Boston, Mass	June 25, "
Telegraphs, electro chemical	G. Westbrook. Henry J. Rogers	Washington, D. C. Baltimore, Md	May 28, "
Telegraphs, repeaters for electro magnetic †	Charles S. Bulkley	Macon, Ga	Nov. 12, "
Telescopes, submarine	Willard Day	Brooklyn, N. Y	Apr. 16, "

* In England, October 12, 1848.

† Antedated Sep. 10, 1850.

CLASS IX.—CIVIL ENGINEERING *and Architecture, comprising works on Rail and Common Roads, Bridges, Canals, Wharves, Docks, Rivers, Wiers, Dams, and other Internal Improvements, Buildings, Roofs, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Balloons and their appendages—see class XI.			
Blinds, Venitian, suspending	Joseph Bohrer	Philadelphia, Pa	June 4, 1850
Bridges, arch, truss for	Henry Lanergan	Boston, Mass	Apr. 23, "
Buildings, iron, construction of the frame, roof and floor of	James Bogardus	New York, N. Y	May 7, "
Canals, feed regulators for	Charles Ross	West Buddick, O	May 21, "
Chairs, machines for making wrought iron railroad	Wm. Van Andear	Poughkeepsie, N. Y.	Apr. 30, "
Chair, wrought iron railroad	Edward S. Renwick	Washington, D. C.	Oct. 22, "
Cornices and mouldings, plaster tool for forming	Sylvester Groesbuck	New York, N. Y	Sep. 17, "
Drilling stone, machines for	Geo. Fletcher, sr	Greensburg, Ind	Apr. 23, "
Eaves trough and gutter, machine; see class II.			
Embankments, levees, and method of forming	Duff Green	Dalton, Ga	June 11, "
Excavating and conveying earth	John A. Sprague	Dayton, O	Oct. 5, "
Excavating auger	James Buck	Buckaport, Me.	Feb. 5, "
Excavating, machines	Martin Newman, 2d	Lanesboro, Pa.	Nov. 19, "
Excavator, the screw	Richard Montgomery	New York, N. Y	May 7, "
Fences	Isaiah Subers	Philadelphia co., Pa.	Feb. 19, "
Fences, portable	Peter M. Purdy	Haysville, O	Feb. 19, "
Gates for fences	Jesse Bailey	Leatherwood, O	Jan. 15, "
Gates, hanging and operating	Thomas Parkinson	Naples, N. Y	Aug. 6, "
Lewis, lever—see class XIII.			
Lock, bolts, method of operating	Thomas Slaight, ass'or to Henry C. Jones	Newark, N. J	Mar. 12, "
Mantel piece	Hiram Tucker	Cambridge, Mass	April 2, "
Piles, &c., method of sinking hollow by exhausting the air from the interior of the same*	Lawrence H. Potts	London, Eng	Jan. 29, "
Rail, compound tubular	Alfred B. Seymour	New York, N. Y	April 16, "
Railings, iron	Wm. Hamilton		Feb. 26, "
Railings, iron	John Krauser, Sommers Crowell, and Cyrus Krauser	Reading, Pa	Nov. 12, "
Railroad frog, oscillating, self adjusting	John W. Hoffman	Philadelphia, Pa	April 2, "
Rails of railroads, method of securing	H. H. May	Galesburg, Ill	Nov. 26, "
Road scrapers, adjustable mouth piece to	Shadrach Davis	Dartmouth, Mass	May 7, "
Roads, machine for repairing	Nathan Potter	East Hamburg, N. Y	June 25, "
Roadway for rail cars and ordinary vehicles	Jordan L. Mott	Mott Haven, N. Y	Sep. 17, "
Scraper, combination of a guide tooth with an inclined	John P. Wood	Hounie, La	June 18, "
Scrapers, removable teeth for	Joseph Sweet	Hughesville, Pa	Apr. 2, "
Stump extractor, wheel and axle	John Rogers	Orleans co., Vt	Jan. 1, "
Wickets, for lock gates	John Jack, ass'r to Alfred Bell	Nunda, N. Y	May 21, "

*In England, Dec. 5, 1848.

CLASS X.—LAND CONVEYANCE, *comprising Carriages, Cars, and other Vehicles used on Roads, and parts thereof.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Axles and shafts, bearings for	Wm. H. Hovey	Hartford, Conn	Dec. 10, 1850
Axles, mail	Wm. H. Saunders	Hastings, N. Y	Mar. 5, "
Balloons and their appendages—see class XI.			
Brakes, connection of with cars	John Kimbell and Harvey Rice	Concord, N. H	Jan. 1, "
Brakes for carriages	Wm. J. Welch, jr	Churchville, Md	Mar. 12, "
Boxes and axles, packing	Wm. H. Hovey	Hartford, Conn	Aug 13, "
Boxes, compound wagon	Inla Drake	Mansfield, N. J	Aug. 20, "
Car couplings	Hiram Baldwin	Nashville, N. H	April 16, "
Car couplings	David S. Neale	Lynn, Mass	Sept. 3, "
Car couplings	Nathan Haskins	Manchester, N. H	Oct. 29, "
Carriage bodies, hanging	M. G. Hubbard	Hume, N. Y	Feb. 12, "
Carriage bodies, hanging	M. G. Hubbard	Geneva, N. Y	Nov. 26, "
Carriage jacks	Thomas G. Clinton, G. H. & E. H. Knight	Cincinnati, O	Mar. 5, "
Carriages	James Patterson	Franklinville, N. Y.	April 16, "
Carriages	Miles S. Watkins	Sommerville, Tenn.	June 25, "
Carriages	Edward and Charles Everett, jr.	Washington, D. C.	Dec. 17, "
Carriages, apparatus for releasing horses from	Tapley B. Pyron	Salina, Tenn	Oct. 22, "
Carriages, dash board for	Lewis Lupton	Winchester, Va	Oct. 1, "
Carriages, detaching horses from	John W. Harrison	Logansport, Ind	Aug. 27, "
Carriage tops, elevating and lowering	John L. Allen	Syracuse, N. Y	Feb. 19, "
Carriage tops, raising and lowering	Solomon Goddard & Henry Warfield	Truxton, N. Y	Feb. 19, "
Cars, apparatus for retaining on the rails	William Payne	New York, N. Y	Mar. 5, "
Car seat backs	Thomas E. Warren	Troy, N. Y	July 30, "
Cars for plank roads, wooden rail, &c.	Gideon Morgan	Calhoun, Tenn.	June 11, "
Cars, railroad	Geo. S. Hacker	Charleston, S. C	Mar. 5, "
Cars, ventilating railroad—see class V, "Ventilating."			
Felloes, machine for cutting	Joseph and Levi Adams	Hadley, Mass	July 9, "
Friction rollers	Joseph M. Totten	Peoria Ill	
Hubs and axles, connecting and disconnecting	A. M. Billings and Thomas A. Ambrose	Claremont, N. H	June 25, "
Hubs, connecting with axles	Junius Foster	Bridgeport, Conn	Feb. 26, "
Hubs with axles, connecting	Eliphalet S. Scripture	Green Point, N. Y	July 30, "
Neck yokes, attaching to poles of carriages	James M. Brown	Bloomfield, O	June 18, "
Omnibuses, turning up the steps of	Stephen Burdett	New York, N. Y	Aug 27, "
Packing for oil boxes of axles, &c. adjusting	Warner Groat	Troy, N. Y	June 11, "
Skeins, connecting with axles	Abel Combs	Farmington, O	May 14, "
Springs for cars, &c., manufacture of India rubber—see class IV. "India rubber, &c."			
Spring, vulcanized India rubber	Fowler M. Ray	New York, N. Y	Oct. 18, "
Trucks, connection with car bodies	George Vanderhoof	Patterson, N. J	Feb. 12, "
Trucks, railroad	James Ingersoll	Grafton, O	Feb. 2, "
Wagon tops, apparatus for regulating the setting of bows in	A. McKinney	Montgomery, N. Y.	Aug. 13, "
Wheels, car	Geo. W. Eddy	Waterford, N. Y	Jan. 8, "
Wheels, car machines for making wrought iron	Nathan Starks	Albany, N. Y	Oct. 29, "
Wheels, cast iron car	Lyman Kinsley	Norfolk co., Mass.	Mar. 12, "
Wheels, cast iron car	Lyman Kinsley	Norfolk co., Mass.	Mar. 12, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.	
Wheels, cast iron car	Asa Whitney	Philadelphia, Pa	Mar. 19,	"
Wheels, cast iron car	James Boon	Lancaster, Pa	Apr. 16,	"
Wheels, cast iron car	Albert Fuller	Boston, Mass	Aug. 27,	"
Wheels, cast iron car	Nathan Washburn	Worcester, Mass	Oct. 8,	"
Wheels, cast iron R. R. car	Benj. Severson	Schenectady, N. Y	Sept. 17,	"
Wheels, wrought iron car	Herrick Aiken	Franklin, N. H	Oct. 1,	"
Wheels, wrought iron car, clamp to be used in the manufacture of	Herrick Aiken	Franklin, N. H	Apr. 2,	"
Whiffletrees, connecting with carriages	James Barnes	Franklin, N. Y	June 11,	"

CLASS XI.—HYDRAULICS AND PNEUMATICS, *including Water-wheels, Windmills, and other implements operated on by air or water, or employed in raising and delivering fluids.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.	
Balloons and their appendages*	Hugh Bell	London, England	Mar. 26,	1850
Engines operated by steam air and water	James Black	Philadelphia, Pa	Jan. 8,	"
Filtering and drinking tube, pocket	Abijah Fess[illegible]	Boston, Mass	April 2,	"
Filtering cocks	Daniel Bart[illegible], Jr	Boston, Mass	Oct. 15,	"
Filters	Chas. D. Birdseye, ass'or to Warring Latting	New York, N. Y	Mar. 26,	"
Hose, India rubber	Horace H. Day & Rich'd McMullin	New York, N. Y G. Barrington, Mass.	Sept. 17,	"
Hydraulic apparatus for producing blast	Ransom Cook	Sarat'a Springs, N.Y.	June 11,	"
Hydraulic blowers	Jeremiah Darling	Cincinnati, O	Dec. 24,	"
Hydraulic blowers for furnaces, &c.	Ransom Cook	Sarat'a Springs, N.Y.	Apr. 16,	"
Hydrolator	Zariel Swope	Lancaster, Pa	Feb. 26,	"
Molasses gates	Erastus Stebbins	Chicopee, Mass	Oct. 15,	"
Pipe coupling	Chapman W[illegible]ner	Louisville, Ky	Apr. 30,	"
Pipe, lead, manufacture of	William P. Latham	Philadelphia, Pa	Sept. 3,	"
Pipes and hose, couplings for	A. H. Brown	Albany, N. Y	Apr. 30,	"
Pumps, attachments to, for agitating the surface of the water in the well	Wm. D. Mayfield	Elkton, Ky	Dec. 24,	"
Pumps for deep wells	Nehemiah Dodge	New York, N. Y	Mar. 12,	"
Pumps for ships, &c	Franklin Ransom	New York, N. Y	Mar. 19,	"
Pumps, rotary	William H. Davis	Maysville, Ky	Nov. 5,	"
Regulators, feed for canal—see class IX., "Canals."				
Sprinkling streets, &c., apparatus for	Joseph D. Price	Smithsburgh, Md	April 9,	"
Valves of hydraulic engines, arrangement of the	William Kentish, ass'or to Cornelius Van Wagoner	Paterson, N. J	Jan. 15,	"
Waste gates	Hiram Yaw, and Thos. P. How	Boston, Mass Buffalo, N. Y	June 25,	"
Water, apparatus for drawing	Cam Broyles	Green Co., Tenn	Apr. 30,	"
Water casks, gauge for	John Mc[illegible], Jr., ass'or to Henry Schreiner	Reading, Pa	Mar. 12,	"
Water metres	William S[illegible]ell, Jr	Williamsburg, N.Y.	Feb. 5,	"
Water metres	Timothy Rose	Cortlandsville, N.Y.	Sept. 24,	"
Water wheels, directing water upon	Marcius B. Ashley	Watertown, N. Y	July 30,	"

* In England, Nov. 2[illegible], 184[illegible].

CLASS XII.—LEVER, SCREW, AND OTHER MECHANICAL POWER, *as applied to Pressing, Weighing, Raising and Moving Weights.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.	
Hoisting machines	Sandy Harris	Philadelphia, Pa	Mar. 19,	1850
Hoisting, machines for	William C. Allison	Philadelphia, Pa	April 2,	"
Lever jacks	James Leffel	Springfield, O	Dec. 10,	"
Lewis, lever	Thos. Lidgerwood	Brooklyn, N. Y	Mar. 12,	"
Press boxes or vats for cheese	Augustus N. Severance	Cherry Valley, O	April 30,	"
Press, cotton	A. D. Brown	Clinton, Ga	Jan. 22,	"
Presses, cheese	Augustus N. Severance	Cherry Valley, O	Mar. 26,	"
Presses, cheese	Joseph Card	Fairport, O	Oct. 22,	"
Presses, cheese, self-acting	John Underwood	Montpelier, Vt	June 25,	"
Presses, cotton	J. T. Elliot	Carrolton, Miss	Oct. 22,	"
Presses for copying letters	George Burnham	Philadelphia, Pa	Oct. 8,	"
Presses, oil	Edwin Hills	Cincinnati, O	Mar. 12,	"
Pressing cotton and other substances into bales	S. A. Clements	Granby, Conn	Sept. 3,	"
Scale beams	Samuel T. McDougal	New York, N. Y	Feb. 26,	"
Scale beams	Wm. P. Pierce, ass'or to E. & T. Fairbanks & Co	St. Johnsbury, Vt	April 9,	"
Weighing frames	Chas. Downer	Philadelphia, Pa	Mar. 19,	"
Weighing grain, machines for	Sam'l R. Wilmot	Lafayette, Ind	Dec. 24,	"
Weighing machines	George Houston	Washington, N. C	Aug. 13,	"
Weighing machines, self, for grain, etc.	W. W. W. H. T. Bramble	Lafayette, Ind	July 16,	"
Windlass, jigger	Charles Perley	New York, N. Y	July 30,	"

CLASS XIII.—GRINDING MILLS, *and Mill-gearing, including Grain Mills, Mechanical Movements and Horse-Powers.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.	
Attachments to mills for preparing corn in the cob for grinding	John M. Seely and Wm. E. Tomlinson	Lockport, O	May 21,	1850
Bran dusters	Ezra R. Benton	Milwaukie, Wis	May 7,	"
Cider Mills	Sam'l Jackson	Hamilton, O	Jan. 15,	"
Clutches, friction	Nelson Barlow	St. Louis, Mo	Aug. 13,	"
Connecting rods of steam engines and other machinery	Levi Bissell	New York, N. Y	May 14,	"
Corn shellers	Sam'l Graves	Springfield, Ill	Sept. 17,	"
Corn shellers	David Eldridge	Philadelphia, Pa	Nov. 19,	"
Corn shellers, concave of	Daniel Hoats	Milton, Pa	Jan. 22,	"
Cutters, machinery for forming rotary—see class II.				
Feed apparatus for mills	John Sherlock and Wm. Brackbill	Portugal, Pa	June 18,	"
Flour bolts	John M. Reed and Wm. B. Willis	Charlestown, Va	Jan. 29,	"
Flour, elevating, cooling and conveying	Jesse White and Jon'n Bundy	Barnesville, O	Dec. 16,	"
Flouring mills	Alexander F. Menefree	Woodville, Va	Mar. 12,	"
Gearing for regulating speed	[illegible]	Manches[illegible], N. H	Apr. 20,	"

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Gearing for sugar cane mills	Edward Phelps	Pittsburgh, Pa	Jan. 29, 1850
Grinding and bolting machines combined	James M. Clark	Lancaster, Pa	Jan. 1, "
Grinding, steaming grain preparatory to	Benj. F. Broomell, ass'or to Israel Jackson	London Grove, Pa	May 14, "
Gudgeons, wing	Mark Wilder	Princeton, Mass	April 9, "
Horse powers	James L. Carthcart	Washington, D. C.	July 16, "
Mills for grinding	Chas. W. Brown	Boston, Mass	Jan. 15, "
Mills for grinding	Joseph W. Webb, ass'or to Benj. Gould	Auburn, N. Y.	Jan. 29, "
Mills for grinding	J. R. Stafford	Cleveland, O	June 18, "
Mills for grinding	Willis P. Coleman	New Orleans, La	Oct. 1, "
Mills for grinding	John Rogers, Jr	Jackson, Mich	Dec. 17, "
Mills for grinding	Joseph N. Walker	Cincinnati, O	Dec. 24, "
Mills for grinding and crushing	William Frost	New York, N. Y	
Motion, &c.—see "Reciprocating" &c.			
Oil cans	David G. Starkey	New York, N. Y	April 9, "
Paint mills	Wm. W. Draper	Greenfield, Mass	
Riciprocating motions, changing into a rotary motion	Peter Yates	Milwaukie, Wis	Apr. 23, "
Reciprocating motion, changing rotary motion into	Isaac D. Garlick	Lyons, N. Y	Aug. 20, "
Registers for machinery, hydraulic*	Leman B. Pitcher	Syracuse, N. Y	April 9, "
Rubbing surfaces for regulating abrasion, form of†	Christian Schiele	Frankfort, Germany	May 21, "
Smut machines	Joseph G. Goshon	Sherleysburg, Pa	Jan. 8, "
Smut machines	Leonard Smith	Troy, N. Y	Feb. 12, "
Smut machines	David Ulam	Mt. Pleasant, Pa	Apr. 23, "
Smut machines	Cyrus D. Gordon and Samuel S. Goldthrite	W Martinsburg, NY. Lowville, N. Y	May 28, "
Smut machines, the rubbers of	Franklin Wright	Indianapolis, Ind	Apr. 30, "
Sugar, machines for pulverizing	Oliver R. Chase, ass'or to Silas E. Chase and O. R. Chase	Boston, Mass	Oct. 15, "

* Antedated Mar. 13, 1850.

† In England, Nov. 23, 1848.

CLASS XIV.—LUMBER, *including Machines and Tools for Preparing and Manufacturing; such as Sawing, Planing, Mortising, Shingle and Stave, Carpenters and Coopers' Implements.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Augers attaching to their handles	John E. Larkin	Ballston Spa, N. Y	Nov. 19, 1850
Augur handle	Augustus Thayer	Malden Bridge, N.Y.	Dec. 3, "
Barrel machinery	Solomon Andrews	Perth Amboy, N. J	Feb. 12, "
Bench hooks	W. B. Kean	Worcester, Mass	Aug. 13, "
Bitts, expansible	Clinton L. Adancourt	Troy, N. Y	Aug. 27, "
Boards, apparatus for jointing	David Foster	Whitestown, N. Y	May 28, "
Boring instruments, connecting cutters to shafts of	Lewis W. Miller	Mesopotamia, O	Jan. 8, "
Boring machines	Andrew Weikart	Greenford, O	Jan. 15, "
Boring machines, augers for	George Flautt	Cave Town, Md	Feb. 12, "
Branding tool	Lewis Stark	Chicopee, Mass	Jan. 1, "
Chucks for boring and mortising machines	Eli K. Wisell	Warren, O	Jan. 22, "
Clothes pins, machines for slitting—see class XVII.			

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Dividers or compasses—see class XIV.			
Irregular forms, machines for dressing	Alanson Cary	Worcester, Mass	Nov. 5, 1850
Irregular forms, mackines for turning	Smith Beers	Naugatuck, Conn	Dec. 3, "
Irregular forms, mills for sawing	Oliver Wright	Rochester, N. Y	Jan. 8, "
Lath cutting machines	Wm. Bullock, ass'or to Chas. Graff	Philadelphia, Pa	July 9, "
Lathes, for turning	J. D. White	Hartford, Conn	May 21, "
Mortises, machines for boring dove tailed	Henry T. Betjeman	Cincinnati, O	Dec. 3, "
Mortising machines	Smith Spencer	Angelica, N. Y	Sept. 10, "
Pill boxes, machinery for making	Asa Fessenden	Templeton, Mass	Mar. 12, "
Pill boxes, machinery for making	Nelson D. White	Winchenton, Mass	Dec. 10, "
Planes for tonguing and grooving boards, &c	James A. Woodbury	Boston, Mass	June 11, "
Planing machines	Nicholas G. Norcross	Lowell, Mass	Feb. 12, "
Planing machines	J. F. Ostrander	New York, N. Y	Sept. 3, "
Planing machines	Dan'l H. Southworth	New York, N. Y	Dec. 10, "
Planing machines, arrangement of pressure and feed rollers in	Chas. A. Spring and Peter Boon	Kensington, Pa	July 30, "
Planing machines, cutters for	Enos G. Allen & Charles H. Briggs	Boston, Mass. New Bedford, Mass.	Nov. 26, "
Planing machines, means for preventing back lash in the feed motion of	Thos. H. Burridge	Jersey City, N. J	Dec. 24, "
Planing ornamental mouldings, machines for—see class XVIII., "Mouldings," &c.			
Planing slats for blinds, machinery for	Geo. Boormill	Frederick, Del	Mar. 5, "
Saw gate	Oliver B. Judd	Rockton, N. Y	Oct. 1, "
Sawing with circular, saw mills for	Orlando Child	Granville, Ill	Dec. 17, "
Saw mills	Wartman Davis	Near Granville, Va	April 2, "
Saw mills, apparatus for setting logs in	Thos. C. Theaker	Mansfield, O	May 21, "
Saw mills, circular	Nicholas G. Norcross	Lowell, Mass	Jan. 15, "
Saw mills, noddle irons for	Gideon Hotchkiss	Windsor, N. Y	Mar. 12, "
Saws	Hazard Knowles	Washington, D. C.	Aug. 27, "
Saws, hanging in saw mills	E. H. & S. E. Parsons	Wilkesbarre, Pa	Apr. 30, "
Scrapers used by cabinet makers	Hiram Carver	Edinburgh, Va	Aug. 6, "
Scribing lumber, machines for	John Shellenberger	Indianapolis, Ind	Sept. 10, "
Shingles, machines for cutting	Wm. Wood	Westport, Conn	Jan. 8, "
Shingles, machinery for dressing	Augustus Welch & Robt. Walker	Bennington, Ind	Jan. 8, "
Slats, boards, &c., apparatus for jointing	Alanson Blanchard	W.Cambridge, Mass.	May 28, "
Splint machines	Horace Patterson	Baldwinsville, Mass.	May 14, "
Spokes, machines for dressing	Orville Mather	Cincinnati, O	Dec. 3, "
Staves, machinery for sawing	Edwin Jenney	New Bedford, Mass.	May 21, "
Staves, machinery for cutting	Chas. B. Hutchinson	Waterloo, N. Y	Feb. 5, "
Staves, machines for dressing	Lewis S. Chicester	Troy, N. Y	Sept. 3, "
Tenon bitts	Eli K. Wisell	Warren, O	Aug. 6, "
Tenoning machines	E. M. Shaw	Baltimore, Md	Aug. 6, "
Tonguing and grooving, machinery for	Robert Kittle	Dansville, N. Y	Jan. 15, "
Tools for preparing hubs for boxes	Sam'l Fahrney, ass'or to A. & J. Fahrney	Near Boonsboro, Md.	Mar. 19, "
Umbrella sticks, &c., machines for turning	Solomon West and Hiram Plumb	Honesdale, Pa	Feb. 12, "
Veneers, &c., machines for cutting	Conrad Poppenhusen	New York, N. Y	July 16, "
Wooden bowls, machinery for turning out	Addison Everett	Middlefield, Mass	July 30, "
Wood, machines for sawing	Spencer Lewis	Tiffin, Ohio	May 21, "

CLASS XV.—STONE AND CLAY MANUFACTURES, *including Machines for Pottery, Glass making, Brick making, Dressing and Preparing Stone, Cements, and other Building Materials.*

INVENTIONS OR DICOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Brick machines, preparing clay for	Charles M. Ferris and Nathan Swan	New Milford, Conn. Patterson, N. Y.	April 16, 1850
Brick presses	Charles Carnell	Kensington, Pa.	Jan. 15, "
Brick presses	John Butler	Buffalo, N. Y.	Jan. 29, "
Brick presses	Collins B. Baker	Troy, N. Y.	Mar. 26, "
Brick presses	Nathan Sawyer	Baltimore, Md.	Apr. 23, "
Brick presses	Shepherd Whitman	New Albany, Ind.	Apr. 23, "
Brick presses	John W. Hope	New York, N. Y.	June 4, "
Brick presses	Thomas Culbertson and Geo. Scott	Philadelphia, Pa.	June 25, "
Kilns, lime	Wm. McCoy	Farnettsburg, Pa.	Nov. 5, "
Marble, machines for sawing	A. H. Tingley, ass'or to E. W. H. F. and A. H. Tingley	Providence, R. I.	Mar. 19, "
Slates, machines for holding and dressing	Samuel E. Crocker	Boston, Mass.	Apr. 30, "
Stone, machines for dressing	Robert Eastman	Concord, N. H.	June 18, "
Stone, machines for polishing	Ames Walter	Middletown, Ind.	May 7, "
Stone, rubbing and polishing	Adrian Olcott	Milistone, N. J.	July 30, "

CLASS XVI.—LEATHER, *including Tanning and Dressing, Manufacture of Boots, Shoes, Saddlery and Harness.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Boot trees	Wm. Upfield	Lancaster, Pa.	June 25, 1850
Buckles	Geo. R. Kelsey	Middletown, Conn.	Jan. 15, "
Buckles for harness	Solon Bingham, jr.	Poestenkill, N. Y.	Dec. 10, "
Buckles, harness	Jacob S. Embich	Green village, Pa.	May 21, "
Buckles, machinery for making four-sided	Alvin & Oliver B. North, and Stephen Frink	New Britain, Conn.	May 28, "
Harness, &c., rings for	Andrew Dietz	New York, N. Y.	Apr. 9, "
Harness, breast plate for	Orrin Ramsdell, ass'or to Joseph B. Sawyer and Sylvanus Sawyer	Westfield, Vt. Mouson, Mass. Templeton, Mass.	Feb. 19, "
Harness, hames	Andrew Dietz	New York, N. Y.	Apr. 2, "
Harness, hames	John Low	New Britain, Conn.	Apr. 9, "
Harness, hames, fastenings for	Timothy Taylor, ass'or to Mortimer Taylor	Purcell's store, Va. Govanstown, Md.	Jan. 15, "
Hide handling cylinders, beaters in	James R. Janis	Easton, Pa.	Mar. 19, "
Hides, machines for breaking	Charles Buchanan	North Whitehall, Pa.	Apr. 16, "
Leather, apparatus for splitting and stretching	Bradford Rowe	Albany, N. Y.	Apr. 30, "
Leather, machine for cutting in hollow-ware forms	Francis Durant and Onesiphore Pecqueur, ass'r to Richard E. Rubeau	Paris, France. Philadelphia, Pa.	June 18, "
Morocco, machines for finishing	Edward Bookhout and Henry Cochen, jr.	Williamsburg, N. Y.	June 11, "
Pegging jacks	Jacob Jenkins	Andover, Mass.	Oct. 15, "
Saddles, harness	Robert Spencer	Brooklyn, N. Y.	Aug. 6, "
Saddles, spring	Geo. Fisher	Raleigh, N. C.	July 16, "
Shoes, over	Peter Dorn	Philadelphia, Pa.	May 7, "
Stirrups, safety	Nathan Post	East Cleveland, O.	June 18, "
Tanning apparatus	Wm. H. Rosensteel	New Oxford, Pa.	Feb. 12, "
Terrets, fastening in saddle harness	Peter B. Cool	Columbus, O.	Mar. 12, "
Vats for tanning hides	Lewis C. England	Williamsburgh, N. Y.	Dec. 24, "

CLASS XVII.—HOUSEHOLD FURNITURE, *Machines and Implements for Domestic Purposes, including Washing Machines, Bread and Cracker Machines, Feather Dressing, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Annunciator, or bell telegraph	John Garvey	New York, N. Y.	Nov. 19, 1850
Bedstead fastenings	Matthew Elder	Mansfield, O.	Jan. 22, "
Bedstead fastenings	Robert R[illegible]sey	W[illegible]ington, Pa.	Feb. 19, "
Bedstead fastenings	Ch[illegible] Coolidge, ass'r to F[illegible] Harrington and C. C. Coolidge	Boston, Mass.	May 7, "
Bedstead fastenings	Charles H. Parker	New Geneva, Pa.	June 11, "
Bedstead fastenings	John Morrison	McArthurstown, O.	Oct. 29, "
Bedsteads	Will[illegible] Zaizer	Cincinnati, O.	Nov. 19, "
Bedsteads and sacking bottoms, portable	Samuel Whitmarsh	Northampton, Mass.	Oct. 8, "
Bedsteads, camp	Wm. C. Shaw James Stakeup	Philadelphia, Pa. Wilmington, Del.	Sept. 10, "
Bedsteads, folding	John Binder	Chelsea, Mass.	Jan. 15, "
Bedsteads, invalid	Alexander W. Bartrer	Suffolk co., Mass.	Mar. 5, "
Bedsteads, machinery for cutting screws on the rails of	Spencer Lewis	Tiffon, O.	Apr. 9, "
Bedclothes clasps	Francis A. Rockwell	Ridgefield, Conn.	Feb. 12, "
Beef, dried, apparatus for cutting	Daniel W. Goble, ass'or to G. S. Ward and G. F. Musselman	Newark, N. J.	July 9, "
Beefsteaks, preparing for cooking	Thomas G. Stagg	New York, N. Y.	Oct. 22, "
Bread, portable soup, preparation of	Gail Borden, jr.	Elizabethport, N. J.	July 30, "
Bureau drawers, fastenings for	Geo. W[illegible]	Galveston, Texas	Feb. 5, "
Casters for furniture	Solomon [illegible] Sillman	New York, N. Y.	Feb. 12, "
Chairs, exercising—see class XX, "Exercising chairs."			
Chairs, nursery	Samuel S. May	Sterling, Mass.	June 4, "
Clothes frames	Humphrey Kempton	Fairhaven, Mass.	Feb. 26, "
Clothes pins, machine for slitting	Oratia P. Allen	Rindge, N. H.	May 14, "
Coffee, apparatus for making	Nathaniel Waterman	Suffolk co. Mass.	Feb. 19, "
Coffee roasting	W. H. Trissler and Elias Brecht	Fairhaven, Mass.	Feb. 26, "
Comfits, kettle for manufacturing	Wm. Holt	Hartford, Conn.	Oct. 8, "
Crackers, machines for cutting	Wm. R. Nevins	New York, N. Y.	Aug. 20, "
Cream, process of preparing—see class I.			
Curtains, window, adjustable rollers for	Edward S. Clark	Suffolk co., Mass.	Feb. 19, "
Dough, method of kneading	Henry N. Rider	Adams, Mass.	Feb. 19, "
Fly-brushes	Samuel R. Wilmott	Lafayette, Ind.	Nov. 5, "
Fulling mills—see class III.			
Knives, spiral, machines for grinding—see class II.			
Mattresses, spring	John V. McElwee	Philadelphia, Pa.	April 2, "
Mattresses, spring	Wm. F. Ressegine	Cincinnati, O.	June 11, "
Meat cutting apparatus	John G. Perry	South Kingston, R.I.	Feb. 26, "
Meat, process for curing—see class IV.			
Quilting frames	Wm. T. Barnes	Buffalo, N. Y.	May 28, "
Quilting frames	Charles H. Cook	Coeyman's hollow, N. Y.	July 9, "
Refrigerators	Ephraim Larrabee	Baltimore, Md.	Feb. 26, "
Rule and socket joint	Charles Chinnock	New York, N. Y.	Feb. 12, "
Sad irons, furnaces for heating—see class V. "Furnaces."			
Sausage stuffers	Simon McNair	Hatborough, Pa.	Nov. 26, "
Sofa bedsteads	Edwin B. Bowditch	New Haven, Conn.	Feb. 26, "
Sofa bedsteads	A. G. Warren	Norwich, Conn.	May 21, "
Sofa bedsteads	Russell Scarrett	St. Louis, Mo.	Oct. 8, "
Stands, the construction of bases for	Ezra Ripley	Troy, N. Y.	Apr. 16, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Table furniture, machines for washing	Joel Houghton	Ogden, N. Y.	May 14, 1850
Tables, self-waiting	Josiah Lamb	New London, Ind.	Jan. 29, "
Tables, extension	Edwin F. Shoenberger	Pittsburg, Pa.	Nov. 19, "
Washing machines	Ransom Mareau	Lawrenceville, Pa.	Jan. 1, "
Washing machines	Joel Haines	West Middleburg, O	Feb. 5, "
Washing machines	Richard A. Fisher	Sunbury, Pa.	Nov. 5, "
Wash mixtures*	Stephen Crane	Charleston, S. C.	Jan. 29, "

* Antedated, Jan. 19, 1850.

CLASS XVIII.—ARTS, POLITE, FINE, AND ORNAMENTAL, *including Music, Painting, Sculpture, Engraving, Books, Printing, Binding, Jewelry, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Burning ornamental figures upon wood	Hamilton Wood	New York, N. Y.	Feb. 19, 1850
Copying presses, damping paper for	Geo. Burnham	Philadelphia, Pa.	Dec. 24, "
Daguerreotype pictures, cases for	Am F. Stiles	Southbury, Conn.	Jan. 22, "
Daguerreotype plate holders	Geo. Mallory	New York, N. Y.	Sep. 17, "
Daguerreotype plates, holding	Samuel Peck	New Haven, Conn.	April 30, "
Electrotyping	Geo. Mathiot	Washington, D. C.	Dec. 10, "
Figures, cutting in relief on wood	John T. Bruen	New York, N. Y.	Mar. 12, "
Files for keeping papers	Edwin D. Dodd	Cincinnati, O.	Jan. 15, "
Guitar heads and caps d'astra	James Ashborn	Walcottville, Conn.	April 16, "
Lozenges, machines for cutting	John W. Pepper	Salem, Mass.	July 2, "
Melodeon	Amos L. Swan	Cherry valley, N. Y.	May 7, "
Mouldings, machines for planing ornamental	John B. H. Chatain	New York, N. Y.	Mar. 19, "
Musical instruments, reed	Charles Austen	Concord, N. H.	April 30, "
Musical instruments, reed	James P. Sleeper	Worcester, Mass.	Oct. 29, "
Musical scales, mode of representing	W. B. Billings	Eastport, Me.	Sep. 10, "
Ornamenting textile fabrics*	Robert Milligan	Harden, Eng.	Aug. 13, "
Paper filers	William A. Collard	Cincinnati, O.	Sept. 17, "
Paper, machines for folding	Geo. R. Snow	Boston, Mass.	Oct. 15, "
Pen and pencil cases	Albert G. Bagley	New York, N. Y.	Jan. 1, "
Pens, fountain	Charles W. Krebs	Baltimore, Md.	Nov. 26, "
Pens, fountain	Ellsworth H. Hyde and Rollin L. Dawson	Haydenville, Mass.	Nov. 26, "
Pentagraphs	Allen Judd	Chicopee	Aug. 13, "
Photographic pictures, coloring	Aaron O. Dayton	Washington, D. C.	Mar. 12, "
Photographic pictures, producing upon transparent media	William B. Jones	Boston, Mass.	June 25, "
Photographic pictures on glass, &c	Frederick Langenheim	Philadelphia, Pa.	Nov. 19, "
Piano forte action	John Buck	New York, N. Y.	April 16, "
Piano fortes	James Poisson	New York, N. Y.	Aug. 13, "
Piano fortes	John Buck	New York, N. Y.	April 23, "
Piano fortes, upright	Lemuel Gilbert	Boston, Mass.	June 18, "
Pianos, sounding boards for	Conrad Meyer	Philadelphia, Pa.	July 9, "
Portfolios	James Shaw	Providence, R. I.	Dec. 24, "
Printing†	Bartholomew Beniowski, (Polish refugee)	London, Eng.	Oct. 29, "
Printing calico, mode of cleansing and drying gum elastic bands in	James Hunter, ass'or to Jeremiah Knight	Blockley, Pa. / Providence, R. I.	Aug. 27, "

* In England, March 8, 1850. † In England, Nov. 17, 1846.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Printing floor oil cloths*	Nathaniel B. Powers	Lansingburg, N. Y.	Mar. 26, 1850
Printing floor oil cloth	Leveret Moore	Balston, Spa, N. Y.	Mar. 26, "
Printing machines	Oliver T. Eddy	Baltimore Md.	Nov. 12, "
Printing presses	Charles W. Hawkes	Boston, Mass.	Dec. 24, "
Printing presses	Geo. P. Gordon	New York, N. Y.	Mar. 26, "
Printing presses	Frederick J. Austin	New York, N. Y.	May 7, "
Printing presses	Charles W. Hawkes	Boston, Mass.	June 4, "
Printing presses and paper machines, apparatus for receiving and transferring to the pile sheets of paper from	Isaac Adams	Boston, Mass.	Mar. 26, "
Printing presses, copper and steel plate	Elijah C. Middleton, Ed. Nevers, & Rob't Neale	Cincinnati, O. / Mount Carmell, O.	Nov. 19, "
Printing presses, cylinder†	Bartholomew Beniowski	London, Eng.	Aug. 13, "
Rule and socket joint—see class XVII.			
Seraphines	Rufus H. Green	Poultney, Vt.	Feb. 19, "
Stereotype plates, casting	Jason M. Mahan	Philadelphia, Pa.	Sept. 24, "
Studs for shirt bosoms	James P. Heiss	Philadelphia, Pa.	Feb. 12, "
Type cases, printers'	John Bell	Harlem, N. Y.	Jan. 8, "
Types, metallic, engraved plate &c., preparing the face of	Luke Vander Veer Newton	New York, N. Y.	Aug. 20, "
Writing and drawing, clamps for holding paper in	Eliakim B. Forbush	Buffalo, N. Y.	Sept. 3, "

* Antedated Sept. 26, 1849. † In England, Oct. 14, 1847.

CLASS XIX.—FIRE-ARMS *and Implements of War, and parts thereof, including the Manufacture of Shot and Gunpowder.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Barrels for fire arms, method of making	Jesse Pannabecker	Elizabeth towns'p Pa	Aug. 6, 1850
Breech pin, piston, devices for moving and holding	Wm. W. Marston	New York, N. Y.	June 18, "
Cartridges, winged metallic	Alonzo D. Perry	New York, N. Y.	Mar. 5, "
Caps, percussion, machine for forming and charging	Geo. Wright	Washington, D. C.	Sept. 24, "
Chargers attached to fire arms	Orville B. Percival, and Asa Smith	East Haddam, Conn / New York, N. Y.	July 9, "
Fire arms, repeating	Samuel Colt	Hartford, Conn.	Sept. 3, "
Fire arms, revolving hammer	Geo. Leonard, jr.	Shrewsbury, Mass.	July 9, "
Gun, percussion, method of preventing accidental discharge in the	John Warflein	Philadelphia, Pa.	April 30, "
Lock for fire arms	Nathan B. Cook	Chicago, Ill.	Aug. 27, "
Lock for fire arms, toothed segment	Dexter H. Chamberlain	Boston, Mass.	May 14, "
Locking, apparatus, the repeating fire arms	Joshua Stevens	Chicopee, Mass.	Nov. 26, "
Revolving breech fire arms	Hans Iverson	New York, N. Y.	Mar. 26, "
Revolving chambered fire arms	Samuel Colt	Hartford, Conn.	Sept. 10, "
Revolving fire arms, method of attaching cylinder in	Dexter H. Chamberlain, ass'nor to Thomas J. Whittemore	Boston, Mass. / Cambridge, Mass.	April 23, "
Rifles, machinery for giving increased twist in cutting	Edwin Williams and Jas. Culbertson	Kenton co., Ky.	Mar. 12, "

CLASS XX.—SURGICAL AND MEDICAL INSTRUMENTS, *including Trusses, Dental Instruments, Bathing Apparatus, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Chairs and supporters, obstetric	Asa Blood	Jarnesville, Wis	Aug. 27, 1850
Dental and surgical chairs	Flavius Searle	Springfield, Mass	Mar. 25, "
Dentists' chairs	Abraham M. Asay	Philadelphia, Pa	April 23, "
Exercising chairs	Solomon Chapin	Ashland, O	Mar. 26, "
Horses, flying	Eliphalet S. Scripture	Greenspoint, N. Y	June 4, "
Leeches, mechanical	Marcellin Dellac	New York, N. Y	May 7, "
Legs, artificial	George W. Yerger	Philadelphia, Pa	Mar. 19, "
Legs, artificial	W. C. Stone	Boston, Mass	Dec. 17, "
Paring horses' hoofs, instruments for—see class XXII., "Horses' hoofs, &c."			
Pessaries	Jonathan M. Robinson	Charlestown, Mass	Nov. 19, "
Plasters, gauges for spreading	James M. Keep	Bath, Me	April 30, "
Respiring apparatus	Benj. J. Lane	Cambridge, Mass	July 2, "
Splints for fractures	Adam Hays	Madison, Ind	Aug. 13, "
Splints for surgeons	Benj. Welch	Larksville, Conn	Sept. 3, "
Supporters, abdominal	Samuel S. Fitch	New York, N. Y	Mar. 19, "
Supporters, obstetrical	Wm. W. Finch, Jacob Blaisdell and Leander Babbit	Essex co., N. Y	June 15, "
Supporters, obstetrical	Mary W. O'Meara	New York, N. Y	Mar. 12, "
Supporters, obstetrical	F. H. Chase	Clintonville, N. Y	Aug. 20, "
Supporters, utero vaginal	Russel Caulkens	Sandusky city, O	June 29, "
Teeth, setting artificial by atmospheric pressure	John A. Cleveland	Charleston, S. C	June 25, "
Truss pads	Frederick M. Butler	New York, N. Y	July 22, "
Trusses for hernia	Wm. R. Battle	Powelton, Ga	Jan. 22, "
Vaccinating, instruments for	Junius F. Tozer	Rochester, N. Y	Aug. 13, "
Vaccinating, instruments for	Henry Mellish	Walpole, N. H	Dec. 24, "

CLASS XXI.—WEARING APPAREL, *Articles for the Toilet, &c., including Instruments for Manufacturing.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Buckles, suspender	Wm. Scarlett	Newark, N. J	May 14, 1850
Buckles, suspender	Chas. Benedict, ass'or to Hotchkiss & Merriman Manufacturing Co	Waterbury, Conn	Oct. 22, "
Buckles, suspender	Elisha Steele	Waterbury, Conn	Dec. 3, "
Buttons, process of varnishing	Elisha M. Pomeroy	Wallingford, Conn	Feb. 19, "
Cap fronts, machines for cutting	Geo. Burgess	New York, N. Y	Feb. 26, "
Hat bodies, machines for making	Edw'd F. Condit, and Alfred Taylor, ass'or to W. Eaglesford	Springfield, N. J	Mar. 19, "
Hats, machinery for pressing	Bennett Potter, Jr	Templeton, Mass	Oct. 29, "
Hooks and eyes, attaching to paper cards	Peter Kirkham	Waterbury, Conn	July 30, "
Hooks and eyes, fastening upon cards, mode of	Ezra J. Warner	Waterbury, Conn	Nov. 5, "
Shirt studs and buttons	Benton P. Coston	Philadelphia, Pa	Aug. 27, "
Stays, ladies'	Louisa Baylis	Orriskany, N. Y	Sep. 10, "
Tailors' measures	Amos Stocker	Ogdensburg, N. Y	May 28, "
Tailors' measures	William W. Allen	Bordentown, N. J	Sep. 16, "

CLASS XXII.—MISCELLANEOUS.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Axes and hoes, application of electro chemical printing in colors to taking	Albert N. Henderson	Buffalo, N. Y	[illegible], 1850
Ballot boxes	Joseph A. [illegible], [illegible] to John P. [illegible] and Abner Hold[illegible]	Bloomington, Ind.; Helonsville, Ind.; Greensburg, Ind	Aug. [illegible], "
Branding tools—see class XIV.			
Embroidery [illegible] clamps for grinding	Henry S. Vrooman	Springfield, Mass	Nov. 5, "
Fire, apparatus for extinguishing—see class [illegible]			
Grapple, spring	Orra Warner and Chas. S. Gaylord	Gaylord's Bridge, Ct	Oct. 5, "
Harpoon, gun	Robt. Brown	New London, Conn	Aug. 20, "
Harpoon, gun	William Allerson	New London, Conn	Nov. 19, "
Harpoon and lances, gun	Robt. Brown	New London, Conn	Aug. 20, "
Harpoons, method of attaching lines to	Chas. F. Brown	Warren, R. I	Sep. 3, "
Horses, apparatus for breaking	Seymour Tomlinson	Washingt'n Hollow, N. Y	Sep. [illegible], "
Horses' hoofs, instruments for paring	Ashley Crafts and Ebenezer Weeks	Auburn, O	Jan. [illegible], "
Ice, scraper for removing snow from	Nathaniel J. Wyeth	Cambridge, Mass	[illegible], "
Locking portable safes to the floor	Henry Hotchsasser	Philadelphia, Pa	Feb. [illegible], "
Privies, apparatus for emptying	Florimond Da[illegible]by	New York, N. Y	Dec. 17, "
Stanchions for cattle	Geo. W. Hatch	Parkman, O	July 20, "
Store counters	Evan O. Thomas	Philadelphia, Pa	July 9, "
Tobacco, method of dressing cut	Gideon Wales	Liberty, N. Y	Mar. 26, "
Tobacco stems, curing	Thos. Hoyt	New York, N. Y	Jan. 8, "
Trap for catching flies	Joel B. Fuller and Geo. W. Pierce	Worcester, Mass	April 16, "
Trunks, arrangement of mirrors in	James Stevens	Middletown, Md	June 11, "
Wedges, &c., bevelling the surface of	William Field	Providence, R. I	Sep. 3, "
Whip lashes	David N. and Edward B. Day	Westfield, Mass	Feb. 5, "
Whips, raw hide, machines for polishing	Chas. Baeder	New York, N. Y	May 21, "
Whips, raw hide, manufacture of	Thos. J. Ba[illegible]	Lowell, Mass	Aug. 16, "

PATENTS RE-ISSUED DURING THE YEAR 1850.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.	RE-ISSUED.
Ball, loaded	Walter Hunt, ass'or to Geo. A. Arrowsmith	New York, N. Y.	Aug. 10, 1848	Feb. 26, 1850
Brick presses	Isaac Gregg	Philadelphia, Pa.	June 6, 1848	Sept. 17, "
Bridges and other structures, constructing, the truss frames of	William Howl	Springfield, Mass	Aug. 3, 1840	Sept. 3, "
Carding and spinning machines	Moses Chase, of whose patent George Law, deceased, is assignee, of whom R. S. S. Stewart is executor	Baltimore, Md.	Mar. 23, 1842	Jan. 1, "
Cartridge, method of attaching	Walter Hunt, ass'or to W. R. Palmer	New York, N. Y.	Aug. 10, 1848	Feb. 26, "
Carriages, railroad, manner of constructing so as to ease the lateral motion of the bodies thereof	Chas. Davenport and Albert Bridges	Cambridgeport, Mass.	May 4, 1841	Dec. 3, "
Churns	Z. C. Robbins	St. Louis, Mo.	June 1, 1849	Jan. 1, "
Curry combs	William Beach	Philadelphia, Pa.	Mar. 13, 1849	Feb. 12, "
Distilling apparatus	Chas. A. Krechler	Stockholm, Sweden	July 10, 1849	Feb. 26, "
Door knobs, shanks for	L. R. Livingston, J. J. Roggen and C. Adams	Pittsburg, Pa.	July 7, 1846	Oct. 1, "
Fire arms, concealed trigger for	Jacob Pecare and Josiah M. Smith	New York, N. Y.	Dec. 4, 1849	Aug. 13, "
Furnaces, portable	Merritt F. Potter	Charlemont, Mass.	Jan. 22, 1850	Oct. 22, "
Harvesters of clover heads and other grain	John Hinton	Packs Ferry, Va.	May 22, 1849	Aug. 13, "
Irregular forms, machinery for turning	Timothy Clark	New Haven, Conn.	Jan. 19, 1847	Nov. 12, "
Lard and tallow, machines for rendering	Ebenezer Wilson	Cincinnati, O.	Oct. 9, 1844	May 7, "
Leather, cutting and stretching	Bradford Rowe	Albany, N. Y.	Apr. 30, 1850	
Mills for grinding	Sidney A. Bantz and Wm. Andrews	Frederick, Md.	Dec. 4, 1849	Oct. 15, "
Paper, machines for boiling and washing rags for manufacturing	Geo. Spafford, ass'or to John Campbell	New York, N. Y.	Sept. 2, 1840	June 11, "
Planing machines	Calvin Emmons, Wm. Emmons administrator of	New York, N. Y.	June 27, 1848	May 21, "
Printing presses	Stephen P. Ruggles	Boston, Mass.	Nov. 10, 1840	Sept. 17, "
Pumps	Birdsill Holly	Seneca Falls, N. Y.	June 5, 1849	May 7, "
Screw machines, feeders for	Solyman Merrick	Springfield, Mass.	Mar. 7, 1846	May 7, "
Screws, wood, machine for cutting the threads of	Cullen Whipple, ass'or to A. Hodges, agent of the New England Screw Company	Providence, R. I.	Aug. 18, 1842	Mar. 5, "
Stoves, coal	Anson Atwood	Troy, N. Y.	May 14, 1850	Sep. 7, "
Stoves, cooking	James Root	Cincinnati, O.	July 18, 1848	Jan. 22, "
Stoves, cooking	Jordan L. Mott	New York, N. Y.	Aug. 22, 1848	April 30, "
Stoves, cooking	Darius Buck, deceased, Desire Buck, administrator of	Albany, N. Y.	May 20, 1839	Aug. 30, "

CLASSIFIED LIST OF PATENTS—CONTINUED.

DESIGNS.

DESIGNS.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bas relief of Henry Clay	C. Y. Haynes	Philadelphia, Pa.	Nov. 12, 1850
Blower stand	Walter Bryent	Boston, Mass.	Sep. 24, "
Bracket, cast iron	Walter Bryent	Boston, Mass.	Aug. 13, "
Bust of Daniel Webster	John C. King	Boston, Mass.	Sept. 17, "
Carriage plates	John S. Royce	Cuylersville, N. Y.	Nov. 19, "
Chandeliers	E. S. Archer and R. F. Warner	Philadelphia, Pa.	Mar. 19, "
Floor cloth, painted	James Hutchinson, assignor to D. A. E. and N. B. Powers	Lansingburg, N. Y.	May 14, "
Furnace, portable	C. W. Warnick, F. Leibrant, J. G. Abbott and A. Lawrence	Philadelphia, Pa.	Mar. 26, "
Grate frame and fender	James L. Jackson	New York, N. Y.	Oct. 15, "
Grate, portable	Amos Paul	New Market, N. H.	July 22, "
Lamps	E. S. Archer and R. F. Warner	Philadelphia, Pa.	July 9, "
Railings, iron	William Ballard	New York, N. Y.	Oct. 29, "
Register and ventilator, plates for	Charles T. Tuttle and James S. Bailey	Williamsburg, N. Y.	Sep. 24, "
Register and ventilator, plates for	Charles T. Tuttle and James S. Bailey	Williamsburg, N. Y.	Sep. 24, "
Register and ventilator, plates for	Charles T. Tuttle and James S. Bailey	Williamsburg, N. Y.	Sep. 24, "
Register and ventilator, plates for	Charles T. Tuttle and James S. Bailey	Williamsburg, N. Y.	Sep. 24, "
Register and ventilator, plates for	Charles T. Tuttle and James S. Bailey	Williamsburg, N. Y.	Sep. 24, "
Register and ventilator, plates for	Charles T. Tuttle and James S. Bailey	Williamsburg, N. Y.	Sep. 24, "
Spoon handles	Charles P. and George B. Gordon	Boston, Mass.	Nov. 19, "
Stoves	Henry L. Sheperd	Dayton, Ohio	Jan. 8, "
Stoves	Peter J. Simmons	Troy, N. Y.	Feb. 5, "
Stoves	J. G. Lamb and C. Harris, assignors to William C. Davis	Cincinnati, Ohio	Feb. 5, "
Stoves	William P. Cresson, David Stuart and Peter Seibert, assignors to William P. Cresson	Philadelphia, Pa.	Feb. 5, "
Stoves	William P. Cresson, David Stuart and Peter Seibert, assignors to William P. Cresson	Philadelphia, Pa.	Feb. 5, "
Stoves	Samuel D. Vose*	Albany, N. Y.	Feb. 12, "
Stoves	Samuel D. Vose†	Albany, N. Y.	Feb. 12, "
Stoves	Samuel D. Vose‡	Albany, N. Y.	Feb. 12, "

* Antedated Nov. 17 1849. † Antedated Nov. 17, 1849. ‡ Antedated Nov. 17, 1849.

CLASSIFIED LIST OF PATENTS CONTINUED.—DESIGNS.

DESIGNS.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Stoves	James H. Conklin, assignor to	Peekskill, N. Y.	
	S. B. Sexton & Co.	Baltimore, Md.	Feb. 19, 1850
Stoves	Jeremiah Green and George Warren	Troy, N. Y.	Feb. 19, "
Stoves*	Lathrop S. Beton	Rochester, N. Y.	Feb. 26, "
Stoves	William L. Sanderson, assignor to	Troy, N. Y.	
	Clute & Brothers	Schenectady, N. Y.	Feb. 26, "
Stoves	W. P. Cresson, David Stuart and P. Seibert, assignors to Wm. P. Cresson	Philadelphia, Pa.	Mar. 12, "
Stoves	W. P. Cresson, David Stuart and P. Seibert, assignors to	Philadelphia, Pa.	Mar. 12, "
	William P. Seibert	Philadelphia, Pa.	Mar. 12, "
Stoves	James H. Conklin	New York, N. Y.	Mar. 12, "
Stoves	Samuel A. Horse	Mechanicsville, N. Y.	Mar. 26, "
Stoves	James Wager	Troy, N. Y.	April 2, "
Stoves	Joshua Crandall, assignor to A. Cox & Co.	Troy, N. Y.	April 9, "
Stoves	David L. Bartlett	Baltimore, Md.	April 9, "
Stoves†	Richard Peterson, David Stuart, and Peter Seibert, assignors to R. Peterson	Philadelphia, Pa.	Mar. 26, "
Stoves	P. A. Palmer	Le Roy, N. Y.	April 30, "
Stoves	Washburn Race	Seneca Falls, N. Y.	May 14, "
Stoves	D. Root	Cincinnati, Ohio	May 21, "
Stoves	Asa C. Brownell	Providence, R. I.	May 28, "
Stoves	Joel C. Bailey and Russell Wheeler	Utica, N. Y.	May 28, "
Stoves	Amos Paul	New Market, N. H.	June 11, "
Stoves	Elijah P. Penniman	Rochester, N. Y.	June 18, "
Stoves	John F. Rathbone	Albany, N. Y.	June 18, "
Stoves	John F. Rathbone	Albany, N. Y.	June 18, "
Stoves	James Wager, David Pratt and Volney Richmond	Troy, N. Y.	June 18, "
Stoves	J. E. Owens, J. Ebert and E. G. Dyer	Hamilton, Ohio	June 25, "
Stoves	Washburn Race	Seneca Falls, N. Y.	June 25, "
Stoves	Joshua Crandall, assignor to E. Johnson and D. B. Cox	Troy, N. Y.	July 2, "
Stoves	Calvin Dean	Braintree, Mass.	July 9, "
Stoves	S. S. Jewett and F. A. Root	Buffalo, N. Y.	July 9, "
Stoves	Apollos Richmond, assignor to A. C. Barstow & Co.	Providence, R. I.	July 16, "
Stoves	James H. Conklin and A. W. Jones, assignors to James	New York, N. Y.	
	MacGregor, jr.	Wilton, N. Y.	July 22, "

* Antedated Aug. 28, 1849. † Antedated Dec. 27, 1849.

Stoves	Job E. Owens, Jacob Ebert and E. G. Dyer	Hamilton, Ohio	July 22, "
Stoves	Reuben J. Blanchard, assignor to Billings P. Learned and George H. Thatcher	Albany, N. Y.	Aug. 13, "
Stoves	Sherman S. Jewett and F. H. Root	Buffalo, N. Y.	Aug. 13, "
Stoves	Robert Donavan	Pittsburg, Pa.	Aug. 20, "
Stoves	William L. Sanderson, assignor to S. Cole and G. C. Mosher.	Troy, N. Y.	Aug. 27, "
Stoves	Charles W. Warwick	Philadelphia, Pa.	Aug. 27, "
Stoves	Joseph G. Lamb	Cincinnati, Ohio	Sep. 24, "
Stoves	Joseph G. Lamb	Cincinnati, Ohio	Sep. 24, "
Stoves	William Savery	New York, N. Y.	Sep. 24, "
Stoves	Reuben J. Blanchard, assignor to Billings P. Learned and George H. Thatcher	Albany, N. Y.	Sep. 24, "
Stoves	Anthony W. Jones, assignor to Edward R. Brown	Albany, N. Y.	Oct. 1, "
Stoves	Charles Gilbert and Witchel G. Hallman	Philadelphia, Pa.	
Stoves	Ezra Ripley, assignor to G. W. Eddy	Waterford, N. Y.	Oct. 22, "
Stoves	Ezra Ripley, assignor to G. W. Eddy	Waterford, N. Y.	Oct. 22, "
Stoves	Laben Eddy	Taunton, Mass.	Oct. 29, "
Stoves	Reuben J. Blanchard, assignor to Billings P. Learned and George H. Thatcher	Troy, N. Y.	Nov. 12, "
Stoves	Apollos Richmond, assignor to A. C. Barstow & Co.	Providence, R. I.	Nov. 12, "
Stoves	D. Root	Cincinnati, Ohio	Nov. 12, "
Stoves	William B. Gleason, assignor to	Boston, Mass.	
	James Hartshorn and Winslow Ames	Nashua, N. H.	Nov. 26, "
Stoves	Samuel Pierce, assignor to Johnson, Cox & Fuller	Troy, N. Y.	Dec. 3, "
Stoves	Morris Smith and Benona S. Gleason	Le Roy, N. Y.	Dec. 3, "
Stoves	Charles A. Lambard	Augusta, Me.	Dec. 10, "
Stoves, coal	John T. Davy	Troy, N. Y.	June 4, "
Stoves, coal	John F. Rathbone	Albany, N. Y.	Aug. 13, "
Stoves, cooking	Jeremiah D. Green and George Warren	Troy, N. Y.	Apr. 16, "
Stoves, cooking	William L. Sanderson	Troy, N. Y.	June 25, "
Stoves, parlor	George W. King, assignor to Johnson, Cox & Fuller	Troy, N. Y.	Aug. 27, "
Umbrella stands	Walter Bryent	Boston, Mass.	June 4, "
Umbrella stands	Edward J. Delany, assignor to G. L. Heins and J. L. Adamson	Philadelphia, Pa.	

PATENTS EXTENDED DURING THE YEAR 1850.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF ORIGINAL PATENT.	EXPIRATION.	TERM OF EXTENSION.
Caoutchouc, application to cloths	Edwin N. Chaffee	New Brunswick, N. J.	Aug. 31, 1836	Aug. 31, 1850	Seven years from Aug. 31. 1850
Dye woods and dye stuffs, machine for cutting and shaving	Bereah Swift	Washington, N. Y.	Aug. 10, 1836	Aug. 10, "	Seven years from Aug. 10,
Friction matches	Eulia T. Swift, adm'r of A. D. Phillips	Charlestown, Mass.	Oct. 24, 1836	Oct. 24, "	Seven years from Oct. 24, "
Printing presses	Isaac Adams	Boston, Mass.	Mar. 2, 1836	Mar. 2, "	Seven years from Mar. 2, "
Turn-about for railroads	Jeremiah Myers	Meredith, N. H.	May 7, 1837	May 8, 1851	Seven years from May 8, 1851
Water wheels, steam engines, &c., the art of regulating the motion of	Nathan Scholfield	Norwich, Conn.	May 17, 1836	May 17, 1850	Seven years from May 7, 1850
Wool, hair, &c., forming web without spinning	John Arnold, Peter U. Morgan, adm'r of, and Geo. G. Bishop	Norwalk, Conn.	Oct. 1836	Oct. 20, "	Seven years from Oct. 20. 1850

ADDITIONAL IMPROVEMENTS GRANTED DURING THE YEAR 1850.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.	IMPROVEMENT ADDED.
Freezers, ice cream	H. P. Masser	Sunbury, Pa.	Dec. 12, 1848	Jan. 1, 1850
Stearine from oleine, process of preparing	John H. Smith	Brooklyn, N. Y.	Apr. 1, 1842	April 9, "
Tailors' measures	Amos. Stocker	Ogdensburg, N. Y.	May 28, 1850	Sept. 3, "

DISCLAIMERS ENTERED DURING THE YEAR 1850.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.	DISCLAIMER ENTERED.
Frog for railroads	John W. Hoffman, ass'or to Henry A. Landry.	Philadelphia, Pa. Camden, N. J.	Dec. 4, 1849	June 6. 1850
Turn-about for railroads	Jeremiah Myers	Meredith, N. H.	May 8, 1837	April 18. "
Turning wooden bowls, machinery for	Parley Hutchins, Jr., ass'or to A. Everett	Middlefield, Mass.	Sep. 25, 1847	Aug. 21. "

RENEWAL.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.	RENEWED.
Capstans	Andrew Morse, Jr.	Boston, Mass.	Mar. 12, 1836	Jan. 8. 1850

[J.]

ALPHABETICAL LIST OF PATENTEES FOR THE YEAR 1850.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
	Abbott, J. G.—see C. W. Warnick, et al.		
7297	Abendroth, William	Stoves, cooking	V.
	Adams, Isaac	Printing Presses	Extension.
7205	Adams, Isaac	Printing presses and paper machines, apparatus for receiving and transferring to the pile sheets of paper from	XVIII.
7421	Adams, Stephen H. and John A. Wood	Carding and mixing wool and cotton	III.
7485	Adams, Joseph and Levi	Felloes, machines for cutting	XIV.
	Adams, Calvin—see J. R. Livingston, et al.		
7589	Adancourt, Clinton L.	Bits, expansible	XIV.
7012	Adkins, Homer	Mowing machines	I.
7229	Aiken, Herrick	Wheels, wrought iron car, clamp to be used in the manufacture of	X.
7676	Aiken, Herrick	Wheels, wrought iron car	X.
7777	Albertson, William	Harpoons, gun	XXII.
7609	Alexandre, Lambert	Vessels, submarine	VII.
7793	Allen, Enos G. and Charles Briggs	Planing machines, cutters for	XIV.
7097	Allen, John L.	Carriage tops, elevating and lowering	X.
7715	Allen, John L.	Carriage tops, braces for	X.
7355	Allen, Oratio P.	Clothes pins, machines for slitting	XVII.
7641	Allen, William W.	Tailors' measures	XXI.
7817	Allen, William D.	Boiler feeder, balanced	VI.
7502	Aller, Zachariah	Cloth, wide, machinery for double folding	III.
7230	Allison, William C.	Hoisting, machines for	XII.
7501	Altender, Theodore	Compasses for measuring, joints for	VIII.
	Ambrose, Thomas A.—see Billings and Ambrose.		
	Ames, Winslow—see W. B. Gleason.		
7298	Andrews, John	Churns	I.
	Andrews, William—see Sidney A. Bantz and W. Andrews		
7077	Andrews, Solomon	Barrel machinery	XIV.
7449	Andrews, Solomon	Vessels, model for	VII.
7694	Anthony, David, sr.	Forks, hay, shanks of	I.
7767	Antisell, Thomas	Oils, filter for	IV.

	Arnold, John, Peter W. Morgan, adm'r of and Geo. G. Bishop	Wool, hair, &c. forming web without spinning	Extension.
273	Archer, E. S. and R. F. Warner	Chandeliers	Design.
299	Archer, E. S. and R. F. Warner	Lamps	Design.
7643	Armstrong, Samuel T. and Charles J. Gilbert	Gutta percha, process of working	IV.
	Arrowsmith, George A—see Walter Hunt.		
7299	Asay, Abraham M.	Dentists' chairs	XX.
7279	Ashburn, James	Guitar heads and caps d'astra	XVIII.
7179	Ashcroft, Edward H.	Boilers, method of applying fusible metal to	VI.
7522	Ashley, Marcius B.	Water wheels, directing water upon	XI.
	Ashmead, James H—see Vine & Ashmead.		
7356	Atwood, Anson	Stoves	V.
176	Atwood, Anson	Stoves, coal	Re-issue.
7768	Atwood, Charles and George Kellog	Jack chains, machine for making	II.
7317	Austin, Charles	Musical instruments, reed	XVIII.
7335	Austin, Frederick J.	Printing presses	XVIII.
7792	Ayers, Frederick J.	Nail plate, machine for feeding	II.
7064	Babbett, Avery	Spooling, machinery for	III.
7714	Babbett, Avery	Looms for weaving figured goods	III.
	Babbit, Leander—see Finch, Blaisdell & Babbit.		
	Babbit, Leander—see Chase, Weston & Babbit.		
7659	Bachelder, John	Sewing machine	III.
268	Bacon, Lathrop S.	Stoves	Design.
7373	Baeder, Charles	Whips, rawhide, machines for polishing	XXII.
6981	Bagley, Albert G.	Pen and pencil cases	XVIII.
	Bagley Daniel C.—see Carey & Bagley.		
	Bailey James S.—see Charles T. Tuttle.		
7013	Bailey Jesse	Gates for fences	IX.
286	Bailey, Joel C. and Russell Wheeler	Stoves	Design.
	Bailey, Yarnall—see Clayton & Bailey.		
7206	Baker, Collins B.	Brick presses	XV.
7486	Baldwin, Ethan	Condensers of steam engines	VI.
7280	Baldwin, Hiram	Car-couplings	X.
	Baldwin, Hiram—see Morrill & Baldwin.		
7778	Ball, Hosea	Ovens, bake	V.
330	Ballard, William	Railings, iron	Design.
7627	Balis, Louisa	Stays, ladies'	XXI.
180	Bantz, Sidney A. & Wm. Andrews	Mills, for grinding	Re-issue, XIII.
7131	Barker, Alex. W.	Bedsteads, invalid	XVII.
7557	Barlow, Nelson	Clutches, friction	XIII.
7132	Barnard, Wm. B.	Door springs, adjustable cord hook for	II.
7155	Barnard, Wm. B.	Sash stopper, spiral spring	II.
7255	Barnard, Wm. B.	Door springs and levers, arrangement of	II.
7422	Barnes, James	Whiffletrees, connecting with carriages	X.

ALPHABETICAL LIST—Continued.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7342	Barnes, Thomas J.	Whips, raw hide, manufacture of	XXII.
	Barnes, Turner—see Fleicher & Barnes.		
7391	Barnes, William T.	Quilting frames	XVII.
	Barnell, Jean, Joseph, Ernest—see Leclaire & Barnell.		
7469	Barstow, Benjamin	Vessels, method of fitting the bows of	VII.
	Barstow, A. C. & Co.—see Apollos Richmond.		
7716	Bartlett, Daniel, Jr.	Filtering cocks	XI.
278	Bartlett, David L.	Stoves	Design.
7032	Battle, William R.	Trusses for hernia	XX.
7571	Batty, Thomas	Sewing mallets	VII.
7281	Bauchman, Charles	Hides, machines for breaking	XVI.
161	Beach, William	Curry combs	Re-issue.
7695	Beaumont, William D.	Compound for imparting a gloss to cloths	IV.
7231	Beers, Elias T.	Ranges, cooking and heating air	V.
7806	Beers, Smith	Irregular forms, machines for turning	XIV.
	Bell, Alfred—see John Jack.		
7207	Bell, Hugh	Balloons and their appendages	XI.
6994	Bell, John	Type cases, printers'	XVIII.
7726	Benedict, Charles, assignor to Hotchkiss & Merriman, Manufacturing Company	Buckles, suspender	XXI.
7558	Beniowski, Bartholomew	Printing presses, cylinder	XVIII.
7738	Beniowski, Bartholomew	Printing	XVIII.
	Bennett, J. I.—see Benj. Crawford.		
7336	Benton, Ezra R.	Bran dusters	XIII.
7727	Bertholf, Henry W.	Straw cutters, feeding apparatus for	I.
7807	Betjeman, Henry I.	Mortises, machines for boring dove-tailed	XIV.
7374	Bevan, John	Girder, arched	IX.
	Bevington, Henry C.—see Knowles & Bevington.		
	Bickford, John C.—see Hayward & Bickford.		
7660	Bigelow, Erastus B.	Loom for weaving tapestry and Brussels carpets	III.
7450	Billings, A. M. & Thomas A. Ambrose	Hubs and axles, connecting and disconnecting	X.
7256	Billings, Hosea	Composition for covering hams	IV.
7628	Billings, W. B.	Musical scales, mode of representing	XVIII.
7014	Binder, John	Bedsteads, folding	XVII.
7818	Bingham, Solon, Jr.	Buckles for harness	XVI.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7208	Birdseye, Charles D., assignor to Waring Latting	Filters	XI.
7644	Birdseye, Charles D.	Cream, process of preparing	I.
	Bishop, George G.—see Arnold & Bishop.		
7357	Bissell, Levi	Connecting rods of steam engines and other machinery	XIII.
6995	Black, James	Engines, operated by steam, air and water	XI.
7065	Blackman, Samuel G.	Carding machines for preparing bats for felting	III.
	Blaisdell, Jacob—see Finch, Blaisdell & Babbit.		
7645	Blake, William	Spike machines	II.
7392	Blanchard, Alanson	Slats, boards, &c., apparatus for jointing	XIV.
307	Blanchard, Reuben J., ass'or to Billings P. Learned and George H. Thatcher	Stoves	Design.
321	Blanchard, Reuben J., ass'or to B. P. Learned and George H. Thatcher	Stoves	Design.
232	Blanchard, Reuben J., ass'or to B. P. Learned and George H. Thatcher	Stoves	Design.
7015	Bleier, Frederick	Dampers for cleaning stove pipes and regulating the draft in the same	V.
7849	Bless, Eleazer	Fanning mills	I.
7590	Blood, Asa	Chairs and supporters, obstetric	XX.
7337	Bogardus, James	Buildings, iron, construction of the frame, roof and floor of	IX.
7408	Bohrer, Joseph	Blinds, Venetian, suspending	IX.
7133	Bonwill, George	Planing slats for blinds, machinery for	XIV.
7433	Bookhout, Edward & Henry Cochen, Jr.	Morocco, machines for finishing	XVI.
7882	Boon, James	Wheels, cast iron car	X.
	Boon, Peter—see Spring & Boon.		
7661	Booth, James C.	Gold, process of refining	II.
7066	Borden, Gail	Bread, portable soup, preparation of	XVII.
7116	Bowditch, Edwin B.	Sofa bedsteads	XVII.
7677	Bowerman, Stephen	Harvester, cotton stalk	I.
7662	Bowers, Geo. W.	Grain cleaning machine	I.
7717	Boyd, Amos H.	Looms	III.
	Boyes, Burritt C.—see Nichols & Boyes.		
	Brackbill, Wm.—see Sherlock & Brackbill.		
7409	Bradford, Hezekiah and Ephraim Morris	Ventilating railroad cars	V.
7078	Bradshaw, Fields	Cotton stalks, cutting in the field	I.
7850	Bragg, Thomas	Starch from maize, manufacture of	IV.
7503	Bramble, W. W. W. H. T.	Weighing machines, self, for grain, &c.	XII.
	Brecht, Elias—see Trissler & Brecht.		
7404	Breed, Zephaniah	Rakes, hay, spring teeth of	I.
	Bridges, Albert—see Davenport & Bridges.		
	Briggs, Chas.—see Allen & Briggs.		
7358	Broomell, Benj. F.—ass'or to Israel Jackson	Grinding, steaming grain preparatory to	XIII.
7047	Brown, A. D.	Press, cotton	XII.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7318	Brown, A. H.	Pipes and hose, couplings for	XI.
7516	Brown, Charles F.	Steering apparatus	VII.
7610	Brown, Charles F.	Harpoons, method of attaching lines to	XXII.
7115	Brown, Christopher F.	Gas generating apparatus	IV.
7016	Brown, Charles W.	Mills for grinding	XIII.
7663	Brown, David S.	Plants, machines for fumigating	I.
	Brown, Edward R.—see Anthony W. Jones.		
7359	Brown, Hiram C.	Sash, balancing	II.
7435	Brown, James M.	Neck yokes, attaching to poles of carriages	X.
7410	Brown, Robert	Harpoon, gun	XXII.
7572	Brown, Robert	Harpoons and lances, gun	XXII.
285	Brownell, Asa C.	Stoves	Design.
7319	Broyles, Cain	Water, apparatus for drawing	XI.
7156	Bruen, John T.	Figures, cutting in relief on wood	XVIII.
7180	Bryant, Mertoun C.	Looms for weaving piled fabrics	III.
7452	Bryant, Mertoun C.	Looms for weaving cut piled fabrics	III.
287	Bryent, Walter	Umbrella stands	Design.
305	Bryent, Walter	Bracket, cast iron	Design.
314	Bryent, Walter	Blower stand	Design.
174	Buck, Darius, Desire Buck, administratrix of	Stoves, cooking	Re-issue.
7067	Buck, James	Excavating auger	IX.
7470	Buckup, Ernst	Air engines, method of distributing the air over the heating and cooling surfaces of	VI.
7678	Buffum, Arnold and Philip Thorpe	Washing gold, double acting rocker for	II.
7739	Bulkley, Charles S.	Enunciators, electro magnetic, for signals in hotels, &c.	XVII.
7769	Bulkley, Charles S.	Telegraphs, repeaters for electro-magnetic	VIII.
7794	Bulkley, Ralph	Ventilators, ship	V.
	Bullock, Thomas—see Hamilton & Bullock.		
6996	Bullock, William	Drills, grain	I.
7487	Bullock, William, assignor to Charles Graff	Lath cutting machines	XIV.
	Bundy, Jonathan—see White & Bundy.		
7591	Burdett, Stephen	Omnibuses, turning up the steps of	X.
7114	Burgess, George	Cap fronts, machines for cutting	XXI.
7696	Burnham, George	Presses for copying letters	XII.
7851	Burnham, George	Copying presses, damping paper for	XVIII.

7852	Burridge, Thomas H.	Planing machines, means for preventing backlash in the feed motion of	XIV.
	Burt, Enoch	Loom, power	III.
7209	Burton, Russell	Gold washers, method of connecting the sections of	II.
7764	Butcher, John	Cloth, apparatus for stretching and smoothing	III.
7517	Butler, Frederick M.	Truss pads	XX.
7048	Butler, John	Brick presses	XV.
7646	Calvert, Francis A.	Cotton, machinery for ginning or picking	III.
7471	Cameron, Charles C.	Sash stopper	I.
7592	Camp, Harry	Straw, machines for cutting	I.
7033	Camp, Herman	Candle mould apparatus	IV.
	Campbell, John—see George Spafford.		
	Cannon, John R.—see Joseph A. Hill.		
7770	Cannon, Samuel	Planters, seed	I.
7728	Card, Joseph	Presses, cheese	XII.
7079	Carey, Augustus C. and Daniel C. Bagley	Cloth, machinery for folding	III.
7017	Carnell, Charles	Brick presses	XV.
	Carpenter, Jesse—see Cullen Whipple.		
7647	Carpenter, Joseph W.	Preparing wheat for grinding, process for	IV.
7543	Carver, Hiram	Scrapers used by cabinet makers	XIV.
7750	Cary, Alanson	Irregular forms, machines for dressing	XIV.
7779	Case, Jarvis	Bee hives, working the doors of	I.
7338	Cathcart, James L.	Stoves, air-heating	V.
7504	Cathcart, James L.	Horse powers	XIII.
7050	Caulkins, Russell	Supporters, utero vaginal	XX.
	Chadbourne, Thomas—see David M. Smith.		
	Chaffee, Edwin M.	Caoutchouc, application to cloth	Extension.
7257	Chamberlain, Dexter H., assignor to C. W. and S. J. M Horner and W. G. Ladd	Dividers or compasses	VIII.
7300	Chamberlain, Dexter H. assignor to Thomas J. Whittemore	Revolving fire arms, method of attaching cylinder in	XIX.
7360	Chamberlain, Dexter H.	Lock for fire arms, toothed segment	XIX.
7210	Chapin, Solomon	Exercising chairs	XX.
7573	Chase, F. H., Adan Weston and Leander Babbit	Supporters, obstetrical	XX.
7505	Chase, Mark L. assignor to William L. Chase	Ploughs, hill-side	I.
158	Chase, Moses, of whom George Law is assignee, of whom Richard S. Stewart is executor	Carding and spinning machine	Re-issue.
7718	Chase, Silas E. and O. R. Chase, assignees of O. R. Chase	Sugar, machines for pulverizing	XIII.
7518	Chase, William L.	Ploughs, fastening the shoes of hill-side	I.
	Chase, William M.—see Halvor Halvorson.		
7181	Chatain, John B. H.	Mouldings, machines for planing ornamental	XVIII.
7611	Chichester, Lewis S.	Staves, machines for dressing	XIV.
7411	Chilson, Gardner	Grates, fireplace	V.
7436	Chilson, Gardner	Stoves, parlor	V.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7780	Chilson, Gardner	Furnaces, air-heating	V.
7832	Child, Orlando	Sawing with circular saws, mills for	XIV.
7090	Chinnock, Charles	Rule and socket joints	XIV.
7593	Chollar, John B.	Grates, coal, revolving	V.
	Churchill, William A.—see L. E. Hicks.		
7134	Clark, Alinzor	Forks, hay and manure, fastening for	I.
7697	Clark, Alinzor	Forks, hay	I.
7098	Clark, Edward S.	Curtains, window, adjustable rollers for	XVII.
6982	Clark, James M.	Grinding and bolting machines, combined	XIII.
7393	Clark, P. J.	Lamps, metallic, making the reservoirs of	V.
182	Clark, Timothy	Irregular forms, machinery for turning	Re-issue.
7594	Clayton, Sharpless and Yarnall Bailey	Lamps, gas, self-generating	V.
7612	Clemens, S. A.	Pressing cotton and other substances into bales	XII.
7451	Cleveland, John A.	Teeth, setting artificial by atmospheric pressure	XX.
7099	Clinton, Thomas G. George H. and Edward H. Knight	Lids for boiler holes of cooking stoves	V.
7135	Clinton, Thomas G. George H. and Edward H. Knight	Carriage jacks	X.
7595	Clinton, Thomas G. George H. and Edward H. Knight	Stoves, coal, for roasting, baking and broiling	V.
	Clute and Brothers—see William L. Sanderson.		
7719	Coates, William B.	Harvesters, hemp	I.
	Cochen, Henry, jr.—see Bookhout and Cochen.		
	Cole and Mosher—see William L. Sanderson.		
7679	Coleman, Willis P.	Mills for grinding	XIII.
7437	Collier, Elisha H.	Nails, method of making by rolling	II.
7232	Collins, Michael H.	Chimney caps	V.
7361	Collins, Thomas M.	Gold washer, cylinder and trough	II.
7648	Collard, William A.	Paper filers	XVIII.
7629	Colt, Samuel	Revolving chambered fire-arms	XIX.
7613	Colt, Samuel	Fire-arms, repeating	XIX.
7362	Colver, Nathaniel, ass'or to Nath'l Colver and W. S. Damrell	Wrench, revolving jaw	II.
7680	Colvin, Robert J.	Seed planters, slides for	I.
7363	Combs, Abel	Skeins, connecting with axles	X.
7833	Conant, Joseph and Lucius Dimock	Silk, &c., machinery for doubling and twisting	III.
7182	Condit, Edward F. and Alfred Taylor, ass'ors to W. Eaglesfield	Hat bodies, machines for making	XXI.
272	Conklin, James H.	Stoves	Design.
266	Conklin, James H., ass'or to S. B. Sexton & Co.	Stoves	Design.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
302	Conklin, James H. and A. W. Jones, ass'ors to James MacGregor	Stoves	Design.
7488	Cook, Charles H.	Quilting frames	XVII.
7596	Cook, Nathan B.	Lock for fire arms	XIX.
7283	Cook, Ransom	Hydraulic blowers for furnaces, &c.	XI.
7211	Cook, Ransom	Blast pipes for conveying heated air and gases to furnaces	II.
7423	Cook, Ransom	Hydraulic apparatus for producing blast	XI.
7157	Cool, Peter B.	Terrets, fastening of, in harness saddles	XVI.
7339	Coolidge, Chas. C., ass'or to Francis Harrington and Chas. C. Coolidge	Beadstead fastenings	XVII.
7597	Coston, Benton P.	Shirt studs and buttons	XXI.
	Cotter, Thos.—see Chas. A. Read.		
7795	Cowing, Henry	Ploughs, gang	I.
	Cox, A. & Co.—see Joshua Crandall.		
	Cox, D. B.—see J. Crandall.		
6983	Crafts, Ashley and Ebenezer Weeks	Horses' hoofs, instruments for paring	XXII.
6997	Crafts, Ashley and Ebenezer Weeks	Cultivators	I.
279	Crandall, Joshua, ass'or to A. Cox & Co.	Stoves	Design.
297	Crandall, Joshua, ass'or to E. Johnson and D. B. Cox	Stoves	Design.
6984	Crane, Jonathan and F. H. Hamilton	Hemp brakes	III.
7049	Crane, Stephen	Wash mixtures	XVII.
7051	Crawford, Benj., ass'or to Wm. B. English, J. J. Bennett, A. D. Frisbee and B. Crawford	Furnaces, steam boiler	V.
270	Cresson, W. P., David Stuart and P. Seibert, ass'ors to W. P. Cresson	Stoves	Design.
271	Cresson, W. P., David Stuart and P. Seibert, ass'ors to W. P. Cresson	Stoves	Design.
261	Cresson, Wm. P., David Stuart and P. Seibert, ass'ors to W. P. Cresson	Stoves	Design.
262	Cresson, Wm. P., David Stuart and P. Seibert, ass'ors to W. P. Cresson	Stoves	Design.
	Cresson, Wm. P.—see D. Stuart.		
7729	Crocker, Luther H.	Cores for casting, machines for making and holding	II.
7320	Crocker, Samuel E.	Slates, machines for holding and dressing	XV.
	Crossley, John, Joseph and Francis—see James Taylor.		
	Crowell, Sommers—see Krauser, Crowell & Krauser.		
	Culbertson, James—see Williams & Culbertson.		
7453	Culbertson, Thomas and George Scott	Brick presses	XV.
7158	Cunningham, James	Ventilating railroad cars	V.
7730	Cunningham, James	Locomotive engines, apparatus for reversing or stopping	VI.
7614	Current, David	Spinners, hand	III.
7375	Dakin, James H.	Bagasse, machines for drying	V.
7258	Dalton, John E. and Thomas Stevens	Bee hives, entrance to	I.

ALPHABETICAL LIST—Continued.

Number.	Patentees.	Inventions or discoveries.	Class.
	Damrell, W. S.—see Nath'l Colver.		
7649	Danford, Ebenezer	Harvesters, grain	I.
7472	Daniels, Reuben	Straw cutters	I.
7681	Daniels, Reuben	Vegetable cutter	I.
7853	Darling, Jeremiah	Hydraulic blowers	XI.
7834	Datichy, Florimond	Privies, apparatus for emptying	XXII.
183	Davenport, Charles and Albert Bridges	Carriages, railroad, manner of constructing so as to ease the lateral motion of the bodies thereof	Re-issue.
7559	Davis, James G. assignor to A. B. Warner and James G. Davis	Candles, manufacture of	IV.
7233	Davis, Robert W	Churns	I.
7340	Davis, Shadrach	Road scrapers, adjustable mouth piece to	IX.
7234	Davis, Waitman	Saw mills	XIV.
	Davis, William C.—see Lamb & Harris.		
7751	Davis, William H	Pumps, rotary	XI.
7159	Davy, John T	Furnaces for heating sad irons	V.
7284	Davy, John T	Grates for cooking stoves	V.
288	Davy, John T	Stoves, coal	Design.
7068	Day, David N. and Edward B	Whip lashes	XXII.
	Day, Horace H.—see John Pridham.		
7650	Day, Horace H. and Richard McMullin	Hose, India rubber	XI.
7285	Day, Willard	Telescopes, submarine	VIII.
7160	Dayton, Aaron O	Photographic pictures, coloring	XVIII.
	Dawson, Rollin L.—see Hyde & Dawson.		
7341	Delluc, Marcellin	Leeches, mechanical	XX
	De Massey, Robert—see Massey, Robert de		
7081	Dermond, John	Fliers and spindles, arrangement of	III.
7376	Devlan, Patrick S	Propellers, screw, arrangement and connexion of	VII.
7576	Dibble, Richard E	Boiler, steam	VI.
7519	Dickerson, Alexander	Iron, wrought, method of making directly from the ore	II.
7235	Dietz, Andrew	Harness, hames	XVI.
7259	Dietz, Andrew	Harness, &c., rings for	XVI.
7808	Dilks, Joseph	Boilers, steam, the alarm and indicator for	VI.
	Dimock, Lucius—see Conant & Dimock.		
7506	Dimpfel, Frederick P	Boilers, steam	VI.
7752	Dimpfel, Frederick P	Furnaces for steam boilers	VI.

Number.	Patentees.	Inventions or discoveries.	Class.
7136	Dixon, Joseph	Firing kilns for pottery ware, blacklead crucibles, &c	V.
7260	Dixon, Joseph	Steel, cast, process for making	II.
398	Doane, Calvin	Stoves	Design.
7018	Dodd, Edwin D	Files for keeping papers	XVIII.
7364	Dodge, John C	Spinning machines, preventing fibres from winding on drawing rollers in	III
7161	Dodge, Nehemiah	Pumps for deep wells	XI
309	Donavan, Robert	Stoves	Design.
7343	Dorn, Peter	Shoes, over	XVI.
7574	Dougherty, John	Propelling boats in shallow water, method of	VII.
7183	Downer, Charles	Weighing frames	XII.
7575	Drake, Imla	Boxes, compound wagon	X.
7630	Draper, William W	Paint mills	XIII.
6998	Du Bois, John	Gins, cotton	III.
7321	Dudley, Martin R	Driers, grain	V.
7394	Dunn, Arthur	Galvanic regulators for steam boilers	VIII.
7424	Durand, Francois, and Onesiphore Pecqueur, assignors to Richard E. Rabeau	Leather, machine for cutting into hollow ware forms	XVI.
	Dyer, E. G.—see J. E. Owens, et al.		
	Eaglesfield, W.—see Condit & Taylor.		
7438	Eastman, Robert	Stone, machines for dressing	XV.
7034	Eberly, David	Seeding apparatus, gearing and ungearing	I.
7698	Eberly, David	Seed planters	I.
	Ebert, J.—see J. E. Owens, et al.		
7137	Eccles, Samuel	Looms for figured fabrics	III.
6999	Eddy, George W	Wheels, car	X.
	Eddy, George W.—see Ezra Ripley.		
329	Eddy, Laben	Stoves	Design.
7771	Eddy, Oliver T	Printing machines	XVIII.
7302	Edes, Oliver	Rocker, submerged, for separating ores	II.
7138	Edwards, Nelson	Vessels' holds, apparatus for registering the depth of water in	VII.
7035	Elder, Matthew	Bedstead fastenings	XVII.
7781	Eldridge, David	Corn shellers	XIII.
7454	Ellicott, Peter F	Churns, atmospheric	I.
7322	Elliott, Hosea	Gearing for regulating speed	XIII.
7731	Elliott, J. T	Presses, cotton	XII.
7377	Embich, Jacob S	Buckles, harness	XVI.
7236	Emerson, Simeon F	Churns, atmospheric	I.
170	Emmons, Calvin, Wm. Emmons, adm'r of	Planing machine	Re-issue.
7082	Engles, Henry Adolph	Furnaces, air heating	V.
7854	England, Lewis C	Vats for tanning hides	XVI.
	English, W. B.—see Benj. Crawford.		
7473	Erb, John E	Straw cutter, feeders of a	I.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7651	Erkson, Gerrett	Clevis, plough	I.
7184	Evans, Evan L.	Vessels, apparatus for trimming	VII.
7664	Evans, Henry	Ropes, machinery for making	III.
7523	Everett, Addison	Wooden bowls, machinery for turning out	XIV.
	Everett, Addison—see P. Hutchins, Jr.		
7835	Everett, Edw'd and Chas., Jr.	Carriages	X.
	Everett, Edward—see Thomas Everett.		
7237	Everett, Stephen	Temples used in weaving double cloth	III.
7185	Fahrney, Samuel, ass'or to A. & J. Fahrney	Tools for preparing hubs for boxes	XIV.
	Fairbanks, E. & T. & Co.—see William P. Pierce.		
7652	Fairbank, John B.	Printing machines	XVIII.
	Farnsworth, Luke A.—see Lawrence & Farnsworth.		
7837	Fawkes, Joseph W.	Planters, seed	I.
7286	Ferris, Charles M. and Nathan Swan	Brick machines, preparing clay for	XV.
7238	Fessenden, Abijah	Filtering and drinking tubes, pocket	XI.
7162	Fessenden, Asa	Pill boxes, machinery for making	XIV.
7615	Field, William	Washers, etc., beveling the surfaces of	XXII.
7598	Finch, Edward B.	Stoves, with circular shaking grate	V.
7019	Finch, William W., Jacob Blaisdell and Leander Babbit	Supporters, obstetrical	XX.
7261	Finkle, Milton	Heddles, wire, machinery for making	III.
7616	Finzel, Conrad W.	Sugars, draining	IV.
7412	Fisher, Charles F.	Shafts, etc., of sheet iron, method of making	II.
7507	Fisher, George	Saddles, spring	XVI.
7753	Fisher, Richard A.	Washing machines	XVII.
7186	Fitch, Samuel S.	Supporters, abdominal	XX.
7836	Flanders, Joseph F.	Metal, sheet, machinery for cutting and bending	II.
7083	Flautt, George	Boring machines, augers for	XIV.
7212	Fletcher, George, Sr.	Bee moth traps	I.
7213	Fletcher, George, Sr., and Turner Barnes	Planters, seed	I.
7301	Fletcher, George, Sr.	Drilling stone, machines for	IX.
7163	Flory, Wm. and George A. Grove	Planter, cultivating seed	I.
	Forbes, George—see Silas Stevens.		
7617	Forbush, Eliakin B.	Writing and drawing, clamps for holding paper in	XVIII.
7395	Foster, David	Boards, apparatus for jointing	XIV.
7117	Foster, Junius	Hubs, connecting with axles	X.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7489	Fowler, Benjamin	Furnaces for calcining gypsum	V.
	Frink, Stephen—see Norths & Frink.		
	Frisbee, A. D.—see Benjamin Crawford.		
7782	Frost, William	Mills for grinding and crushing	XIII.
7563	Fuller, Albert	Wheels, cast iron car	X.
7288	Fuller, Joel B. and George W. Pierce	Trap for catching flies	XXII.
7214	Fulton, Andrew	Packing, metal, compound hard and soft	VI.
7699	Gardner, Gervis S., assignor to G. S. Gardner and G. Rohr	Seeding apparatus for seed planters	I.
7118	Garlick, Isaac D.	Churn dashers	I.
7577	Garlick, Isaac D.	Reciprocating motion, changing rotary motion into	XIII.
7378	Garretson, John G.	Looms, hand	III.
7783	Garvey, John	Annunciator or bell telegraph	XVII.
	Gaylord, Charles S.—see Warner & Gaylord.		
7440	George, Ammi M.	Spike machine	II.
7052	Gesner, Abraham	Gas, manufacture of illuminating from bitumen	IV.
	Gilbert, Charles J.—see Armstrong & Gilbert.		
	Gilbert, Charles and W. G. Hallman	Stove	Design.
7441	Gilbert, Lemuel	Piano fortes, upright	XVIII.
7830	Gilman, Samuel H.	Cut off motion for puppet valves	VI.
7838	Gilman, Samuel H.	Engines, horizontal, expansion gear for	VI.
7344	Gitt, Daniel D.	Plough cleaners	I.
237	Gleason, William B., assignor to James Hartshorn and Winslow Ames	Stoves	Design.
	Gleason, Benona S.—see Smith & Gleason.		
7489	Goble, Daniel W., assignor to Gilbert S. Ward and George F. Musselman	Beef, dried, apparatus for cutting	XVII.
7100	Goddard, Solomon and Henry Warfield	Carriage top, raising and lowering	X.
7164	Goodhue, Perry	Stoves, air heating	V.
6986	Goodyer, Robert Burns and Benj. Hirst, assignors to Alfred Jenks	Looms, operating shuttle boxes in	III.
336	Gordon, Chas. P. and Geo. B.	Spoon handles	Design.
7396	Gordon, Cyrus D. and Samuel S. Gouldthrite	Smut machines	XIII.
7215	Gordon, George P.	Printing presses	XVIII.
7000	Goshon, Joseph G.	Smut machines	XIII.
7740	Goshon, Joseph G.	Winnowing machines	I.
7239	Gosnell, Lemuel W.	Stoves, parlor, air-heating	V.
	Gould, Benjamin—see Joseph W. Webb.		
	Gouldthrite, S. S.—see Gordon & Gouldthrite.		
	Graff, Charles—see William Bullock		
7720	Grant, Isaac T. and Daniel H. Viall	Grain cradle	I.
7139	Grant, William W.	Flax and hemp, machinery for dressing	III.
7653	Graves, Samuel L.	Corn shellers	XIII.
7240	Gray, George H., Sr.	Sash stopper	II.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7425	Green, Duff	Embankments, levees, etc., method of forming	IX.
267	Green, Jeremiah D. and George Warren	Stoves	Design.
280	Green, Jeremiah D. and George Warren	Stoves, cooking	Design.
7113	Green, Rufus H.	Seraphines	XVIII.
6985	Greene, Chauncey O.	Grates, coal	V.
7772	Greene, Samuel S.	Horse-shoe machinery	II.
177	Gregg, Isaac	Brick presses	Re-issue.
7426	Groat, Warner	Packing for oil boxes of axles, &c., adjusting	X.
7654	Groesbeeck, Sylvester	Cornices and mouldings, plaster, tool for forming	IX.
7187	Groshon, John P.	Planters, seed	I.
	Grove, George A.—see Flory & Grove.		
7216	Guiteau, Calvin	Magnetic needles, correcting	VIII.
7140	Hacker, George S.	Cars, railroad	X.
7070	Haines, Joel	Washing machines	XVII.
7665	Hall, Elijah	Looms, stop motion of	III.
	Hallman, W. G.—see Chas. Gilbert.		
7682	Halvorson, Halvor, assignor to William M. Chase	Loom	III.
7397	Hamilton, Edward	Tubes, copper, machinery for making	II.
	Hamilton, F. H.—see Crane & Hamilton.		
6987	Hamilton, Farwell H. and Thomas Bullock	Hemp scutchers	III.
7119	Hamilton, William	Railings, iron	IX.
7508	Hardaway, Moore	Spike machines	II.
7578	Hardeman, J. Locke	Hemp, machines for cutting	III.
7053	Hare, Robert	Manure, preparation of animal and other	I.
	Harrington Francis—see Charles C. Coolidge.		
	Harris, Conrad—see Lamb & Harris.		
7666	Harris, Darius W.	Thrashing machine	I.
7188	Harris, Sandy	Hoisting machines	XII.
7600	Harrison, John W.	Carriages, detaching horses from	X.
7544	Hart, Edson	Planters, seed	I.
7700	Hart, George	Mowing machine, mounting cutters of a	I.
7289	Harvey, Thomas	Fastener, combined shutter and sash	II.
7741	Haskins, Nathan	Car couplings	X.
	Hartshorn, Jas.—see W. B. Gleason.		
7524	Hatch, George W.	Stanchions for cattle	XXII.
7241	Haverstick, Levi	Planters, seed, construction of drill teeth in	I.
7413	Hawkes, Charles W.	Printing presses	XVIII.
7855	Hawkes, Charles W.	Printing presses	XVIII.
7165	Hayden, Whiting	Drawing rollers, regulators for	III.
7765	Hayes, John P.	Furnaces, portable	V.
331	Haynes, C. Y.	Bas relief of Henry Clay	Design.
7561	Hays, Adam	Splints for fractures	XX.
7189	Hayward, Francis D. and John C. Bickford	India rubber cloth, process of rolling	IV.
7020	Heath, John E.	Harvesting machines	I.
7520	Heath, John E.	Grain, machines for raking and binding	I.
7096	Heiss, James P.	Studs for shirt bosoms	XVIII.
7521	Henderson, Albert N.	Ayes and noes, application of electro-chemical printing in colors for taking	XXII.
7683	Herndon, John J.	Harvester, rice	I.
7701	Hey, Moses	Yarn, machinery for doubling and twisting	III.
7474	Hibbs, Jonathan	Thrasher, clover, setting the teeth on the concave of a	I.
7242	Hicks, Daniel	Hammer, forge, attachment of the, to its helve	II.
7839	Hicks, Lucien E., assignor to William A. Churchill and James Stanley	Eyelets, machine for making	II.
7490	Hight, Cornelius R. and John	Churn dashers, spiral	I.
7545	Hill, Joseph A., assignor to John R. Cannon and Abner Hobbs	Ballot boxes	XXII.
7166	Hills, Edwin	Presses, oil	XII.
173	Hinton, John	Harvesters of clover heads and other grain	Re-issue.
	Hirst, Benjamin—see Goodyer & Hirst.		
7190	Hoagland, George H.	Steam, method of employing the exhaust	VI.
7036	Hoats, Daniel	Corn shellers, concave of	XIII.
	Hobbs, Abner—see Joseph A. Hill.		
	Hodges, Alexander—see Cullen Whipple.		
7243	Hoffman, John W.	Railroad frog, oscillating, self-adjusting	IX.
7303	Hoffman, John W.	Lamps, safety	V.
	Hoffman, John W., assignor to Henry W. Landry	Frog for railroads	Disclaimer.
7618	Hogle, Orange W.	Rakes, hay, fastenings of	I.
7491	Holland, Joel K.	Manure, carts, for spreading	I.
7509	Hollen, Joseph	Knitting machines	III.
168	Holly, Birdsill	Pumps	Re-issue.
7702	Holt, William H.	Comfits, kettle for manufacturing	XVII.
	Homer, C. W. & S. J. M.—see Dexter H. Chamberlain.		
7601	Hoopes, John R.	Dryers, grain	V.
7414	Hope, John W.	Brick presses	XV.
7415	Hope, Joseph D.	Ploughs, gang	I.
7455	Horn, George H.	Telegraphs, electric	VIII.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7809	Horton, William H.	Tin cutting and bending machines, arrangement of the bending rollers in	II.
	Hotchkiss & Merriman, Manufacturing Co.—see Charles Benedict.		
7167	Hotchkiss, Gideon	Saw mills, noddle irons for	XIV.
7101	Hotchstraser, Henry	Locking portable safes to the floor	XXII.
7365	Houghton, Joel	Table furniture, machines for washing	XVII.
7840	Houghton, Joel	Grain cradle fingers	I.
274	House, Samuel A.	Stoves	Design.
7562	Houston, George	Weighing machines	XII.
7084	Hovey, Alvan	Rakes, horse	I.
7563	Hovey, William H.	Boxes and axles, packing	X.
7819	Hovey, William H.	Axles and shafts, bearings for	X.
	How, Thos. P.—see Yaw & How.		
7456	Howard, Jason G.	Tacks, carpet, machine for forming washers and attaching them to	II.
7667	Howe, Ephraim	Burning fluid	V.
175	Howe, William	Bridges and other structures, constructing the truss frames of	Re-issue.
7021	Howell, John and Wm. D., and Joseph Sipe	Clevis, substitute for the	I.
7001	Hoyt, Thomas	Tobacco stems, curing	XXII.
7085	Hubbard, M. G.	Carriage bodies, hanging	X.
7796	Hubbard, M. G.	Carriage bodies, hanging	X.
7037	Hubbard, William U.	Valve, grid iron slide	VI.
7002	Hughes, William M.	Ore washers	II.
163	Hunt, Walter, assignor to William R. Palmer	Cartridge, method of attaching a ball to	Re-issue.
164	Hunt, Walter, assignor to George A. Arrowsmith	Ball, loaded	Re-issue.
7602	Hunter, James, assignor to Jeremiah Knight	Printing calico, mode of cleansing and drying gum elastic bands in	XVIII.
	Hunter John W.—see Radley & Hunter.		
7191	Huntley, Hosea H.	Stoves, cooking	V.
	Hutchins, Parley, Jr., assignor to Addison Everett	Turning wooden bowls, machinery for	Disclaimer.
7069	Hutchinson, Charles B.	Staves, machines for cutting	XIV.
7416	Hutchinson, Charles B.	Rule, board and log	VIII.
282	Hutchinson, James, ass'or to D. A. E and N. B. Powers	Floor cloth, painted	Design.
7217	Hyde, Ellsworth H. and Rollin L. Dawson	Pens, fountain	XVIII.

7345	Hyde, James R.	Stoves, cooking	V
7086	Ingersoll, James	Trucks, Railroad	X.
7192	Innis, James R.	Hide handling cylinders, beaters in	XVI.
7218	Iverson, Hans	Revolving breech fire arms	XIX.
7379	Jack, John, ass'or to Alfred Bell	Wickets for lock gates	IX.
7072	Jackson, Charles and James Moir	Carding and drawing wool, engines for	III.
7304	Jackson, Henry	Stoves, double cooking	V.
	Jackson, Israel—see Benj. F. Broomell.		
326	Jackson, James L.	Grate frame and fender	Design.
7022	Jackson, Samuel	Cider mills	XIII.
7054	Janes, Adrian	Heating air by hot water, apparatus for	V.
7721	Jenkins, Jacob	Pegging jack	XVI.
	Jenks, Alfred—see Goodyer & Hirst.		
7380	Jenny, Edwin	Staves, machinery for sawing	XIV.
7219	Jennings, Andrew	Cutters, machines for forming rotary	II
7492	Jennings, Isaiah	Lamp tubes	V.
7244	Jennings, Lewis	Lock, revolving plate and tumbler	II.
300	Jewett, S. S. & F. H. Root	Stoves	Design.
308	Jewett, S. S. & F. H. Root	Stoves	Design.
7619	Jewett, S. S. & F. H. Root	Stoves	V.
7457	Johnson, A. Livingston	Shutters, the hinge of rolling iron	II.
	Johnson, Cox & Fuller—see Samuel Pierce.		
	Johnson, Cox & Fuller—see George W. Ring.		
	Johnson, E.—see J. Crandall.		
7262	Johnson, Jasper	Vises, parallel, method of working the pawl in	II.
7168	Johnson, John, ass'or to Elias Johnson	Looms for weaving piled fabrics	III.
7797	Johnson, M. Y., adm'r of James H. Johnson	Cordage, processes for rendering uninflammable	III.
	Jones, A. W.—see Conklin & Jones.		
325	Jones, Anthony W., ass'or to Edward R. Brown	Stove	Design.
7773	Jones, Aquilla	Paints, drying	IV.
	Jones, Henry C.—see Thomas Slaight.		
7856	Jones, John	Window blinds and their slats, apparatus for operating	II.
	Jones, Wm. B.—see Whipple & Jones.		
7564	Judd, Allen	Pentographs	XVIII.
7684	Judd, Oliver B.	Saw gate	XIV.
7755	Judson, Junius & Alfred, ass'ors to Junius Judson	Valves for governors	V.
7459	Keagy, Abraham	Stoves, cooking	V.
7565	Kean, W. B.	Bench hooks	XIV.
7245	Keeny, Abel	Grates, coal, agitating	V.
7323	Keep, James M.	Plasters, gauges for spreading	XX.
	Kellogg, George—see Atwood & Kellogg.		
7417	Kelly, Oliver A.	Looms, shuttle motion of	III.
7810	Kelly, William	Casting large kettles, metallic flask for	II.

ALPHABETICAL LIST—Continued.

Number.	Patentees.	Inventions or discoveries.	Class.
7025	Kelsey, George R.	Buckles	XVI.
7120	Kempton, Humphrey	Clothes frames	XVII.
7023	Kennish, William, ass'or to Cornelius S. Van Wagoner	Valves of hydraulic engines, arrangement of the	XI.
7525	Kershaw, Edward	Locks, prism, attachment of	II.
313	King, John C.	Bust of Daniel Webster	Design.
7141	King, Robert J.	Ploughs, corn	I.
7169	Kinsley, Lyman	Wheels, cast iron car	X.
7170	Kinsley, Lyman	Wheels, cast iron car	X.
6988	Kimball, John and Harvey Rice	Brakes, connexions of with cars	X.
7526	Kirkham, Peter	Hooks and eyes, attaching to paper cards	XXI.
7024	Kittle, Robert	Tonguing and grooving, machinery for	XIV.
	Knab, David C.—see Poisat & Knab.		
	Knight, Geo. H. and Edward H.—see Clinton & Knights.		
	Knight, Jeremiah—see James Hunter.		
7171	Knight, Sylvanus	Steam boilers, interior arrangement of	VI.
7546	Knowles, Calvin C.	Gold, process for amalgamating	IV.
7475	Knowles, Hazard and Henry C. Bevington	Harvester, cutters and rakers of a grain and grass	I.
7603	Knowles, Hazard	Saws	XIV.
7324	Knowles, Jonathan	Looms, let off motion of	III.
7774	Krauser, John, Sommers Crowell and Cyrus Krauser	Railings, iron	IX.
7798	Krebs, Charles W.	Pens, fountain	XVIII.
162	Krechler, Charles A.	Distilling apparatus	Re-issue.
	Ladd, W. G.—see Dexter H. Chamberlain.		
7263	Ladd, W. G., Jr.	Level, fluid	VIII.
260	Lamb, Joseph G. and Conrad Harris, ass'or to W. C. Davis	Stoves	Design.
322	Lamb, Joseph G.	Stove	Design.
323	Lamb, Joseph G.	Stove	Design.
7055	Lamb, Josiah	Tables, self-waiting	XVII.
340	Lambard, Charles A.	Stoves	Design.
7220	Lamborn, Lewis	Cultivator teeth	I.
	Landry, Henry A.—see John W. Hoffman.		
7476	Lane, Benjamin J.	Respiring apparatus	XX.
7703	Lane, Thomas W.	Gas metres	IV.
7305	Lanergan, Henry	Bridges, arch truss for	IX.
7784	Langenheim, Frederick	Photographic pictures on glass, &c.	XVIII.

Number.	Patentees.	Inventions or discoveries.	Class.
7785	Larkin, John E.	Augers, attaching to their handles	XIV.
7121	Larrabee, Ephraim	Refrigerators	XVII.
	Latting, Warring—see Charles D. Birdseye.		
	Law, George—see Moses Chase.		
	Lawrence, A.—see C. W. Warnick, et al.		
7246	Lawrence, Jabez F. and Luke A. Farnsworth	Blind and shutter opener and fastener	II.
7841	Lazelle, William H.	Fasteners, sash	II.
	Learned, Billings P.—see Reuben J. Blanchard.		
	Learned, B. P. and George H. Thatcher—see Reuben J. Blanchard.		
7668	Leavitt, O. S.	Hemp, drawing and parting fibres of	III.
7351	Leclaire, Edme Jean and Jean Joseph, Ernest Barnel	Oxide of zinc, manufacture of the	IV.
7704	Lee, John	Eaves trough and gutter machine	II.
7820	Leffel, James	Lever jacks	XII.
	Leibrandt, F.—see C. W. Warnick, et. al.		
7493	Leonard, George, Jr.	Fire-arms, revolving hammer	XIX.
7381	Lewis, Spencer	Wood, machines for sawing	XIV.
7264	Lewis, Spencer	Bedsteads, machinery for cutting screws on the rails of	XVII.
7172	Lidgerwood, Thomas	Lewis, lever	XII.
7287	Lillie, John H.	Electro-magnetic engines	VIII.
179	Livingston, Lawreston R., John J. Roggen and Calvin Adams	Door knobs, shanks of	II.
7477	Locke, John	Levels, collimating	VIII.
7510	Locke, John	Compasses, surveyors'	VIII.
	Lombard, Sanford H.—see A. M. Rice.		
7154	Long, James	Gas metres	IV.
7247	Loomis, Osbert B.	Churns, rotary	I.
7842	Loper, Richard F. and John W. Nystrom	Engine, steam, arrangement of	VI.
7265	Low, John	Harness hames	XVI.
7685	Lupton, Lewis	Carriages, dash board for	X.
7142	MacGregor, James, Jr.	Ranges, cooking and air heating furnaces connected therewith	V.
7143	MacGregor, James, Jr.	Furnaces, air heating	V.
7193	MacGregor, James, Jr.	Stoves, double oven cooking	V.
	MacGregor, James, Jr.—see Conklin and Jones.		
7756	Macomber, A. S.	Straw cutters	I.
6990	Maguire, William	Fastener and mover, blind and shutter	II.
7003	Maguire, William	Sash, counterbalancing by means of a heavy weight	II.
7026	Maguire, William	Lock, door	II.
7669	Mahan, Jason M.	Stereotype plates, casting	XVIII.
7511	Mallerd, William	Compounds, sizing for warps or yarns	IV.
7655	Mallory, George	Daguerreotype plate holders	XVIII.
7412	Maltby, Benj. K., ass'or to Ira M. Mead	Grate, apparatus for raising the, in cooking stoves	V.
6989	Mareau, Ransom	Washing machines	XVII.
7173	Marquart, John, Jr., ass'or to Henry Schreiner	Water casks, gauge for	XI.

ALPHABETICAL LIST—Continued.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7527	Marsh, Joseph	Churn dashers	I.
7443	Marston, William W.	Breech pin piston, devices for holding and moving	XIX.
93	Masser, H. B.	Freezers, ice cream	Additional imp'mt.
7342	Massy, Robert de	Sugar, defecating	IV.
7811	Mather, Orville	Spokes, machines for dressing	XIV.
7636	Mathews, Moses M.	Ink, printers', use of rosin oil in	IV.
7821	Mathiot, George	Electrotyping	XVIII.
7799	May, H. H.	Rails of railroads, method of securing	IX.
	May, Philip—see Bathelemy Thimmonier, Sr.		
7418	May, Samuel S.	Chairs, nursery	XVII.
7857	Mayfield, William D.	Pumps, attachments to, for agitating the surface of the water in the well	XI.
7382	Maynard, James A.	Tuyers, devices for discharging ashes from	II.
7757	McCoy, William	Kilns, lime	XV.
7670	McCulloh, Richard S.	Gold bullion, process of reducing	II.
7122	McDougal, Samuel T.	Scale beams	XII.
7248	McElwee, John V.	Mattresses, spring	XVII.
	McGriff, Allen R.—see Joseph Pollock.		
7566	McKinney, A.	Wagon tops, apparatus for regulating the setting of bows in	X.
7056	McLaughlin, Thomas	Valves, puppet, expansion gear for	VI.
	McMullin, Richard—see Day & McMullin.		
7800	McNair, Simon	Sausage stuffers	XVII.
	Mead, Ira M.—see Benj. K. Maltby.		
7528	Meinicke, Charles J.	Distilling spirits of turpentine	IV.
7858	Mellish, Henry	Vaccinating instruments	XX.
7057	Melsens, Louis Henri F., ass'or to Louis de Saulles	Sugar, manufacture of	IV.
7174	Menefee, Alexander F.	Flouring mills	XIII.
169	Merrick, Solyman	Screw machines, feeders for	Re-issue.
	Merrick, S. V.—see John H. Towne.		
7671	Metcalf, Joseph	Electricity, removing from wool in the process of manufacture	III.
7494	Meyer, Conrad	Pianos, sounding boards for	XVIII.
7786	Middleton, Elijah C., Edward Nevers and Rob. Neale	Printing presses, copper and steel plate	XVIII.
7579	Millar, John C.	Fulling mills	III.
7478	Miller, Joseph R.	Amalgamator, re-immersing	II.
7004	Miller, Lewis W.	Boring instruments, connecting cutters to shafts of	XIV.

7567	Milligan, Robert		
7529	Milner, George B.	Ornamenting textile fabrics	
	Moir, James—see Jackson & Moir.	Valve gear for steam engines	XVII.
7073	Montgomery, Richard		VI.
7346	Montgomery, Richard	Punching between rollers, method of	
7742	Montgomery, Richard	Excavator, the screw	II.
7221	Moore, Leverett	Boilers, corrugated	IX.
7479	Moore, Lewis	Printing floor oil cloth	VI.
7427	Morgan, Gideon	Planters, seed, seeding apparatus of	XVIII.
	Morgan, Peter U.—see Arnold & Bishop.	Cars for plank roads, wooden rails, &c	I.
7604	Morrill, Alden R. and Hiram Baldwin		X.
	Morris, Ephraim—see Bradford & Morris.	Drilling machines, self-acting, adjustable feed gear for	
7743	Morrison, John		II.
7656	Morrison, William	Bedstead fastenings	
	Morse, Andrew, Jr.	Ploughs, spring beams to	XVII.
7266	Mortimer, Charles	Capstans	I.
166	Mott, Jordan L.	Paint, process of making from bituminous coal	Renewal.
7347	Mott, Jordan L.	Stoves, cooking	IV.
7366	Mott, Jordan L.	Stoves, cooking	V.
7657	Mott, Jordan L.	Stoves, cooking	V.
7687	Murkland, Willian and Joseph Milner	Roadway for railroad cars and ordinary vehicles	V.
	Musselman, Geo. F.—see Daniel W. Goble.	Weavers' shuttle	IX.
	Myers, Jeremiah		III.
		Turn about for railroads	
7460	Myers, Nathaniel and Frederick C. Smith		Disclaimer and extension.
7271	Nash, Adkins	Sash stopper, arrangement of	
7348	Nash, William R.	Thrashers, endless aprons for	II.
7620	Neal, David S.	Churn dasher, working a rotary and vertical	I.
	Neale, Robt.—see Middleton, Nevers & Neale.	Car couplings	I.
7144	Nelson, Charles M.		X.
7461	Nelson, John R.	Stoves cooking	
	Nevers, Ed.—see Middleton, Nevers & Neale.	Straw cutters, mounting the knife of	V.
7580	Nevins, William R.		I.
	New England Screw Co.—see Cullen Whipple.	Crackers, machines for cutting	
7787	Newman, Martin, 2d		XVII.
7581	Newton, Luke Vanderveer	Excavating machines	
7306	Nichols, William R. and Burritt C. Boyes	Types, metallic, engraved plates, &c., preparing the face of	IX.
7480	Nock, Joseph	Grates, furnace, coal stirrers for	XVIII.
7027	Norcross, Nicholas G.	Lock bolt for shutters	V.
7087	Norcross, Nicholas G.	Saw mills, circular	II.
7398	North, Alvin and Oliver B., and Stephen Frink	Planing machines	XIV.
7194	Nystrom, John W.	Buckles, machinery for making four sided	XIV.
	Nystrom, John W.—see Loper & Nystrom.	Propeller, centripetal	XVI.
			VII.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7605	Odeon, Tilgath	Trusses, method of attaching yards to	VII.
7530	Olcott, Adrian	Stone, rubbing and polishing	XV.
7175	O'Meara, Mary W.	Supporters, abdominal	XX.
7531	O'Neil, John	Churns, atmospheric	I.
7195	Ostrander, Wm. and Wm. Webster	Tubes, method of forming sheet metal	II.
7621	Ostrander, J. F.	Planing machines	XIV.
7812	Otis, Melville	Nail plate feeder and turner	II.
294	Owens, J. E., J. Ebert and E. G. Dyer	Stoves	Design.
303	Owens, J. E., J. Ebert and E. G. Dyer	Stoves	Design.
7732	Pagett, Wm. C.	Ploughs, subsoil	I.
7642	Palmer, Aaron	Planters, seed, seeding rollers of a	I.
281	Palmer, P. A.	Stoves	Design.
7612	Palmer, P. A.	Ovens, heating elevated	V.
	Palmer, Wm. R.—see Walter Hunt.		
7547	Pannabecker, Jesse	Barrels for fire-arms, method of making	XIX.
7145	Paris, Charles E. and Charles H.	Composition for enameling hollow ware	IV.
7608	Park, Austin F.	Telegraph, electric, manipulator	VIII.
7428	Parker, Charles H.	Bedstead fastenings	XVII.
7307	Parkhurst, Stephen R.	Gins, cotton	III.
7548	Parkinson, Thomas	Gates, hanging and operating	IX.
7071	Parmelee, Dubois D.	Calculating machines	VIII.
7125	Parry, John C.	Casting chilled rolls, method of giving a rotary motion to metal in	II.
7383	Parry, John C.	Casting rolls, method of giving rotary motion to fluid iron in	II.
7859	Parry, John C.	Castings, hollow, method of loosening metallic cores from	II.
7325	Parsons, E. H. and S. E.	Saws, hanging in saw mills	XIV.
7367	Patterson, Horace	Splint machines	XIV.
7290	Patterson, James	Carriages	X.
289	Paul, Amos	Stoves	Design.
304	Paul, Amos	Grate, portable	Design.
7038	Pawling, John	Tuyere	II.
7399	Payne, Charles	Preserving wood, processes for	IV.
7146	Payne, William	Cars, apparatus for retaining on the rails	X.
7058	Pearl, Oliver	Bobbins upon spindles, driving	III.
7744	Pease, Dan., Jr	Grain screens, rotary	I.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7267	Pease, Julius A.	Sash-bearer, elastic roller	II.
172	Pecare, Jacob and Josiah M. Smith	Fire arms, concealed trigger for	Re-issue.
7326	Peck, Samuel	Daguerreotype plates, holding	XVIII.
	Pecqueur, Onesiphore—see Durand & Pecqueur.		
7268	Pierson, Jacob	Planters, seed, gearing for	II.
7481	Pierson, Jacob	Harvester, arrangement of cutters in a grass and grain	I.
7368	Pelton, A. S.	Thrashing machines	I.
290	Penniman, Elijah P.	Stoves	Design.
7495	Pennock, Samuel and Morton	Planters, seed, seeding apparatus of	I.
7822	Pennock, Samuel and Morton	Planters, seed	I.
7482	Pepper, John W.	Lozenges, machines for cutting	XVIII.
7496	Percival, Orville B. and Asa Smith	Chargers attached to fire arms	XIX.
7249	Perley, Charles	Stoppers, cat head and shank painter	VII.
7532	Perley, Charles	Windlass, jigger	XII.
7147	Perry, Alonzo D.	Cartridges, winged metallic	XIX.
	Perry, David—see Slaughter & Perry.		
7123	Perry, John G.	Meat cutting apparatus	XVII.
275	Peterson, Richard, David Stuart and Peter Seibert, assignors to Richard Peterson	Stoves	Design.
7059	Phelps, Edward	Gearing for sugar cane mills	XIII.
	Phillips, Alonzo D.—see E. T. Swift.		
7269	Phillips, William H.	Fire, apparatus for extinguishing	V.
	Pierce, Geo. W.—see Fuller & Pierce.		
7775	Pierce, Samuel	Stoves, cooking	V.
338	Pierce, Samuel, ass'or to Johnson, Cox & Fuller	Stoves	Design.
7270	Pierce, William P. ass'or to E. and T. Fairbanks & Co.	Scale beams	XII.
7349	Pierpont, William	Straw carriers	I.
7758	Pine, Joseph, ass'or to Benjamin Pine	Carriages, running gear of	X.
7568	Pirsson, James	Piano fortes	XVIII.
7250	Pirsson, Joseph P.	Condenser, surface for steam engines	VI.
7272	Pitcher, Leman B.	Regulators for machinery, hydraulic	XIII.
	Plumb, Hiram—see West & Plumb.		
7497	Pohl, Henry	Paper, machinery for measuring pulp in the manufacture of	III.
7124	Poisat, Anthony M. and David C. Knab	Distilling oleaginous matter	IV.
7582	Pollock, George	Registers, hot air	V.
7104	Pollock, Joseph, Allen R. McGriff, administrator of the estate of	Hulling clover seed	I.
7005	Pomeroy, Ebenezer G.	Iron, coating with copper, or its alloy	II.
7102	Pomeroy, Elisha M.	Buttons, process of varnishing	XXI.
7512	Poppenhusen, Conrad	Veneers, &c. machines for cutting	XIV.
7444	Post, Nathan	Stirrups, safety	XVI.
7745	Porter, Bennett, Jr	Hats, machinery for pressing	XXI.
7059	Potter, Merritt F.	Furnaces, portable	V.. Re-issued.

ALPHABETICAL LIST—Continued.

Number.	Patentees.	Inventions or discoveries.	Class.
181	Potter, Merritt F.	Furnaces, portable	Re-issue.
7462	Potter, Nathaniel	Roads, machine for repairing	IX.
7060	Potts, Lawrence H.	Piles, etc., method of sinking hollow, by exhausting the air from the interior of the same	IX.
	Powers, D., A. E., & N. B.—see James Hutchinson.		
7228	Powers, Nathaniel B.	Printing floor oil cloths	XVIII.
	Pratt, David—see Wager, Pratt & Richmond.		
	Prescott, Jedediah—see Rembert & Prescott.		
7273	Price, Joseph D.	Sprinkling streets, &c., apparatus for	XI.
7196	Pridham, John, assignor to Horace H. Day	India rubber, use of oxide of tin in the manufacture of	IV.
7103	Purdy, Peter M.	Fences, portable	IX.
7733	Pyron, Tapley B.	Carriages, apparatus for releasing horses from	X.
7197	Quimby, Phineas P.	Steering apparatus	VII.
7705	Quincey, Edmund	Harvester, grain and maize	I.
	Rabeau, Richard E.—see Durand & Pecqueur.		
293	Race, Washburn	Stoves	Design.
295	Race, Washburn	Stoves	Design.
7040	Radley, James and John W. Hunter	Spark arresters	VI.
7106	Ramsdell, Orrin, assignor to Jos. B. & Sylvanus Sawyer	Harness, breast plate for	XVI.
7107	Ramsey, Robert	Bedstead fastenings	XVII.
7198	Ransom, Franklin	Pumps for ships, &c.	XI.
7483	Ransom, S. H.	Stoves, cooking, construction of	V.
291	Rathbone, John F.	Stoves	Design.
292	Rathbone, John F.	Stoves	Design.
306	Rathbone, John F.	Stoves, coal	Design.
7251	Ray, Fowler M.	India rubber springs for cars, etc., manufacture of	IV.
7706	Ray, Fowler M.	Spring, vulcanized India rubber	X.
	Read, Charles A. and Thomas Cotter, assignors to Charles A. Read	Fulling cloth, machinery for	III.
7274	Reasin, James F.	Plough cleaners	I.
7126	Reed, Jesse	Steering apparatus, parallelogram	VII.
7063	Reed, John M. and William B. Willis	Flour bolts	XIII.
7028	Reed, Josiah G.	Spindles, bobbins for spinning	III.
7843	Rees, Edward	Cores for castings, composition for making	II.
7222	Rembert, Samuel S.	Thrashing harvesters	I.

7631	Rembert, Samuel S. and Jedediah Prescott	Cotton, picking from the bolls in the field	I.
7734	Renwick, Edward S.	Chair, wrought iron railroad	IX.
7429	Ressigine, William F.	Mattresses, spring	XVII.
7223	Reynolds, Ira	Ploughs, clevis	I.
7369	Reynolds, O. L.	Sewing machines	III.
7823	Rhodes, Dexter B.	Planters, seed	I.
7275	Rice, Augustus M., assignor to Sandford H. Lombard and A. M. Rice	Chimney caps	V.
	Rice, Harvey—see Kimball & Rice.		
7583	Rice, James D.	Boilers, steam, registers for	VI.
7350	Richardson, Cyrus	Valves, slide, arrangement of several in the same steam chest	VI.
301	Richmond, Apollos, assignor to A. C. Barstow & Co.	Stoves	Design.
333	Richmond, Apollos, assignor to A. C. Barstow & Co.	Stoves	Design.
	Richmond, Volney—see Wager, Pratt & Richmond.		
7533	Rider, Elias P.	Cotton batting, apparatus for sizing and drying	III.
7105	Rider, Henry N.	Dough, method of kneading	XVII.
7148	Riley, George	Glucose, process in the manufacture of	IV.
310	Ring, George W., assignor to Johnson, Cox & Fuller	Stoves, parlor	Design.
7291	Ripley, Ezra	Stands, the construction of bases for	XVII.
327	Ripley, Ezra, assignor to Geo. W. Eddy	Stoves	Design.
328	Ripley, Ezra, assignor to Geo. W. Eddy	Stoves	Design.
159	Robbins, Zenas C.	Churns	Re-issue.
7006	Robbins, Zenas C.	Churns	I.
7400	Roberts, Jesse	Fanning mills	I.
	Robertson, John W.—see John G. Webster.		
7824	Robinson, Frederick R.	Sewing machines	III.
7788	Robinson, Jonathan H.	Pessaries	XX.
7569	Robinson, Warren	Ventilators, ship	V.
7088	Rockwell, Francis A.	Bedclothes, clasps	XVII.
7463	Rodger, Charles	Cultivator, weed cutters of a	I.
6991	Rogers, John	Stump extractor, wheel and axle	IX.
7844	Rogers, John, Jr.	Mills for grinding	XIII.
	Roggen, John J.—see L. R. Livingston & Co.		
7513	Rohr, George	Planters, seed, seeding apparatus of	I.
	Rohr, George—see Gervis S. Gardner.		
7845	Rohr, David E.	Seeding cylinders, oscillating	I.
284	Root, D.	Stoves	Design.
334	Root, D.	Stoves	Design.
	Root, F. H.—see Jewett & Root.		
	Root, F. H.—see Jewett & Root.		
160	Root, James	Stoves, cooking	Re-issue.
7674	Rose, Timothy	Water wheels	XI.
7029	Rosensteel, William H.	Tanning apparatus	XVI.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7384	Ross, Charles	Canals, feed, regulators for	IX.
7759	Rouse, Wanton	Spinners, cop, operating the copping rail of	III.
7199	Routzahn, Nathaniel	Churn dashers	I.
7327	Rowe, Bradford	Leather, apparatus for splitting and stretching	XVI.
	Rowe, Bradford	Leather, cutting and stretching	Re-issue.
335	Royce, John S.	Carriage plates	Design.
7292	Ruck, John	Piano forte, action	XVIII.
7308	Ruck, John	Piano fortes	XVIII.
7584	Ruggles, Stephen P.	Metal, sheet, &c., machine for cutting	II.
178	Ruggles, Stephen P.	Printing presses	Re-issue.
7149	Russell, Charles W.	Fire places and throats of chimneys, construction of	V.
7534	Sabbaton, Joseph A.	Gas, coal, purifying	IV.
7813	Sabin, Harvey W.	Rakes, horse	I.
7293	Sage, Marcus & Silas S.	Planter, seed, attachment of harrow to	I.
269	Sanderson, William L., ass'or to Clute & Brothers	Stoves	Design.
269	Sanderson, Wm. L.	Stoves, cooking	Design.
311	Sanderson, Wm. L., ass'or to S. Cole & G. C. Mosher	Stove	Design.
7294	Sandoe, Anthony	Planters, seed, gearing of	I.
7688	Sanford, Gelston	Auger handle	II.
	Saulles, Louis de—see Louis H. F. Melsens.		
7150	Saunders, William H.	Axles, mail	X.
324	Savery, William	Stoves	Design.
7200	Sawyer, Edmund	Spike machines, movement of the pointing dies in	II.
	Sawyer, Jos. B. and Sylvanus—see Orrin Ramsdell.		
7309	Sawyer, Nathan	Brick presses	XV.
7846	Scales, Charles	Ships' timbers, instruments for laying down curves of	VII.
7370	Scarlett, William	Buckles, suspender	XXI.
7707	Scarritt, Russell	Sofa bedsteads	XVII.
7385	Schiele, Christian	Rubbing surfaces for regulating abrasion, form of	XIII.
7760	Schindler, Carl W.	Fats and oils, hardening	IV.
	Scholfield, Nathan	Water wheels, steam engines, &c., the art of regulating the motion of	Extension.

	Schreiner, Henry—see John Marquart, Jr.		
	Scott, George—see Culbertson & Scott.		
7630	Scott, Melchi	Smiths' strikers	II.
7419	Scripture, Eliphalet S.	Horses, flying	XX.
7535	Scripture, Eliphalet S.	Hubs with axles, connecting	X.
7224	Searle, Flavius	Dental and surgical chairs	XX.
7386	Seely, John M. and Wm. E. Tomlinson	Attachments to mills for preparing corn in the cob for grinding	XIII.
	Seibert, Peter—see Cresson, Stuart & Seibert.		
	Seibert, Peter—see Peterson, Stuart & Seibert.		
7498	Sellers, George Escol	Locomotive engines for working heavy grades, boilers and gearing of	VI.
7225	Severance, Augustus N.	Presses, cheese	XII.
7328	Severance, Augustus N.	Press boxes or vats for cheese	XII.
7658	Seversson, Benjamin	Wheels, cast iron railroad car	X.
7075	Sewell, William, Jr.	Water metres	XI.
	Sexton, S. B. & Co.—see James H. Conklin.		
7295	Seymour, Alfred B.	Rail, compound tubular	IX.
7549	Shaw, E. M.	Turning machines	XIV.
7860	Shaw, James	Portfolios	XVIII.
7633	Shaw, William C. and James Stalcup	Bedsteads, camp	XVII.
7636	Shellenberger, John	Scribing lumber, machines for	XIV.
7607	Sheperd, Henry L.	Stoves, cooking, arrangement of dampers in	V.
258	Sheperd, Henry L.	Stoves	Design.
7445	Sherlock, John and Wm. Brackbill	Feed apparatus for mills	XIII.
7550	Sherman, Robert S.	Churn dashers	I.
7634	Shield, George	Cylinders, steam, exhaust passages for	VI.
	Shipton, Thomas N.—see Signer & Shipton.		
7789	Shoenberger, Edwin F.	Tables, extension	XVII.
7387	Shuttleworth, John	Looms, power	III.
7831	Signer, John and Thomas N. Shipton	Planters, seed	I.
259	Simmons, Peter J.	Stoves	Design.
	Sipe, Joseph—see Howells & Sipe.		
7176	Slaight, Thomas, ass'or to Henry C. Jones	Lock bolts, method of operating	IX.
6992	Slaughter, Franklin and David Perry	Cordage, cotton, machinery for making	III.
7007	Slaughter, Franklin and David Perry	Cordage, cotton, machinery for making	III.
7747	Sleeper, James P.	Musical instruments, reed	XVIII.
7499	Sloan, Thomas J.	Screws, machines for cutting	II.
7748	Sloan, Thomas J.	Screws, wood, machines for nicking the heads of	II.
7801	Sloan, Thomas J.	Screw threading machine	II.
7446	Smith, Alexander	Parti-coloring yarn, apparatus for	IV.
7825	Smith, Alexander	Carpets, manufacture of two and three ply	III.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
	Smith, Asa—see Percival & Smith.		
7310	Smith, Benjamin M.	Propellers and chimneys for canal boats, arrangement of	XIII.
7296	Smith, David M., ass'or to Thomas Chadbourne.	Sewing machines	III.
94	Smith, John H.	Stearine from elaine, process of preparing	Additional Imprv't
	Smith, Josiah M.—see Pecare & Smith.		
7090	Smith, Leonard	Smut machines	XIII.
339	Smith, Morris & Benona S. Gleason	Stoves	Design.
7420	Smith, Samuel B.	Electro magnetic machines for shocks	VIII.
7689	Smith, William W.	Callipers	VIII.
7690	Snead, Charles S.	Dryers, grain	V.
7091	Snedaker, Samuel B.	Fasteners and window shutter openers, method of bolting in	II.
7722	Snow, George K.	Paper, machines for folding	XVIII.
7430	Snyder, Elisha S.	Thrashing machines	I.
7826	Sommers, Henry B.	Vessels, apparatus attached to for indicating the depth of water	VII.
7708	Southward, Eli F.	Grummet strap	VII.
7827	Southworth, Daniel H.	Planing machines	XIV.
171	Spafford, George, ass'or to John Campbell	Paper, machine for boiling and washing rags for manufacturing	Re-issue.
7551	Spencer, Robert	Saddles, harness	XVI.
7635	Spencer, Smith	Mortising machines	XIV.
7723	Sprague, John A.	Excavating and conveying earth	IX.
7008	Spratt, James	Alloys for points of lightning rods	IV.
7076	Spratt, James	Lightning conductors, attachments for	VIII.
7536	Spring, Charles A. and Peter Boon	Planing machines, arrangement of pressure and feed rollers in	XIV.
7637	Stadden, Robert	Hullers, clover	I.
7447	Stafford, J. R.	Mills for grinding	XIII.
7735	Stagg, Thomas G.	Beefsteak, preparing for cooking	XVII.
	Stalcup, James—see Shaw & Stalcup.		
	Stanley, James—see L. E. Hicks.		
6993	Stack, Lewis	Branding tools	XIV.
7276	Starkey, David G.	Oil cans	XIII.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7746	Starks, Nathan	Wheels, car, machines for making wrought iron	X.
7766	Starkweather, George	Curing meat, process for	IV.
7724	Stebbins, Erastus	Molasses gates	XI.
7814	Steele, Elisha	Buckles, suspender	XXI.
7431	Stevens, James	Traps, arrangement of mirrors in	XXII.
7802	Stevens, Joshua	Locking apparatus, the of repeating fire arms	XIX.
7388	Stevens, Silas, assignor to George Forbes	Knives, spiral, machine for grinding	II
	Stevens, Thomas—see Dalton & Stevens.		
7484	Stewart, Franklin	Lamps, safety tubes for	V.
	Stewart, Richard S.—see Moses Chase.		
7041	Stiles, Ann F.	Daguerreotype pictures, cases for	XVIII.
7514	Stiles, David, Jr.	Straw cutters, feeding apparatus of	I.
7151	Stimpson, Frederick H.	Ranges, cooking	V.
7161	Stimpson, Herbert H. and Frederick H.	Ranges, cooking, water backs for	V.
7402	Stocker, Amos	Tailors' measures	XXI.
95	Stocker, Amos	Tailors' measures	Additional imp'mt.
7847	Stone, W. C.	Legs, artificial	XX.
7338	Stoner, John B.	Clevises, plough	I.
7537	Stout, Joseph and James T. Stanton	Tubes of sheet metal, machines for forming	II.
7698	Stuart, David, assignor to William P. Cresson	Stoves, Franklin, blowers of	V.
	Stuart, David—see Cresson, Stuart and Seibert.		
	Stuart, David—see Peterson, Stuart and Seibert.		
7108	Subers, Isaiah	Fences	IX.
7352	Swan, Amos L.	Melodeon	XVIII.
	Swan, Nathan—see Ferris & Swan.		
7127	Sweeney, Peter	Stoves	V
7252	Sweet, Joseph	Scrapers, removable teeth for	IX.
7790	Swett, Samuel	Spark arresters	VI.
	Swift, Beriah	Dye woods and dye stuffs, machine for cutting and shaving	Extension.
	Swift, Erdix T., administrator of Alonzo D. Phillips	Friction matches	Extension.
7749	Swift, Horatio N.	Spike machines	II.
7128	Swope, Zuriel	Hydrolator	XI.
7624	Tatham, William P.	Pipe, lead, manufacture of	XI.
	Taylor Alfred—see Condit & Taylor.		
7403	Taylor, James, assignor to John, Joseph and Francis Crossley	Pile for rugs, &c., preparation of	III.
7030	Taylor, Timothy, assignor to Mortimer Taylor	Harness hames, fastenings for	XVI.
7570	Tennent, John C. and John Workman	Safety apparatus for steam boilers	VI.
	Thatcher, George H.—see Reuben J. Blanchard.		
7815	Thayer, Augustus	Auger handle	XIV.
7353	Theaker, Thomas C.	Valves, oscillating, of steam engines	VI.
7389	Theaker, Thomas C.	Saw mills, apparatus for setting logs in	XIV.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7623	Thimmonier, Barthelemy, Sr., assignor to Philip May	Sewing machines	III.
7500	Thomas, Evan O.	Store counters	XXII.
7861	Thomas, Samuel T. and Edward Everett	Looms for weaving figured fabrics	III.
7092	Thomas, William S.	Telegraphs, electric	VIII.
7311	Thompson, Henry G.	Lathe for turning a peculiar species of curve	II.
7848	Thompson, Robert	Lamps for lighting gas burners	V.
	Thorpe, Phillip—see Buffum A.		
7464	Timby, T. R.	Water wheels for increasing or diminishing their diameters	XI.
7585	Tingle, George	Paddle wheels, opening and closing bucket for	VII.
7201	Tingley, Albert H., assignor to E. W., H. F. and A. H. Tingley	Marble, machines for sawing	XV.
7625	Tomlinson, Seymour	Horses, apparatus for breaking	XXII.
	Tomlinson, W. E.—see Seely & Tomlinson.		
7623	Towne, John H., assignor to S. V. Merrick	Hammer, direct action steam	II.
7691	Townsend, Ashley	Thrashing machines and grain cleaners, endless aprons for	I.
7277	Townsend, Benjamin M.	Hay, machines for raking and loading	I.
	Totten, Joseph M	Friction rollers	X.
7560	Tozer, Junius F.	Vaccinating, instruments for	XX.
7371	Trees, James	Propeller, shell	VII.
7329	Trissler, W. H. and Elias Brecht	Coffee roasting	XVII.
7816	Trotter, Jonathan T.	India rubber, vulcanizing	IV.
7515	Truscott, Samuel	Car wheels, apparatus for regulating the contraction of	II.
7253	Tucker, Hiram	Mantel piece	IX.
7061	Turnbull, James, Jr., and Jno.	Looms, for piled fabrics	III.
315	Tuttle, Charles T. and James S. Bailey	Register and ventilator, plates for	Design.
316	Tuttle, Charles T. and James S. Bailey	Register and ventilator, plates for	Design.
317	Tuttle, Charles T. and James S. Bailey	Register and ventilator, plates for	Design.
318	Tuttle, Charles T. and James S. Bailey	Register and ventilator, plates for	Design.
319	Tuttle, Charles T. and James S. Bailey	Register and ventilator, plates for	Design.
320	Tuttle, Charles T. and James S. Bailey	Register and ventilator, plates for	Design.
7312	Ulam, David	Smut machines	XIII.
7093	Ulmann, Solomon B.	Castors for furniture	XVII.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7465	Underwood, John	Presses, cheese, self-acting	XII.
7466	Upfield, William	Boot-trees	XVI.
7330	Van Anden, William	Chairs, machine for making wrought iron railroad	IX.
7586	Van Brocklin, John	Bolts, rivets, etc., machine for heading	II.
7094	Vanderhoof, George	Trucks, connecting with car bodies	X.
7331	Van Der Veer, Benj. M.	Rules, board and log	VIII.
	Van Wagoner, Cornelius S.—see William Kennish		
	Viall, Daniel H.—see Grant & Viall.		
7552	Vine, William and James H. Ashmead	Gold, machines for beating	II.
7553	Vogel, Kasimir	Harness, weavers', machinery for dressing	III.
263	Vose, Samuel D.	Stoves	Design.
264	Vose, Samuel D.	Stoves	Design.
265	Vose, Samuel D.	Stoves	Design.
7761	Vrooman, Henry S.	Emery wheels, clamps for girding	XXII.
277	Wager, James	Stoves	Design.
293	Wager, James, David Pratt and Volney Richmond	Stoves	Design.
7226	Wales, Gideon	Tobacco, method of dressing cut	XXII.
7109	Wakefield, Charles A.	Planting barrows, seed	I.
7110	Wakefield, Charles A.	Planters, seed	I.
7862	Walker, Joseph N.	Mills for grinding	XIII.
	Walker, Robert—see Welch & Walker.		
7554	Walker, William and Matthew C.	Churn dashers	I.
7354	Walter, Amos	Stone, machine for polishing	XV.
	Ward, Gilbert S.—see Daniel W. Goble.		
7538	Ward, William E.	Bolt and rivet machine	II.
	Warfield, Henry—see Goddard & Warfield.		
7863	Waring George E.	Furnaces, hot air	V.
	Warner, A. B.—see Jas. G. Davis.		
7332	Warner, Chapman	Pipe coupling	XI.
7372	Warner, James N.	Stove pipes, joints of	V.
7762	Warner, Ezra J.	Hooks and eyes, fastening upon cards	XXI.
7709	Warner, Orra and Charles J. Gaylord	Grapple spring	XXII.
	Warner, R. F.—see Archer & Warner.		
276	Warnick, Charles W., F. Leibrandt, J. G. Abbott and A. Lawrence	Furnace, portable	Design.
312	Warnick, Charles W	Stoves	Design.
7404	Warren, A. G.	Sofa bedsteads	XVII.
7640	Warren, David	Plough cleaner	I.
	Warren, George—see Green & Warren.		
	Warren, George—see Green & Warren.		
7539	Warren, Thos. E.	Car seat backs	X.
7710	Washburn, Nathan	Wheels, cast iron car	X.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7129	Waterman, Nathaniel	Coffee, apparatus for making	XVII.
7467	Watkins, Miles S.	Carriages	X.
7725	Watson William	Harvester, maize	I.
7062	Webb, Joseph W., assignor to Benjamin Gould	Mills for grinding	XIII.
7711	Webb, Joseph W., assignor to Benjamin Gould	Straw cutters, adjustment of knives in	I.
7112	Webster, John G., assignor to John W. Robertson and John G. Webster	Cloth, measuring on looms	III.
	Webster, William—see Ostrander & Webster.		
	Weeks, Ebenezer—see Crafts & Weeks.		
7405	Weidman, John	Fanning mills	I.
7031	Weikart, Andrew	Boring machines	XIV.
7009	Welch, Augustus and Robert Walker	Shingles, machinery for dressing	XIV.
7626	Welch, Benjamin	Splints, surgeons'	XX.
7177	Welch, William T., Jr.	Brakes for carriages	X.
7042	Welsh, George	Shutters, window, chain and flange apparatus for opening and closing	II.
7692	Wescott, Amos	Door spring	II.
7095	West, Solomon and Hiram Plumb	Umbrella sticks, &c., machinery for turning	XIV.
7406	Westbrook, C. and Henry J. Rogers	Telegraphs, electro-chemical	VIII.
	Weston, Adan—see Chase, Weston & Babbit.		
	Wheeler, Russel—see Bailey & Wheeler.		
7130	Whipple, Cullen, ass'or to Jesse Carpenter	Yarn, machinery for spinning and making rope	III.
165	Whipple, Cullen, ass'or to Alexander Hodges, agent of the New England Screw Company	Screws, wood, machine for cutting the threads of	Re-issue.
7458	Whipple, John A. and William B. Jones	Photographic pictures, producing upon transparent media	XVIII.
7390	White, J. D.	Lathes for turning	XIV.
7555	White, James	Stoves, cooking	V.
7828	White, Jesse and Jonathan Bundy	Flour, elevating, cooling and conveying	XIII.
7829	White, Nelson D.	Pill boxes, machines for making	XIV.
7043	White, Stephen	Gases, preparing illuminating	IV.
7540	Whitehead, Jesse	Speeder, counter twist	III.
7152	Whiteley, Edward	Chimney caps	V

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
7202	Whitney, Asa	Wheels, cast iron car	X.
7313	Whitman, Shepherd	Brick presses	XV.
7712	Whitmarsh, Samuel	Bedsteads and sacking bottom, portable	XVII.
7314	Whiton, E. F.	Cloth, instruments for measuring	III.
	Whittemore, Thomas J.—see Dexter H. Chamberlain.		
7736	Whittlesey, Austin and Austin K.	Coulters to ploughs, fastenings of	I.
7227	Wicks, Edward	Planter, seed, the seed roller of a	I.
7278	Wilder, Mark	Gudgeons, wing	XIII.
7803	Willcox, Thomas T.	Looms, shuttle motions in	III.
7203	Williams, David R.	Blind slat operator	II.
7178	Williams, Edwin and James Culbertson	Rifles, machine for giving increased twist in cutting	XIX.
7044	Willis, William B.	Planters, seed	I.
	Willis, Wm. B.—see Reed & Willis.		
7763	Wilmot, Samuel R.	Fly brushes	XVII.
7864	Wilmot, Samuel R.	Weighing grain, machines for	XII.
7776	Wilson, Allen B.	Sewing machines	III.
167	Wilson, Ebenezer	Lard and tallow, machines for rendering	Re-issue.
7587	Winslow, J. A.	Vessels, method of carrying over shoals	VII.
7254	Winslow, Seth E.	Sash-stopper, spring, inclined plane and roller	II.
7045	Wisell, Eli K.	Chucks for boring and mortising machines	XIV.
7556	Wisell, Eli K.	Tenon bits	XIV.
7541	Wode, George	Bureau drawers, fastenings for	XVII.
7315	Wolf, David	Plough, corn, adjustable shares of	I.
7432	Woodbury, James A.	Planes for tonguing and grooving boards, &c.	XIV.
7111	Wood, Hamilton	Burning ornamental figures upon wood	XVIII.
	Wood, John A.—see Adams & Wood.		
7448	Wood, John F.	Scraper, combination of a guide tooth with an inclined	IX.
7804	Wood, Loftis	Boiler, cupola and grate combined	V.
7805	Wood, Loftis	Stoves, cooking	V.
7010	Wood, William	Shingles, machines for cutting	XIV.
7713	Woodside, Peter G.	Registers, warm air	V.
7693	Woodward, Isaac	Straw cutter	I.
7407	Woolson, Amasa	Cloth, machines for shearing	III.
	Workman, John—see Tennent & Workman.		
7333	Wright, Franklin	Smut machines, the rubbers of	XIII.
7675	Wright, George	Caps, percussion, machine for forming and charging	XIX.
7011	Wright, Oliver	Irregular forms, mills for sawing	XIV.
7534	Würflein, John	Gun, percussion, method of preventing accidental discharge in the	XIX.
7737	Wurtz, Jacob H.	Alum, processes for manufacturing	IV.
7153	Wyeth, Nathaniel J.	Ice, scraper for removing snow from	XXII.
7316	Yates, Peter	Reciprocating motion, a, changing into a rotary motion	XIII.

ALPHABETICAL LIST—Continued.

Number.	Patentees.	Inventions or discoveries.	Class.
7468	Yaw, Hiram and Thomas P. How	Waste gates	XI
7204	Yerger, George W.	Legs, artificial	XX
7588	Young, James	Stannates of potash or soda, processes for making	IV
7046	Young, John	Churns, atmospheric	I
7791	Zaiser, Wilhelm	Bedsteads	XVII

II.

INVENTIONS AND CLAIMS

FOR THE YEAR 1850.

No. 6981.—*Improvement in Pen and Pencil Cases.*

Having thus described my invention, I claim the auxiliary interior tube C, in combination with the two outside tubes A and B, in the manner substantially as herein described, and for the purpose set forth.

ALBERT G. BAGLEY.

No. 6982.—*Improvement in combining Grinding and Bolting Machines.*

What I claim as my invention, and desire to secure by letters patent, is the combination of an adjustable grinding mill, with an adjustable bolting machine, both worked on one shaft, and adapted to each other, so that both or either can be adjusted independent of the other, substantially in the manner and for the purposes above made known.

JAMES M. CLARK.

No. 6983.—*Improvement in Instruments for Paring Horses' Hoofs.*

Having thus described the mannner of constructing and using our combined gripe and lever knife for paring the feet of horses for shoeing, what we claim as our invention and desire to secure by letters patent, is the combination of the gripe (A,) arm (E,) and knife (D,) whether made with or without the adjustive plates (G,) and joint pin (B,) or in any way, substantially the same and of any suitable size and material.

ASHLEY CRAFTS.
EBENEZER WEEKS.

No. 6984.—*Improvement in Hemp Brakes.*

What we claim as our invention and desire to secure by letters patent, is the combination of the revolving rollers, with the swords or beaters arranged and operating substantially in the manner herein described.

JONATHAN CRANE.
F. H. HAMILTON.

No. 6985.—*Improvement in Coal Grates.*

What I claim as my invention, and desire to secure by letters patent, is the formation of a revolving cylinder grate, by placing circular grate bars or flanges around a hollow cylinder, a draft of cold air being passed through the said hollow cylinder for the purpose of cooling the same, at the same time making it answer the purpose of a hot air chamber substantially as above described.

CHAUNCY O. GREENE.

No. 6986.—*Improvements in operating Shuttle Boxes in Looms.*

Having thus described our improvements in looms, what we claim therein as new and desire to secure by letters patent is, shifting a series of shuttle boxes substantially as herein set forth by means of a corresponding series of cams, acting through levers, cords or other means, severally brought into action at the required intervals by the pattern wheel face, cam and spring, or other equivalent devices, the whole arranged and operated substantially as described.

ROBERT BURNS GOODYEAR.
BENJAMIN HURST.

No. 6987.—*Improvements in Hemp Scutchers.*

What we claim as our invention, and desire to secure by letters patent, is the combination of the circular back or head, with the inclined knives or scrapers, and the hub and rest, substantially as is herein mentioned.

F. H. HAMILTON.
THOMAS BULLOCK.

No. 6988.—*Improvement in Connections of Brakes with Cars.*

What we claim as our invention is the enclosure of said link or pin in a tube, coating or lining of India Rubber or other elastic substance, and securing said rubber in a box or casing so as to confine the same permanently in such way as to allow the action of the brake or other machinery, without wear or friction, rattling or noise.

JOHN KIMBALL.
HARVEY RICE.

No. 6989.—*Improvement in Washing Machines.*

What I claim as my invention and desire to secure by letters patent, is the combination of a bed of rollers moving at different velocities with a compressor for the purpose of washing, rinsing, and wringing clothes; substantially as herein set forth.

RANSOM MAREAN.

No. 6990.—*Improved Blind and Shutter mover and fastener.*

Having thus fully, clearly, and exactly described the nature and operation of my invention in window blind fasteners; what I claim therein as new and desire to secure by letters patent is, the combination of the finger (e,) and wheels (h) and (l,) with the gravitating catch (j,) its recess (p,) and spring (p',) and hook (n,) for moving, fastening, and unfastening the blind.

WILLIAM MAGUIRE.

No. 6991.—*Improvements in the Wheel and Axle Stump Extractor.*

What I claim as my invention, is the arrangement and combination of the axle or journals of the wheels and the axle or journals of the windlass barrel of a stump extracting machine, substantially in the manner, and with respect to the bed frame and other parts of the machine, as herein before specified and exhibited in the accompanying drawings, the same being for the purpose essentially as above set forth.

JOHN ROGERS.

No. 6992.—*Improvement in Machinery for making Cotton Cordage.*

Having thus fully described our improved machine for making cords or ropes, directly from cotton or other slivers, what we claim therein as our invention, and desire to secure by letters patent, is first, the improved form of the nipper heads E, (shown in figs. 4 and 7,) when the nippers (e,) are combined therewith, by means of the steadying pins q q. projecting from the inner edge of the nippers into guiding holes v, in the nipper heads, and by suitable actuating springs b, b, or their equivalents, substantially as represented and described; by means of which the nippers are prevented from becoming clogged and obstructed in their movements, and from pressing against the slivers, by the accumulation of trashy matter about them.

2nd. In combination with the planetary motion of the series of flyers that receive and twist the cotton slivers, and lay the threads formed thereby into a cord or rope as described, we claim the independently moving and self adjusting compressing forming block c, for giving a round and perfect form to the cord, or rope, (after its component threads have been laid together,) substantially in the manner herein set forth.

FRANKLIN SLAUGHTER.
DAVID PERRY.

No. 6993.—*Improvement in Branding Tools.*

I claim as my invention and desire to secure by letters patent, the combination of the inner with the outer shell, substantially in the manner described, as applied to the branding tool.

LEWIS STARK.

No. 6994.—*Improvement in Printers' Type Cases.*

I confine my claim to grooving the bottoms of type cases for the reception of the lower edges of the partitions and to securing these in them by glue, in the manner herein set forth, or of modes substantially the same.

JOHN BELL.

No. 6995.—*Improvements in Engines operated by Steam and Water.*

What I claim as my invention and desire to secure by letters patent, is the manner of combining steam, and air for the purpose of giving motive power to the wheel B, consisting in a jet of the former being thrown from the nozzle E, of the pipe C, into the pipe F, simultaneously introducing therein a quantity of the latter, which together are discharged through the lower orifice of said pipe F, into the buckets of the wheel, and displacing the water therein, causing said wheel to revolve, *in combination with* the pipe G, through which the hot air is drawn from the top of the box, or reservoir into the pipe F, and reintroduced with the steam into the box at its bottom, thus using it repeatedly over again. The apparatus, by means of which the above is accomplished, is constructed and arranged substantially in the manner described in the foregoing specification.

JAMES BLACK.

No. 6996.—*Improvement in Grain Drills.*

What I claim as new and of my invention, and desire to secure by letters patent is:

First. The rollers *a*, which rollers serve to clear the teeth from rubbish and govern the depth of the teeth.

Second. The spring z, in combination with the sheaves and teeth, by which arrangement the whole or a part of the teeth can be held by a spring of the same power, and range of movement that it would require for a single tooth.

Third. The moveable bar u', to which the team is attached, in combination with the mode of hanging the teeth by means of sheaves or other similar device, by which arrangement the teeth will pass over obstructions in which the action of the team in hauling the drill or cultivator will bring the teeth forward to their proper places as soon as they pass over the obstructions.

And Fourth. The feeding band, substantially in the manner and for the purpose set forth

WILLIAM BULLOCK.

No. 6997.—*Improvement in Cultivators.*

We do not claim to be the original inventors of any of the individual parts of this wheeled, rotary cylindrical cultivator, but what we do claim is the combination of the levers D, rollers A, and driving wheel G, in the manner and for the purpose set forth.

ASHLEY CRAFTS.
EBENEZER WEEKS.

No. 6998.—*Improvement in Cotton Gins.*

I claim the back ribs F, in combination with the front ribs E, they (THE BACK RIBS) being constructed with a horn or projection h, each, behind which they curve downwards, to allow the saws to pass twice between the ribs, to remove the motes, and other impurities, in the manner substantially as described.

JOHN DU BOIS.

No. 6999.—*Improvement in Car Wheels.*

What I claim as my invention and desire to secure by letters patent, in rail-road car wheels, is the combination of the rods which connect the hub and rim with the plate or plates, which also unite the hub and rim, substantially as herein described, whereby the plate or plates, are protected against fracture from any sudden jar, and the hub prevented from being separated from the rim should the plate or plates break, as herein described.

GEORGE W. EDDY.

No. 7000.—*Improvement in Smut Machines.*

What I claim as my invention and desire to secure by letters patent, is constructing the shoe, (having the perforated plate for separating large extraneous matter from the grain) with a screen D^2 for separating the cockle and cheat from the grain, and an imperforated plate D^3 and spout for conducting the same to the outside of the machine as described.

JOS. G. GOSHEN.

No. 7001.—*Improvement in Curing Tobacco Stems.*

What I claim as my invention and desire to secure by letters patent, is the process of curing stem or other parts of tobacco with charcoal, by combining or mixing the two together, substantially in the manner and for the purpose herein set forth.

THOMAS HOYT.

No. 7002.—*Improved Ore Washer.*

What I claim as my invention, and desire to secure by letters patent, is separating substances differing in specific gravity, or washing metallic ores, by means of oblique currents of water, and a horrizontal one passing over the same in a reverse direction, substantially in the manner herein described. The oblique currents being produced by inclined surfaces or their equivalents.

WM. M. HUGHES.

No. 7003.—*Method of counterbalancing Sash by means of a heavy weight.*

What I claim therein as new and desire to secure by letters patent, is counterbalancing the sash, (and consequently enabling it to be suspended at any desired point) by means of metallic racks within the window frame, these racks being operated by pinions rotating on fixed shafts within the window frame, and these pinions being driven by other racks attached to the sides of the sashes throughout their entire length, the whole being constructed and arranged in the manner, and for the purpose set forth.

WILLIAM MAGUIRE.

No. 7004.—*Improvement in connecting cutters to shafts of boring instruments.*

What I do claim as new and for which I desire to secure letters patent, is the fastening, by which the knives *(k & m)* are affixed to the mandrel, being a keyed ring, to sustain the shank of the knives firmly, in adjusting slots in the mandrel, substantially as above described.

LEWIS W. MILLER.

No. 7005.—*Improvement in Coating Iron with Copper or its alloy.*

What I claim as my invention or discovery, and desire to secure by letters patent, is—

First. The before described process of coating and impregnating iron in all useful shapes and forms, with copper or any alloy of which copper forms a part, the said process consisting of cleansing with sulphuric acid, defending the cleansed surface with a coating of clay or other aluminous earth—drying the same, and then plunging the article thus coated into melted copper, or some alloy of that metal.

Second. I also claim the use of the clay paste to protect the metal from oxidating during the process of alloying or coating the metal plates, or pieces of iron, as set forth herein.

E. G. POMEROY.

No. 7006.—*Improvement in Churns.*

What I claim therein as my invention, and desire to secure by letters patent, is the placing the inner surfaces of the series of outer blades a, a, in positions tangential, or nearly so, to their circle of rotation, when they are combined with the inclined inner series of blades b b, substantially in the manner and for the purpose as herein set forth. Not intending, however, to limit myself to the exact number, proportions, positions, and arrangement of the dasher blades, as herein described and represented, but shall vary them to suit the different sizes of churns required for operating upon milk, and for operating upon cream, whilst I attain the same results by means substantially the same as those herein particularly set forth.

Z. C. ROBBINS.

No. 7007.—*Improvements in Machinery for making Cotton Cordage.*

What we claim as our invention, and desire to secure by letters patent, is the constructing the nipper springs of parallel bars *n n*, (one or both of which may be made elastic,) having series of holes (or slots) formed in them for the reception of the connecting, and adjusting screw bolts *s s'*, for the purpose of enabling us to cause the several nippers to press with the same amount of power and elasticity, upon the slivers during their passage through the nipper heads; and also to vary the elasticity of the springs as circumstances may require, substantially as herein set forth.

F. SLAUGHTER.
DAVID PERRY.

No. 7008.—*Improvement in Alloys for Points of Lightning Rods.*

What I claim and desire to secure by letters patent as my invention, is the formation of an alloy, composed of English block tin, oxide of tin, antimony, bismuth, refined silver, platinum, and silex, in proportions as shown in the above specification, and for the purposes of being manufactured into lightning rod points.

JAMES SPRATT.

No. 7009.—*Improvement in Machinery for Dressing Shingles.*

What we claim therein as new, and desire to secure by letters patent, is the combination of two planes, (*c c*,) guided and moving to and fro in the straight converging grooves (*b*) with the spring-plates (*j j*,) in front of the plane-irons for holding the slab, and those (*k k*,) behind the plane-irons for discharging the finished shingle from the machine, the whole being arranged and operating as herein set forth.

AUGUSTUS WELCH.
ROBERT WALKER.

No. 7010.—*Improvement in Machines for Cutting Shingles.*

What I claim as my invention, and desire to secure by letters patent, is the mode of moving the carriage *G*, sideways, and forcing the same toward the knife, alternately, by means of the cams (*k k'*) moving over the grooved shaft *B*, by means of the bar *I*, and groove (*l*) operating on the curved bars *H*, cams (*m m'*) inclined bars (*k*,) bolts *J*, arranged in the tubes (*s*,) and pressed against the notches (*t*) of the slotted bars (*o*) by the spiral springs (*u*,) spring *L*, the whole arranged and operated, substantially in the manner and for the purpose herein set forth.

WILLIAM WOOD.

No. 7011.—*Improvements in Mills for sawing Irregular Forms.*

I claim the mode of raising, and lowering the table or platform G, on the segmental plates or bars H, for adapting the same to any thickness of timber to be cut, and keeping the middle of the timber between its top and bottom, always in a line with the centre, of which the segmental plates or bars H, form arcs of circles, through which (the centre) the saw passes, to prevent it from bending in the timber when sawing a curvilinear surface, by means of the ribs (*h*) having slots (*i*) near their ends, through which the screws (10) which enter the segmental plates or bars H pass, in the manner herein described.

OLIVER WRIGHT.

No. 7012.—*Improvement in Mowing Machines.*

Having thus explained my invention, I claim the master wheel *A*, constructed with cogs on its face, in combination with the rocking shaft *R*, constructed with two knobs or projections N^1, N^2, on it, to give a rocking motion to the said shaft, in the manner substantially as described.

HOMER ADKINS.

No. 7013.—*Improvements in Gates for Fences.*

What I claim as my invention, and desire to secure by letters patent, is the method of balancing and adjusting gates by the panel of fence secured to the gate posts, substantially as herein set forth.

JESSE BAILEY.

No. 7014.—*Improvement in folding Bedsteads.*

What I claim as my invention, and desire to have secured to me by letters patent, is arranging said centre joint with the centre rivet below the other two, in combination with the curving of the adjacent edges of the parts of the side bars, so as to rest upon said centre rivet as described; and also the forming of the inner connecting bar with lateral projections, or shoulders, which when the bedstead is open, shall rest on the top of the two cross bars of the bedstead adjacent to the joint in the side bars of the same, all as herein above set forth.

JOHN BENDER.

No. 7015.—*Improvement in Dampers for cleaning Stove Pipes and regulating the draft in the same.*

What I claim as my invention, and desire to secure by letters patent, is the scraper (F,) with the rods attached in such manner that it may be used for the purpose of cleaning the stove pipe, and also to act as a damper, as set forth in the above specification.

FREDERICK BLEIER.

No. 7016.—*Improvement in Mills for Grinding.*

I claim the employment of a sliding adjustable tube, within, and in combination with the brush of the stationary stone, and the spindle, for the purpose and in the manner, substantially as described.

CHARLES W. BROWN.

No. 7017.—*Improvement in Brick Presses.*

Having thus fully shown the construction and operation of my improvement, what I claim as new and desire to secure by letters patent, is—

First. The arrangement of levers B and C, by which arrangement the bearing of C, is near the fulcrum of B, thereby giving the operator power to start the brick out of the mould, and by which arrangement the motion of the piston is increased by the bearing of C on B.

CHARLES CARNELL.

No. 7018.—*Improvement in Files for keeping Papers.*

Having thus fully described as my invention, what I claim therein as new, and desire to secure by letters patent, is the top (*a*, *b*,) consisting of a stationary part for about half its length, and a lid hinged thereto for the remainder, in conjunction with the end lid (*g*,) and one or more side openings (*f*,) substantially after the manner, and for the purposes described—namely, that of combining with sufficient facility of reference, the greatest attainable dispatch, in the abstraction, and insertion of papers, and moreover constituting when closed, a secure and portable paper holder.

EDWIN D. DODD.

No. 7019.—*Improvement in Obstetrical Supporters.*

Having described the construction and use of our improved spine abdominal obstetrical supporter, what we claim therein as new and for which we solicit letters patent, is—

First. The combination of the back supporter A, feet straps E, E, and adjustive shoulder braces C, constructed as described, with the back pad B, by which the female is enabled to apply the necessary pressure to the back, by the simultaneous or alternate action of the shoulders and feet on the straps connected with the back pad, for relieving the labor and irritation of parturition, without the assistance of any other person, as herein fully set forth.

WM. W. FINCH.
JACOB BLAISDELL.
LEANDER BABBITT.

No. 7020.—*Improvement in Harvesting Machines.*

What I claim in the foregoing as my invention, and desire to secure by letters patent, is the method of cleansing the cutters by giving them at suitable intervals a larger vibration than ordinary, substantially in the manner herein set forth—thus detaching the dirt and gum which accumulates upon them.

J. E. HEATH.

No. 7021.—*Substitute for the Clevis.*

What we claim as our invention, and desire to secure by letters patent, is the combination of the crownhead A, and bolt D, with the upright, by which the plough is made to cut any width and depth desired, made substantially as herein described.

JOHN HOWELL.
WILLIAM D. HOWELL.
JOSEPH SIPE.

No. 7022.—*Improvement in Cider Mills.*

What I claim as my invention, and desire to secure by letters patent, is the particular combination of machinery used for the purpose of grinding and pressing fruits, and juicy substances, viz:

First. The cutter drum A, with its teeth *a*, fig. 2, running into teeth *b*, in bed mould B, used to grind the fruit or juicy substance.

Second. The strap C, fig. 1, made of felting, hair cloth, or other porous fabric, used to carry the pomice, or ground substance between the pressing drums D and E, where it is pressed, and to strain the juice thus expressed.

Third. The press drums D and E, used to press the juice from the pomice, or ground substance.

Fourth. The brush L, used to remove the pomice or ground substance, from the strap C, figs. 1 and 2, all of the above being performed by one application of power and continued rotary motion.

SAMUEL JACKSON.

No. 7023.—*Improved arrangement of the Valves of Hydraulic Engines.*

What I claim as my invention, and desire to secure by letters patent, is arranging four register valves upon one spindle, in such a manner with reference to each other, and their seats, so that the pressure upon any one of them shall be counterbalanced by the pressure upon some other of them, substantially in the manner herein described, for the purpose of regulating the induction and eduction to and from hydraulic engines.

WILLIAM KENNITH.

No. 7024.—*Improvement in Machinery for Tonguing and Grooving.*

What I claim as my invention, and desire to secure by letters patent, is the placing the finishing, grooving, and tonguing cutters *c*, *d*, in the same heads A, B, with the primary grooving, and tonguing cutters *a*, *a*, *a*, and *b*, *b*, *b*, and in reversed positions thereto, when the said cutter heads are connected to operating cranks at one end, and are jointed to working levers *e*, *e'*, at points between the primary grooving, and tonguing cutters, and the finishers, substantially as above described, for the purpose of giving to the said cutters the movements and action herein set forth.

ROBERT KITTLE.

No. 7025.—*Improvement in Buckles.*

What I claim as my improvement, and desire to secure by letters patent, is the mode of making buckles entire from a single piece of sheet metal as above described; the buckle opening and shutting by means of the spring given to it in the construction thereof, as aforesaid.

GEORGE R. KELSEY.

No. 7026.—*Improved Door Lock.*

Having thus fully, clearly, and exactly described the nature and construction of my combination lock, what I claim therein as new, is—

First. The combination of parts forming the key, constructed substantially as described, and represented, viz: the shaft with its slot (*a*,) the slide (*b*,) with its slots (*c*, *c'*,) pins (*d*,) rack (*f*,) jaws (*e*,) pinion (*g*,) and bit (*h*,) with its teeth (*i*).

Second. Constructing the knob with a central opening in its face, closed by a spring disc, for the purpose of introducing these through the semicylindrical spindle (*k*,) with its annular shoulder, and a key such as aforeclaimed, the shank of the knob being hollow, for the purpose of receiving the same.

Third. Arranging the bent lever (*h'*,) that lifts the spring tumbler (*e''*,) so that the key must operate this lever before it can be inserted into the notch (*o'*,) of the compound lever and tumbler (*b'*,) for lifting the same, substantially in the manner as described.

Fourth. Constructing the compound lever and tumbler (*b'*,) with the following characteristics, viz: so that its projection (*n''*,) in combination with the spring lever (*e''*,) prevents the bolt (*f*,) being forced back by pressure on its face, when the bolt has been thrown forward; so that its projection (*o''*,) in combination with the projection (*p'*,) on the latch (*p''*,) prevents the retraction of the same when the bolt (*f*,) is thrown forward; and so that its cam (*a''*,) prevents the spring (*z*,) in the spindle from throwing the catch (*y*,) on the other end of the lever (*x*,) into the cavity (*w*,) on the face of the shank of the knob, so long as the bolt (*f*,) is thrown forward; the knob being thereby permitted to rotate on the spindle when the bolt is thrown forward, and to rotate with the spindle when by the elevation of the compound lever and tumbler, the cam (a'',) is carried below the lever (x); the compound lever and tumbler (b',) being thus combined with the spring tumbler (e'',) the bolt (f',) the latch (p'',) the spindle (k,) through its lever (x,) and the knob (n,) substantially in the manner and for the purposes described.

WILLIAM MAGUIRE.

No. 7027.—*Improvement in Circular Saw Mills.*

What I claim as my invention, and desire to secure by letters patent, is the application to circular saw frames of rocker boxes, and a swing frame as herein set forth, and suspending said frame in position, by means of the driving belt as above described, for the free and successful operation of the saw, by the motion before mentioned.

N. G. NORCROSS.

No. 7028.—*Improvements in Spindles and Bobbins for Spinning.*

What I claim as my invention, and desire to secure by letters patent, is making the life spindle or bobbin tube, with two conical shoulders, substantially as described, in combination with the conical supports in which they run, one or both ends being adjustable, substantially as described.

And finally, I claim the method substantially as described of driving the life spindle by means of a warve tube running on a dead spindle, or a step, and embracing the lower end of the spindle, substantially as described.

JOSIAH G. REED.

No. 7029.—*Improvement in Winnowing Machines.*

Having thus described my improved winnowing machine, what I claim therein as new, and desire to secure by letters patent, is the combination of a series of wind passages (e,) with a separating chamber (D,) or other device for presenting the foul grain to the action of the blast, and a fan (C,) for producing the blast, substantially as herein set forth.

ABRAHAM STRAUB.

No. 7030.—*Improvement in Fastenings for Harness Hames.*

What I claim as my invention, and desire to have secured to me by letters patent, is the combination of the hook lever C, and metallic plate A, secured to the lower end of one of the hames H, for tightening or slacking the connecting strap D, attached to the lower end of the fellow hame H, and for the purpose herein fully set forth, by which the hames may be connected and disconnected instantaneously, by simply moving the hook lever (C,) in the arc of a circle—thus doing away with the troublesome and insecure fastening usually employed to connect the lower ends of hames.

TIMOTHY TAYLOR.

No. 7031.—*Improvement in Boring Machines*

I do not in this application claim to be the original inventor of an adjustive boring machine, to be affixed to the stationary timber to be bored, as I have heretofore patented such a machine, and as various combinations of mechanical devices to produce such a machine have been made and used, but what I do claim as my original invention and desire to secure by letters patent, is the combination of the jointed hook lever N P, pawl X, notched plate M,

perforated flanched plate T, crane C, adjustive clamping block E, with the adjustive stock A, for adjusting and confining the bearings of the boring tool to the timber to be bored in any desired position, for boring holes in the timber at any required angle without moving the timber, as described.

A. WEIKHART.

No. 7032.—*Improvement in Trusses for Hernia.*

What I claim as my invention, and desire to secure by letters patent, is the peculiar bend of the elliptical springs, as described in the foregoing specification, so as to cross them in front and make the spring on one side support the opposite side, thereby giving a better pressure with more ease and comfort to the wearer.

WILLIAM R. BATTLE.

No. 7033.—*Candle Mould Apparatus.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The before described mode of making candles by using the candles previously drawn from the moulds, to hold the wicks for the succeeding candles in the centres of the moulds, until the latter become sufficiently hard to sustain their own wicks as described.

Second. I claim the combination of the frames F, K, recessed candle holders H, I, J,—H′, I′, J′, frames M, M, and spools O[b] containing the continuous wicks N, with the candle moulds D, as described.

Third. I claim the employment of the revolving platform in combination with the hinged moulds, constructed as aforesaid, arranged and operated in the manner and for the purpose herein fully set forth.

Fourth. I also claim the manner of raising the outer end of the spout (Y,) of the vat Q, simultaneously with lowering the gate T, for the purpose of stopping the dripping of the tallow whilst turning the frame of moulds, by combining the spout with the gate by the stirrup roller and lever, as described. I do not however, intend to confine my claim to the precise construction described in the foregoing specification, but to use such a form of construction as may be the best adapted to accomplish the desired object, by means substantially the same. Neither do I claim any portion of the machine above described that has been practised successfully by others, prior to its being invented by myself.

H. CAMP.

No. 7034.—*For an Improvement in Gearing and Ungearing Seeding Apparatus.*

I do not claim the four double lever cog wheels J, or the horizontal level cog wheels F, as my invention, as they have been heretofore used in machinery and are old devices, but what I do claim as my invention and desire to secure by letters patent, are the devices used herein for gearing and ungearing the seeding apparatus, as described.

DAVID EBERLY.

No. 7035.—*Improvement in Bedstead Fastenings.*

My invention consists in giving such forms to the respective portions of the fasteners A, D, that they can be secured to the posts and rails of a bedstead, without making a mortise in either the one or the other, thereby producing a saving of labor in the manufacture of bedsteads; and also producing economy in the use of materials by enabling the posts to be made of smaller size than they are required to be when other forms of fasteners are made use of. Having thus fully described my improved bedstead fastener, what I claim therein as my invention, and desire to secure by letters patent, is the giving the portion D, of the fastener that is secured to the ends of a rail a tubular shape, and such a size that the portion thereof that projects from the end of a rail will embrace the fastening plate A, that is secured to the side of a post, when this arrangement is combined with the lugs *c*, *c*, projecting inwards from the extremity of D, and the notches *e*, *e*, and inclined planes *b*, *b*, on the plate A, substantially as herein set forth, by means of which the respective parts A, D, of the bedstead fastener can be secured to the posts and rails of a bedstead without forming a mortise in either the one or the other.

MATTHEW ELDER.

No. 7036.—*Improvement in the Concave of Cornshellers.*

What I claim as my invention, and desire to secure by letters patent, is—

First. I claim, connecting the opposite sides of the concave, substantially as herein described, whereby they may be moved simultaneously towards or from the cylinder, without changing their relative distances from the same.

Second. I claim the combination of the screen or grate with the punches for freeing its meshes from obstructions, substantially as described.

D. HOATS.

No. 7037.—*Improvement in the Gridiron Slide Valve.*

What I claim as my invention, and desire to have secured to me by letters patent, is the peculiar arrangement of the exhaust mortises or spaces *o*, *o*, *o*, &c., *p*, *p*, *p*, &c., in the sliding valve, *between* and *around* the inducting and educting passages *h*, *h*, &c., *b*, *b*, &c., through said valve, in combination with the elongated side slots or passages *g*, *g*, &c., through the valve seat leading to the exhaust chamber *q*, *q*, the whole arrangement and operation being substantially as herein above set forth.

WILLIAM W. HUBBARD.

No. 7038.—*Improved Tuyere.*

What I claim as new, and of my invention, and desire to secure by letters patent, is placing within a chamber, having numerous apertures at the top, and a discharge valve at the bottom, an upright pipe open at both ends, in the manner described, whereby a blast of the greatest intensity is delivered at the centre of the fire and the vertical pipe may be readily freed from ashes, cinders, &c.

JOHN PAWLEY.

No. 7039.—*Improvement in Portable Furnaces.*

I claim the mode herein described of constructing my portable furnace, viz: with a diving flue, open at the bottom, so as to adapt it readily for use to the boiler holes of cooking stoves, in the manner above specified.

MERRITT F. POTTER.

No. 7040.—*Improvements in Spark Arresters.*

What we claim as our invention, and desire to secure by letters patent, is—

First. The arranging of a series of chambers and channels between two conically shaped plates, the channels being so formed as to cause the products of combustion to impinge against that side of each of the dirt chambers, which has the openings and caps, and thereby force the sparks, dirt, &c. &c., into them, in the manner described herein.

We also claim the combination of the double conical cap or cover for the formation of the second series of dirt chambers, with the pipe (*p*,) the whole being combined and operating substantially as described herein.

JAMES RADLEY.
JOHN W. HUNTER.

No. 7041.—*Improvement in Cases for Daguerreotype Pictures.*

What I claim as my invention, and desire to secure by letters patent, is the new manufacture of daguerreotype cases, to wit: securing the picture in a glass tube or case provided with a magnifying lens, said tube being blackened on part of its inner surface, and admitting the light through another part, to the plate in the manner herein described.

ANN F. STYLES.

No. 7042.—*Chain and Flange Apparatus for opening and closing Window Shutters.*

What I claim as my invention, and desire to secure by letters patent, is the combination of links, and a centre nut with a stationary curved flange, exterior to the chain to guide the links in such a manner, that they may be operated to turn the centre pulley or nut, either by pushing or pulling, as herein described.

I also claim, in combination with the sliding bar and links herein described, the arm *e*, on the centre nut, and the notch *b*, on the *bar* for locking the shutter and taking the pressure off of the links when the bar is pushed in and the shutter fastened, as described.

G. WELSH.

No. 7043.—*Improvement in Preparing Illuminating Gases.*

I claim the method which I have described of producing hydrogen gas, oxide of carbon gas, and light carburetted hydrogen gas combined, freed, or nearly freed, from the presence of carbonic acid gas, by passing the gas evolved by the decomposition of water, through a mass of materials consisting of charcoal, coke, or anthracite coal, in combination with thin iron plates, or iron wires, or iron turnings heated to a high temperature; such compound gas, produced as aforesaid, being combined with heavy carburetted hydrogen gas, produced by the decomposition of resin, oil, fat, or pit-coal, or such other substances as herein before designated, as described. But I do not claim the modes herein described of decomposing the water.

I claim the use of small chains or other similarly connected pieces of metal, as a means of presenting a large amount of iron surface, for decomposing the resin, tar, oil, or fats, or other such substances herein before designated, such chains or other similarly united pieces of metal being so arranged as to expose the vapors disengaged from the above mentioned substances to a multitude of small divided and heated surfaces.

STEPHEN WHITE.

No. 7044.—*Improvement in Seed Planters*

I do not claim the frame, hopper, stirrer, slide, drills, nor any of the parts heretofore used in seeding machines. I only claim as my invention the employment of the flanged, supporting, conveying, cleaning and covering wheels A, made as described in combination with the rest of the machine, when made in the manner as above set forth, for planting cotton and other seeds, and for other purposes.

WM. B. WILLIS.

No. 7045.—*Improvement in Chucks for Boring and Mortising Machines.*

What I claim in the before described machine for mortising and turning, as my invention and desire to secure by letters patent, is the self-centering chuck, constructed substantially as herein set forth.

ELI K. WISELL.

No. 7046.—*Improvement in Atmospheric Churns.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the inverted vessel (H,) and the disc (*i*,) on the stem of the dasher to prevent the splashing out of the cream at the churn lid.

JOHN YOUNG.

No. 7047.—*Improvement in the Cotton Press.*

I claim the pully F, with its axis S, eccentric to its centre, in combination with the stock or follower of the pressure block D, to compress cotton, &c., in the bale box, in the manner substantially as herein represented and described.

A. D. BROWN

No. 7048.—*Improvement in Brick Presses.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the crank K, chain *n*, and oscillating frame or carriage J, with the stationary bed of rollers *c*, *c*. the whole being arranged and operated as herein described, for the purpose of supporting the moulds while being filled and pressed, striking the bricks and then pushing the moulds out of the machine.

JOHN BUTLER.

No. 7049.—*Improvement in Wash Mixtures.*

Having thus fully set forth my improved compound and its operation, I wish it to be understood, that I do not claim any of the ingredients contained therein, when employed separately, as they have long been known, but what I do claim as my invention and for which I desire to secure letters patent, is the above described compound consisting of soap and ley, pearlash, or soda with ammonia, and spirits of turpentine in the proportions, substantially as herein set forth.

S. CRANE.

No. 7050.—*Improvement in Utero-Vaginal Supporters.*

Having described my invention, I will now state what I claim as new and desire to secure by letters patent.

First. I claim the combination of the elevating levers *E*, *E*, with the tube *A*, made of any material, and the mode of raising and spreading the said elevating levers by the screw F, with its conical groove as herein described, or in any way, substantially the same.

Second. I further claim the capsule *H*, distended by the sponge *G*, introduced through the tube A, for the purpose of supporting the uterus and vagina, in the manner herein set forth.

RUSSELL CAULKINS.

No. 7051.—*Improvement in Steam Boiler Furnaces.*

Having thus described the several improvements I have made in the construction, and arrangement of my steam boiler furnace, and the steam blower therefor, for the purpose of economizing fuel by rendering its combustion more perfect, and by reclaiming a portion of the waste heat of the flues and exhaust steam, what I claim therein as new and desire to secure by letters patent, is the injection of whirling jets of highly heated steam among the gases evolved by the fuel on the grate, simultaneously with the forcing by the steam blower of a stream of mingled steam and heated air through the ash-pit into the fire; the air being heated, substantially in the manner described by the exhaust steam and waste heat of the flues, and the draught of the flues being maintained by whirling jets of steam injected by the steam blower.

BENJ. CRAWFORD.

No. 7052.—*Manufacture of Illuminating Gas from Bitumen.*

What I claim as my invention, and desire to secure by letters patent, is the use of compact and fluid bitumen, asphaltum, chapapote, or mineral pitch for the production of illuminating gas, to be substituted for other materials now in use. I also claim the retort B, B, in combination with its movable case C, in the manner and for the purposes set forth.

ABRAHAM GESNER.

No. 7053.—*Preparation of Animal and other Manure.*

I am aware that sulphuric acid has been employed as a manure alone, and also to decompose bones for the purpose of procuring super phosphate of lime to be used as a manure; these applications of it I therefore do not claim.

What I do claim as my invention, and desire to secure by letters patent, is the use of the mineral acids to act upon the soft parts of animals, or upon azotous vegetable matter, at temperatures varying according to circumstances, as herein set forth for producing a concentrated manure.

Second. I also claim the combination of the mineral acids with the different salts as described, for modifying the antiseptic action of the acids on azotous materials, and for rendering them pulverulent, whether said azotous materials be animal or vegetable.

Third. I also claim the combination of the mineral acids with wood tar, coal tar, or their equivalents, in the manner and for the purposes herein set forth.

ROBT. HARE.

No. 7054.—*Improvement in Apparatus for Heating Air by Hot Water.*

Having thus fully described my improved apparatus, what I claim therein as new, and for which I desire to secure letters patent, is the peculiar construction and arrangement of the heating apparatus by uniting the series of straight horizontal pipes into gangs by vertical end pieces C, through which the circulating water is conveyed to all the pipes in the gang, in combination with the union boxes D, D', the series of gangs forming the cluster being united at one end at the top of the end pieces by the union box D, and at the opposite end, at the bottom by a similar box D', through which the water circulates to all the pipes, by means of a flow and return pipe, connected with the boiler or heater at the furnace, as herein clearly specified.

ADRIAN JANES.

No. 7055.—*Improvement in Self-waiting Tables.*

Having thus fully described the nature of my invention, what I claim therein as new and desire to secure by letters patent, is arranging and operating a dumb-waiter and fan, so as to cause them to be self-acting, substantially in the manner and for the purpose described.

JOSIAH LAMB.

No. 7056.—*Expansion Gear for Puppet Valves.*

Having now described my invention, I will state what I claim and desire to secure by letters patent. What I claim therefore, is the use and employment of the connecting rod I, acted upon by two eccentrics in combination with the reciprocating plate H, and arm K, having an angular opening in it, and quadrant shaped plate J', or its mechanical equivalent attached thereto, for the purpose of working puppet-valves in form and manner, substantially as herein set forth.

THOMAS McLAUGHLIN.

No. 7057.—*Composition for the Manufacture of Sugar.*

That which I claim as my invention, and that which I desire to have secured to me by letters patent, is the *mutisme*, or process of treating saccharine solutions by means of a solution of acid sulphite of lime, baryta or stronitia as herein before described, applied to products containing sugar from the cane or other vegetables, that the crystallizable sugar may undergo no chemical change either by the formation of secondary products which destroy it, or by the generation of ferments which modify or transform it.

MELSENS.

No. 7058.—*Improvement in Driving Bobbins upon Spindles.*

What therefore I claim as my invention, is the counter-sunk friction button, made substantially as specified, or in other words the combination of the friction annulus with the enclosed space for the reception of dirt and extraneous matter, when used in connection with the spindle and bobbin, substantially as specified.

OLIVER PEARL.

No. 7059.—*Improvement in Gearing for Sugar Cane Mills.*

I do not lay claim to the general arrangement, by which a heavy horizontal wheel is made to traverse on friction rollers. This I am aware, has often been done, when such wheel was fixed to its vertical axis, by permanent arms, especially for the purpose of enabling the wheel to support heavy weights, as in the common turn tables of railroad stations.

But in such cases there is no strain or vibration primarily given to the vertical shaft, as is the case of the cane mill, having one of its rolls on the vertical shaft which is to be driven by the heavy face wheel.

But what I do claim as my invention, and desire to secure by letters patent, is the wheel A, revolving horizontally in combination with the jointed or loose braces *b*, *b*, *b*, *b*, connecting, but not fastening it to the shaft S, and with the fixed arm D, the vertical grooves *g*, *g*, and the friction rollers *i*, *i*, acting together, substantially in the manner and for the purposes herein set forth, not limiting myself in these claims to the exact number and arrangement of the several parts herein described, but varying the same at pleasure, while I attain the same ends by means substantially the same.

EDWARD PHELPS

No. 7060.—*Method of Sinking Hollow Piles, &c., by exhausting the Air from the Interior of the same.*

Having described what I consider as generally the most attainable means for producing the required effects, I do not intend to limit myself thereto, but to use any known mechanical means that may be best adapted to any particular circumstances, as I hereby disclaim any invention of the parts employed, irrespective of the manner in which they are to be used for any of these purposes.

What I claim as new, and of my own invention of improvements in the mode of sinking piles, tubes, caissons, shafts and other structures, and which I desire to secure by letters patent of the United States, consists in the attenuation of the air approaching to, or forming a vacuum in the interior of a hollow pile, tube, caisson, shaft, or other structure, by any of the known means of producing what is termed "suction," by which the hollow pile, tube, shaft, or other structure, is made to descend as before described.

L. H. POTTS.

No. 7061.—*Improvement in Looms for Piled Fabrics.*

We do not wish to confine ourselves to the precise mechanical arrangements herein specified for operating or shifting the picker tappets, although we have essayed it with success, and deem it the best; but other arrangements may be devised for carrying this part of our invention into effect.

As to the third part of our invention, any desired known means of regulating the friction of the fly-wheel on the shaft may be substituted for the temper screws herein above described, as the means of regulating the friction is not of the substance of our invention; nor is it essential to our invention, that the friction be adjustable, although we deem it advisable to have it so. In the adjustable mode of throwing back the shuttle staffs, we do not wish to confine ourselves to the use of a nut, to regulate the tension of the helical spring, as other mechanical equivalents may be substituted therefor—such as a wedge in a slot; but we have described and represented the nut as the most advantageous in our estimation.

In relation to the fifth part of our invention, we do not wish to limit ourselves to the number of rollers, nor to the mode of making friction on the rollers, over which the warps pass, as our invention is irrespective of these.

We do not wish to limit ourselves to the precise arrangement above described, for connecting the ratchet wheel of the take up motion with the roller, as this may be varied at pleasure, without affecting the mode of operation of this part of our invention.

And finally, with regard to the last part of our invention, we do not wish to be limited to the precise direction, in which the thread is carried from the eye near the end of the shuttle, to the delivering eye, near the middle of the length thereof, as this may be slightly varied, and still retain the character of this part of our invention.

What we claim as our invention, and desire to secure by letters patent, is—

First. Dividing the heddles into two or more divisions to be worked in succession, substantially as herein described, that the entire opening of the shed may be effected in succession, and thus avoid the evil effects consequent on the opening of the shed, at one operation, as heretofore described.

Second. Operating the two picker levers or treddles, by means of a shifting tappet operated or shifted alternately for each pick by means of an eccentric or its equivalent, that the shaft which carries the tappet or tappets, may make one entire rotation for each throw of the shuttle, substantially as herein described, and thus operating the shuttle by a tappet rotating with greater velocity than by any means heretofore known, as described.

JAMES TURNBULL, Jr.
JOHN TURNBULL.

No. 7062.—*Improvement in Mills for Grinding.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the cone screws as above described, with the beaters or rubbers on the cylinder, substantially as described.

JOSEPH W. WEBB.

No. 7063.—*Improvements in Flour Bolts.*

We do not claim to be the original and first inventors of bolts for bolting the flour, or of any of the several parts of the bolting apparatus that have heretofore been used for that purpose in the ordinary modes, but what we do claim as our invention, and desire to secure by letters patent, is—

The combination of the revolving wire screens with the ordinary bolts, whether stationary or revolving, for bolting flour, by which the larger particles of bran and extraneous substances that may chance to pass into the bolts with the meal are separated therefrom by the said wire screens, and are thus prevented from coming in contact with the bolting cloth, whilst the wings drive the flour through the screens and bolting cloth, by the combined action of centrifugal force and currents of air produced by the rotary motion of said wings, by which the advantages stated in the foregoing specification are obtained.

JOHN M. REED.
WM. B. WILLIS.

No. 7064.—*Improvement in Machinery for Spooling.*

Having thus described fully the material parts of the machine in which my improvements are introduced, and also those improvements, what I claim as my invention, and desire to secure by letters patent, is not the abstract production of friction between the thread or yarn, and any other substance, as the thread or yarn passes from the runners to the bobbin or spool, so as to secure the winding of the thread or yarn, tightly on the bobbin or spool; but I do claim as my invention, and desire to secure by letters patent, the combination of machinery herein before described, whereby in machines for winding yarns or threads on bobbins or spools, the thread or yarn on its passage from the runners to the bobbin or spool, has applied to it friction produced between the thread or yarn, and any other substance, which friction diminishes with uniformity as the pull upon the thread or yarn from the runners increases, and increases with uniformity, as the pull upon the thread or yarn from the runners diminishes—such combination consisting, as shown in the accompanying drawing, of the vibrating lever M, M, the stand L, L', the joint L', the three pins N, O, P, the four pins H, I, J, K, the box G, G, the spiral spring Q, any one of the three hooks S, T, U, the staple at R, and the guide W, substantially as herein set forth.

AVERY BABBETT.

No. 7065.—*Improvement in Carding Machines for preparing Bats for Felting.*

Having thus fully described my invention, I would state that I do not claim the producing an interlocking of the fibres of wool, by means of a reciprocating longitudinal movement of either the carding cylinders of a carding machine working against the doffer.

But what I do claim as my invention, and desire to secure by letters patent, is the production of the requisite interlocking combination of the fibres of wool, preparatory to converting the same into felt cloth, by subjecting the said fibres to a rubbing or combing action, while they are upon the doffer of a carding machine, by means of auxiliary cards, or other suitable friction surfaces, substantially as herein set forth; not intending by this claim, however, to limit myself to the special and particular manner of producing the said interlocking of the fibres of wool, while they are upon the carding machine doffer, as herein set forth.

SAMUEL G. BLACKMAN.

No. 7066.—*Preparation of Portable Soup Bread.*

Having thus explained my invention, I do not claim the extract of flesh made into what is known as portable soup; but I claim the new and useful manufacture of desicated soup bread, formed of the concentrated extract of alimentary animal substances, combined with vegetable flour or meal, made into cakes and baked into bread, in the manner, substantially as herein described, for the purpose set forth.

G. BORDEN, Jr.

No. 7067.—*Improved Excavating Auger.*

What I claim as my invention, and desire to secure by letters patent, is the formation of a machine or instrument, for boring the earth under water, or otherwise, and retaining the substance bored until it can be brought to the surface, which I construct in the manner following: I first make two sections of a cylinder, or pods, the one of which is enough smaller than the other to admit its turning into the larger one, and I connect them together by pivots through the ends of each, the larger section of a cylinder or pod having a lip similar to a pod auger, and I attach a shaft or handle firmly to the upper pivot, which pivot passes through the centre of the outer section of a cylinder or pod, and is attached firmly to the smaller section of a cylinder or pod, so that by turning the shaft one way, I put it into a pod auger shape ready for boring. By reversing the motion of the handle or shaft it turns the inner section of a cylinder out of the other, making it into a cylindrical or bucket shape, and thereby secure the substance bored.

JAMES BUCK.

No. 7068.—*Improvement in Whip Lashes.*

What we claim as our invention, and desire to secure by letters patent, is a new manufacture for whip lashes, by making plaited whip lashes of spun and twisted threads or cords, as described, instead of leather thongs, the same being plaited over a central cord or core, extending the whole length as described, and a swell made of cotton, or other soft and pliable cloth attached to the central core, without rolling, substantially as described.

DAVID N. DAY.
EDWARD B. DAY.

No. 7069.—*Improvement in Machines for Cutting Staves.*

What I claim as my invention, and desire to secure by letters patent, is the mode of cutting staves to the required curvature, with a spiral drawing stroke, by means of the segmental plate *D*, having bar or ribs (*e*,) at its ends, to which the knife *f*, is attached, segmental rims *C*, moving in the segmental slots *B*, formed in the side plates *A*, and containing slots through which the segmental plates *D*, move spiral slots *E*, in the plates *D*, and bars (*g*,) passing through the same, substantially as herein set forth.

CHARLES B. HUTCHINSON.

No. 7070.—*Improvement in Washing Machines.*

I do not claim the tub, nor do I claim fluted rubbers for cleaning clothes, or any of the parts heretofore used for washing clothes; but what I do claim, is making the disc, with a hinged segment, to admit the clothes beneath the same, being so arranged as to rise and fall vertically, as it is turned horizontally over the clothes, by turning the vertical rock shaft to the right and left, as described.

JOEL HAINES.

No. 7071.—*Improved Friction Roller Sash Supporters.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the loose roller, spring and friction wheel, applied to the window sash, as herein set forth, whereby the sash is held in any position to which it may be raised.

JOSEPH MAYNARD.

No. 7072.—*Improvement in Engines for Carding and Drawing Wool.*

First. Having thus explained our invention, we claim the combination of what is termed the main or condensing cylinder, with the reciprocating rod F, to give the carding cylinder a reciprocating side-to-side motion, in combination with its rotary motion, in the manner substantially as herein described, or in any other manner, substantially the same, to produce the same effects.

Second. We claim the combination of a twisting band and drawing rolls, with rub rolls of the common construction, for the purpose of reducing roping, by drawing it with twist upon the carding machine in the manner substantially as herein described, or in any other analogous manner.

CHARLES JACKSON.
JAMES MOIR.

No. 7073.—*Improved method of Punching between Rollers.*

Having thus fully described my improvements, in the preparation of iron

plates for boilers, what I claim therein as new, and for which I desire to secure letters patent, is the apparatus for the purpose of punching, consisting of a series of punches thrown out at proper intervals, substantially as above described, either with or without the combined operation of corrugating said plates as above described.

R. MONTGOMERY.

No. 7074.—*Improvement in Calculating Machines*

What I claim, therefore, as of my own invention, and for which I desire letters patent of the United States, is the making additions of figures, by means of a finger board of keys, each communicating a proper and known motion to an indicator, substantially in the manner and for the purposes herein described.

DUBOIS D. PARMALEE.

No. 7075.—*Improvement in Water Metres.*

Having thus fully described my improved machine for measuring water in its passage through pipes; what I claim therein as new, and for which I desire to secure letters patent, is the employment of a flat spring (*e*,) with both sides of which the water as it enters communicates, substantially in the manner and for the purposes set forth, in combination with the wings, with an adjusting spring in the centre, by means of which improvements I relieve the apparatus from danger arising from obstruction in its movement, and the strain caused by the transmission of a non-elastic fluid, and cause it to move with less friction than any other form with which I am acquainted.

WILLIAM SEWELL, Jr.

No. 7076.—*Improvement in Attachments for Lightning Conductors.*

What I claim herein as new, and of my invention, and desire to secure by letters patent, is forming the eye of the metallic attachment with an opening (*c, c*,) to allow the passage of a lug (*a*,) on the neck of the isolator, and so that the rod also can be inserted, after the attachment is secured to its place, when this is combined with a lug on the shank of the attachment, corresponding to that on the isolator, substantially after the manner and for the purposes herein set forth, that is to say, enabling the rod at any time to be inserted or withdrawn, without disturbing the attachment in the building.

JAMES SPRATT.

No. 7077.—*Improvement in Barrel Machinery.*

I claim as my invention in the stave cutter, and desire to secure by letters patent, the eccentric groove and cap, extending over or around the shaft to the side opposite the knife, the said cap constituting a part of the eccentric cam ring passing around the shaft, and having an opening through the said cam ring at the posterior termination of the cap, where the staves make their exit. And I also claim the whirl or secondary shaft, as described in combination therewith. I claim as my invention, the right and left stave holders, in the jointer, having flanges or thumb pieces to support the edge of the stave during the operation of jointing, and to ensure an equal width at each end.

I also claim as my invention, the horizontal jointer, in combination with an inside and an outside frame, to which the right and left stave holders are attached by hinges, and by which arrangement four or more boys may work

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around one horizontal wheel or jointer, and operate simultaneously, being also thereby enabled to joint the staves with the grain of the wood, without loss of time.

I claim as my invention, the moveable centre in the head machine, in connection with the opposite face plate on an universal joint, between which the head block is held before it is brought in contact with the rubber of the face of the chuck, and the slide which holds the chissels, constructed substantially in the manner set forth.

I claim as my invention, the combination of the cutter (*c*,) with the jointed spring cutter (*g*,) and levers (*b*, *b*,) in fig. 6, for cutting the locks in wooden hoops, substantially as herein before described.

SOLOMON ANDREWS.

No. 7078.—*Machine for Cutting Cotton Stalks in the Field.*

What I claim as my invention, and desire to secure by letters patent, is the adaptation of iron and steel knives or cutters, to the cutting down, and cutting to pieces of cotton stalks, either in a green or dry state, in the manner and for the purpose above described.

FIELDS BRADSHAW.

No. 7079.—*Improvements in Machinery for Folding Cloth.*

What we claim as our invention, and desire to secure by letters patent, is the mode of folding and laying the cloth on the table or platform B, kept in a state of equilibrium by the weight (*h*,) wheel (*e*,) chain (*d*,) and rod (*g*,) by means of the notched bars (*l*, *l'*,) attached to the radial rods (*k*, *k'*,) secured to the shafts E, E, combs (*j*, *j'*,) attached to the shafts D, D', segmental plates G, G, bent bars (*p*, *p*;) and H, H', arms J, J', horizontal and inclined connecting rods or bars (*r*, *s*,) slotted arm or crank (*t*,) constructed, combined, arranged and operated, as herein set forth.

AUGUSTUS C. CAREY.
DANIEL C. BAGLEY.

No. 7080.—*Improvement in Rule and Socket Joints.*

What I claim as my invention, and desire to secure by letters patent, is the application to the rule joint, and to the ball and socket joint of the rod D, which is hinged into the ball or rule joint, to hold the joint as firm as desired, by means of the spiral spring G, on the India rubber spring P, as described.

CHARLES CHINNOCK.

No. 7081.—*Improvements in Arrangements of Fliers and Spindles.*

What I claim as my invention, and desire to secure by letters patent, is the manner of suspending the flier, separate from the spindle, by the flier being connected to, and forming a part of the tube (E,) the lower end of which revolves in a socket bearing, allowing the spindle of the bobbin to pass and move through it without touching it, so that however great the speed of the flier may be, it will be prevented from vibrating the spindle.

JOHN DERMOND.

No. 7082.—*Improvement in Air-Heating Furnaces.*

Having thus fully, clearly, and exactly described the nature, construction, and operation of my improvements in air-heating and steam infusing apparatus, for warming and keeping moist the atmosphere in apartments, what I claim therein as new, and desire to secure by letters patent, is constructing a furnace for heating air, with a spiral flue passing up between concentric cylinders, when this is combined with a conical roof to the furnace within the inner concentric cylinders, thus obtaining the most extensive radiating surface within the least space, and in the most compact and simple form.

HENRY ADOLPH ENGLES.

No. 7083.—*Improvement in Augers for Boring Machines.*

What I claim as my invention, and desire to secure by letters patent, is making the pod of an auger separate from the stem on which it is revolved, with a considerably greater velocity than the cutting bit, substantially as herein set forth.

GEORGE FLAUTT.

No. 7084.—*Improvement in Horse Rakes.*

What I claim as my invention, and desire to secure by letters patent, is the method of working the rake head, by means of the treadle (*g*,) in combination with the hand bars (*t*, *t*,) and the back piece A, *a*, as described.

I also claim the attachment of the stilts to the thills—(1,) in the manner and for the purpose described; all of which gearing being so arranged that a person on his seat, may change and discharge, or suspend the rake head at pleasure, as herein set forth.

ALVAN HOVEY.

No. 7085.—*Improvement in Hanging Carriage Bodies.*

Having thus fully described my improvement, what I claim therein as new, and for which I desire to secure letters patent, is the combination of cross reaches and springs, substantially in the manner and for the purpose set forth.

M. G. HUBBARD.

No. 7086.—*Improvement in Railroad Trucks.*

Having thus described my improvements in railroad cars, and other carriages, what I claim therein as new, and desire to secure by letters patent, is the combination of an endless track on the frame of the carriage, with an endless series of rollers running thereon, and guided by flanges, the endless track being supported on the peripheries of the rollers which intervene in endless succession between it and the surface of the ground or rail, and which are broad enough to keep themselves erect and steady without the use of axles or rods, extending across the carriage.

JAMES INGERSOLL.

No. 7087.—*Improvements in Planing Machines.*

What I claim as my invention, is the combination of the rotary planing cylinder E, and the rest *f*, with mechanism, by which the two can be freely moved up or down simultaneously, and independently of the bed or platform B, B', or any analogous device, substantially in the manner and for the purpose of reducing a board to equal thickness throughout its length, all as herein before specified.

I also claim the above described improvement of making the under side of the rest concave, in combination with so extending the part B, under the rest *f*, and applying it to the concave part thereof, as to cause the board, as it passes across the rest to be bent, and presented with a concave surface to the operation of the rotary cutter planing cylinder, substantially as specified, the same being for the purpose herein before mentioned.

NICHOLAS G. NORCROSS.

No. 7088.—*Improvement in Bedclothes Clasps.*

What I claim as my invention, and desire to secure by letters patent, is the use of the cam and lever *e*, *e*, acting on the spring *b*, to constitute a clasp, in the manner and for the purpose set forth.

FRANCIS A. ROCKWELL.

No. 7089.—*Improvement in Tanning Apparatus.*

What I claim as my invention, and desire to secure by letters patent, is—

First. Revolving the tanning cylinders alternately in opposite directions, substantially as herein set forth.

Second. Handling the hides in the spent liquor from the tan vats E, substantially in the manner herein set forth.

Third. Liming hides or skins in a close revolving cylinder, substantially as herein set forth.

W. H. ROSENSTEEL.

No. 7090.—*Improvement in Smut Machines.*

Having thus described, and represented the construction, and operation of my new and improved smut machine, for cleaning grain, what I claim therein as new, and desire to secure by letters patent, is—

First. The grates (B, B,) in the top of the machine, in combination with the scrolls or spiral chambers A, A, and spouts C, C, for discharging smut and other light materials carried up by the blast, as set forth.

Second. I claim the chamber I, at the bottom of the cylinder which concentrates and gives free discharge to all foreign matter, to be separated from the grain by the blast in the last stage of operation of the machine, in the manner described and represented.

Third. I claim in combination with the concave bottom which gathers the grain for its discharge from the machine, the distributors *j*, *j*, fig. 6, which gives direction in the discharge of the grain separated from the foreign matter by the blast.

Fourth. I claim the draft floats *h*, *h*, *h*, *h*, fig. 5, in combination with the scouring surfaces *f*, *f*, for cleaning buckwheat, as set forth.

The whole being constructed, arranged, and operating, substantially in the manner and for the purpose set forth as made known.

LEONARD SMITH.

No. 7091.—*Improved Method of Bolting in Window Shutter Openers and Fasteners.*

Having thus fully described the nature, construction, and operation of my invention, what I claim therein as new, and desire to secure by letters patent, is fastening the window blind at any suitable point by means of bolts projecting on opposite sides of the pintle of the hinge by a driver, the bolts and driver being suitably guided, and the bolts passing into suitable notches on a plate attached to the blind or to the upper leaf of the hinge, thus not only retaining the blind in any desired position, but also at the same time relieving the pintle of the hinge from any strain athwart its axis, the whole being arranged substantially in the manner and for the purposes described.

S. B. SNEDEKER.

No. 7092.—*Improvement in Electric Telegraph.*

Having thus described my invention, and exemplified the manner in which it may be carried into effect, what I claim therein as new, and desire to secure by letters patent, is the making of signals or marks for telegraphic purposes, by the agency of the heat generated, induced, or controlled, by a current of electricity passed along attenuated conductors, wires or points, substantially as herein set forth. The signals being the flashes of light emitted by the heated conductor or points are manifest to the eye of the operator.

The marks being produced on the paper by the heated points or conductor are the record of the message.

WM. S. THOMAS.

No. 7093.—*Improvement in Castors for Furniture.*

What I claim and desire to secure by letters patent, is neither the ball, the socket, the vertical pivot, or either of the pivots of the ball, but the combination of the whole as above, substantially specified, whereby the ball of the castor is enabled to revolve across the two centres of the two axes of the ball, as set forth.

SOLOMON BERNHARD ULMANN.

No. 7094.—*Improvement in Connecting Trucks with Car Bodies.*

What I claim as my invention, and desire to secure by letters patent, is the mode of attaching car bodies to trucks by means of the trough A, (with the sloat *c*, and king bolt F,) and the rail B, constituting the segment traverse, as above described.

GEORGE VANDERHOOF.

No. 7095.—*Improvements in Machinery for Turning Umbrella Sticks, &c.*

What we claim as our invention, and desire to secure by letters patent, is the combination of the hollow shaft or cylinder F, graduating cutters or knives L, made and ground exactly alike, and arranged on opposite sides of said shaft or cylinder, and cutting inward and in exact unison with each other, the feeding rollers O, arranged in front, and the receiver or carriage K, arranged in the rear of the shaft F, together with the case U, surrounding the cutters and wings (*d*,) for enabling them to act as a fan or blower to discharge the shavings; the whole being arranged and operated, substantially as herein set forth.

SOLOMON WEST.
HIRAM PLUMB.

No. 7096.—*Improvement in Studs for Shirt Bosoms.*

Having thus described the construction and operation of my improved fastening for shirt-studs, what I claim therein as new, and desire to secure by letters patent, is constructing the shank in two sections, the first being fixed to, and projecting from the back of the stud, and the other being hinged to the first in such a manner that it can be brought in line with it or be turned across it, as herein set forth, but I make no claim to the mere fastening of a stud, by means of a cross bar attached to a chain or other similar arrangement.

JAMES P. HEISS.

No. 7097.—*Improvement in Elevating and Lowering Carriage Tops.*

What I claim as my invention, and desire to secure by letters patent, is connecting a handle, lever, or any analogous device upon the inside of carriage tops, with joints or jointed braces upon the outside of the same, substantially in the manner and for the purpose set forth above.

JOHN L. ALLEN.

No. 7098.—*Adjustable Rollers for Window Curtains.*

I do not claim the confining the end of a curtain or piece of cloth, to a roller by means of a groove, and a strip of wood or other substance, placed and fastened therein, as I am well aware that such is not new; but what I do claim, is my improvement in the construction of the curtain roller, whereby I do not only attain all the advantages of securing cloth to it by the groove and strip, but am enabled to regulate or adapt the roller to any window of any ordinary width; my said improvement consisting in making the curtain roller and its guide heads in two parts, in such manner that the grooved section of the roller, and one head shall be united together and form a separate part, while the other section or tongue and the other head, shall also be united and constitute another part, the two parts being so applied, that when put together the tongue may be slid or fitted endwise into the groove in manner described, such a combination of the heads and groove, and tongue sections, enabling me to cut each section to the length required, and to readily adapt the roller to a window.

EDWARD S. CLARK.

No. 7099.—*Improvement in Lids for Boiler-holes of Cooking Stoves.*

Having thus fully described the nature, construction, and operation of our invention, what we claim therein as new, and desire to secure by letters patent, is—

Firstly. So arranging the lid (or centre plate,) in connection with the top plate of the stove, as that the lid, (or centre plate) when withdrawn from the opening, may be made to add its area to, and at the same time lie flush with or below the level of the top of the stove; this being effected by a neck proceeding from the lid (or centre plate,) in the direction of its plane, said neck, (whether the lid or centre plate be closed or folded back,) fitting and filling a notch in the stove top, and having lugs projecting from its sides, which lugs, bearing upwards against the top plate, or against shoulders projecting therefrom, sustain the lid when folded back.

Secondly. The arrangement, substantially as described, of journals on the neck, at or about midway of its length, forming a fulcrum upon which the lid can be folded back, either with its top face, or with its flue face uppermost, the lugs in this case being behind the journals, and midway of the thickness of the neck.

Thirdly. Constructing the lid (or centre plate,) with a handle projecting therefrom in the direction of its plane, and at its coldest point, so as to afford a means of operating the lid by hand, with comparative impunity and facility, and so as to avoid on the one hand any impediment to the shifting of the

cooking utensils, and on the other hand, the usual cavity difficult to mould, liable to collect dirt, and placed unavoidably at the hottest part of the lid.

THOS. G. CLINTON.
GEO. H. KNIGHT.
EDWARD H. KNIGHT

No. 7100.—*Improvements in Raising and Lowering Carriage Tops.*

We do not claim the use of levers or handles upon the inside of carriage tops, connected with the jointed braces upon the outside, for the purpose of working the braces, but all that we claim as of our own invention, and which we desire to have secured to us by letters patent, is connecting the jointed braces upon opposite sides of carriage tops, by means of a shaft (A,) or rod passing back of the seat, in such a manner that the braces may be worked simultaneously upon both sides, substantially as herein described.

SOLOMON GODDARD.
HENRY WARFIELD.

No. 7101.—*Improvement in Locking Portable Safes to the floor.*

What I claim as my invention, and desire to secure by letters patent, is the device for locking down a portable safe or box to the floor, and at the same time locking the box, as described and shown herein.

HENRY HOCHSTRASSER.

No. 7102.—*Improved Process of Varnishing Buttons.*

What I claim as my invention and discovery, and desire to secure by letters patent, is the process of japanning and baking the buttons in bulk, substantially as is herein before described, after they have been prepared for the reception of a smooth coat of japan or other varnish, in the manner specified in my former letters patent, respectively, or in any other method, substantially the same.

ELISHA M. POMEROY.

No. 7103.—*Improvement in Portable Fences.*

What I claim as my invention, and desire to secure by letters patent, is fastening together the panels of portable fences, substantially as herein set forth, by means of binding irons and wedges.

PETER M. PURDY.

No. 7104.—*Improvement in Hulling Clover Seed.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement, and combination of the cylindrical cups R, R, and D, D, with each other, for the purpose of discharging the grain at C, and the lighter materials at O, as herein described.

JOSEPH POLLOCK,
Administrator of Allen K. M'Griff.

No. 7105.—*Improved method of Kneading Dough.*

What I claim therein as my invention, and desire to secure by letters patent, is the combination of a reciprocating kneading table, with a reciprocating breaker, substantially as herein set forth, but irrespective of the devices by which they are severally put in motion.

HENRY NORMAN RIDER.

No. 7106.—*Breast Plate for Harness.*

What I claim as my invention, and desire to secure by letters patent, is the centre draft and expansion breast plate for the horse harness, in combination with the use of the double fulcrum self-adjusting pad, applied either to the double or single harness, as set forth.

ORIN RAMSDELL.

No. 7107.—*Improvement in Bedstead Fastenings.*

What I claim as my invention, and desire to secure by letters patent, is the employment of bush pieces C, C, locked by the key piece E, in the manner and for the purpose set forth herein.

ROBERT RAMSEY.

No. 7108.—*Improvement in Fences.*

What I claim as my invention, and desire to secure by letters patent, is the method of constructing a self-adjusting and self-fastening fence of any material whatsoever, substantially such as herein described, the parts of which, when put together fasten themselves firmly, by means of a combination of locks and chairs, substantially as described, without the use of lead rivets, screw bolts, wedges, or any other of the modes heretofore adopted and used for the purpose.

ISAIAH SUBERS.

No. 7109.—*Improvement in Seed Planting Barrows.*

What I claim as my invention, is the employment of the gauge plate G, of variable thickness, in combination with the moveable tube L, and face plate K, and its springs, the same being applied to the hopper and conducting tube leading in to the furrow opener, and the whole being made to operate, substantially as specified.

CHAS. A. WAKEFIELD.

No. 7110.—*Improved Seed Planter.*

What I claim as my invention, is as follows:—I claim the combination of the curtain or apron, with the cylindrical or broadcast regulator.

I also claim the manner of constructing the regulator, or in other words, the combination of the prism with the side plates or boards, and their adjusting and confining mechanism, as set forth.

CHAS. A. WAKEFIELD.

No. 7111.—*Improvement in Burning Ornamental Figures upon Wood.*

What I claim as my invention and discovery, and desire to secure by letters patent, is—

First. The method I have described for constructing the mould or dies, so as to allow for the excessive depth they will charr the wood in certain parts of figures, in order that the whole figure when finished, shall be an exact resemblance of the original.

Secondly. I claim the channels or other like devices, cut in the face of the dies, for escape passages for the gases, smoke, &c.

Thirdly. I claim the use of an alkaline and acid solution, or baths to aid the removal of the charred surface.

I do not claim branding, or the production of uneven surfaces or fingers, by hot metal mould pressed upon wood, but the several improvements, as above claimed on the art within described.

HAMILTON WOOD.

No. 7112.—*Improvement in Measuring Cloth on Looms.*

I am aware that a roller or cylinder and clock work have been combined and used for indicating the length of any surface, against which the periphery of the said roller might be placed and rolled, such a contrivance being generally known by the name of "way metre," "carriage metre," or "pedemetre." I am also aware that a roller or cylinder, and a pencil marking apparatus have been applied to the cloth beam of a loom, in order to mark into equal lengths or parts, the cloth woven upon the said cloth loom.

I therefore, neither claim such contrivances, nor the methods by which they have been applied and used. But what I do claim as my invention, is the arrangement of the roller and clock work directly upon the breast beam of the loom, and with respect to the cloth or selvage thereof, as specified.

JOHN G. WEBSTER.

No. 7113.—*Improvement in Seraphines.*

I do not claim the use of wooden sounding reeds abstractly, nor the adjustable blocks, nor the combination of duplicate blowers with a keyed reed instrument. But what I do claim as new, and desire to secure by letters patent, are—

First. The combination of wooden sounding reeds with wooden reed-plates, constructed in the manner herein described.

Second. The combination of the adjustable blocks T, with the duplicate blowers A, and the lifting rods X, arranged as herein described, and

Third. The combination of the two sounding boards *a*, *a*, and the piano board *b'*, *b'*, with the sounding reeds and keys, arranged in the manner and for the purpose herein set forth.

RUFUS H. GREEN.

No. 7114.—*Improvement in Machines for Cutting Cap Fronts.*

I do not claim any one part used herein separately, as all are well known. But what I do claim as new, and of my own invention, and desire to secure by letters patent, is the construction and application of the frame *f*, with the blades 6, and 7, and guide pins 4, 4, taking holes in the bed *e*, to work in either direction from the centre, all these parts being constructed and operating, substantially as described and shown; and I claim in combination with the foregoing, the bed *k*, fitted with supporting guide rollers 11 and 12, and adjusting bar 14, with rollers 15, moving over the bar *l*, and taking the indentations to adjust the position of the material, over the cutter blades 6 and 7, the whole constructed and operating, substantially as described and shown.

GEORGE BURGESS.

No. 7115.—*Improvement in Gas Generating Apparatus.*

Having thus fully described my improved apparatus, and mode of manufacturing gas, what I claim therein as new, and for which I desire to secure letters patent, is the supply tube, combined with the vaporizing cup, as herein set forth, for the double purpose of supplying liquid for making gas, and for vaporizing the same before it comes in contact with the decomposing surfaces in the retorts, for the purposes set forth. I also claim the compound retort, constructed and arranged as above specified.

CHRISTOPHER T. BROWN.

No. 7116.—*Improvement in Sofa Bedsteads.*

First. What I claim as my invention, and desire to secure by letters patent, is the ordinary seat of a sofa, (or other suitable article of furniture,) so arranged as to revolve on a centre at each end, in a frame so constructed, as to turn over and bring the top or stuffed side of the seat, (by revolving the same,) on a level with another seat or bed, placed under the ordinary seat.

Second. I also claim the use of the stuffed ends forming the support for the top seat when turned over and used as a bed.

No. 7117.—*Improvement in Connecting Hubs with Axles.*

What I claim as my invention, and desire to secure by letters patent, is enclosing the spring collars that fit and run in the groove of the axle, within a box at the inner end of the hub, substantially as herein described, when this is combined with the ring fitting to and turning on the outer periphery of the box, and acting on the ends of the spring collars for the purpose of drawing them out of the groove when it is desired to take off the hub, substantially as described.

JUNIUS FOSTER.

No. 7118.—*Improvement in Churn Dashers.*

What I claim as my invention, and desire to secure by letters patent, is the hinging the series of beaters *b*, *b*, to the dasher rod, in such a manner that their faces will be thrown into inclined positions by the upward movement of the dasher, and into horizontal positions by the downward movement thereof; when the said vibrating beaters (*b*, *b*,) are combined and act in concert with the series of vertical faced beaters or wings *d*, *d*, (upon the same dasher rod,) substantially as herein set forth.

ISAAC D. GARLICK.

No. 7119.—*Improvement in Iron Railings.*

I wish it to be understood, that I do not claim forming joints, or connecting irons by lead packing, as that has before been done, but what I do claim, and for which I desire to secure letters patent, is constructing the pailings or upright rails, as herein described with holes in them, by means of which they slide freely in the horizontal bars, and with a cavity for containing lead or other proper metal surrounding said bar, for the purposes of allowing the pailings to be placed and fastened at any desired distance from each other, substantially in the manner and for the purpose set forth, by means of which I form a cheap and perfect railing of different lengths with the same number of palings, and firmly secure the rails in place.

WM. HAMILTON

No. 7120.—*Improvement in Clothes Frames.*

Having thus fully described the construction and operation of my improved portable clothes frame, what I claim therein as new, and desire to secure by letters patent, is the combination of the jointed arm G, G, bars H, H, and rods I, I, with the collars B, C, D, E, F, and the mast A, by means of the stay cords *n*, *n*, and the cords *l*, *l*, and *m*, *m*, substantially in the manner and for the purpose herein set forth.

HUMPHREY KEMPTON.

No. 7121.—*Improvement in Refrigerators.*

Having thus fully described the construction, and operation of my improved refrigerator, what I claim therein as my invention, and desire to secure by letters patent, is the inclosing water space A, for cooling the preserving chamber B, in combination with the pipe *d*, for discharging the waste water, substantially in the manner herein represented and described.

EPHM. LARRABEE

No. 7122.—*Improvement in Scale Beams.*

What I claim as of my own invention, and desire to secure by letters patent, is the combination of two or more scale beams, (having fixed and independent points of suspension,) with each other at the points (*e*,) and (*f*,) where the weight is usually attached, substantially in the manner, and for the purpose herein set forth.

S. T. McDOUGALL.

No. 7123.—*Improvement in Meat Cutting Apparatus.*

Having thus explained my invention, I claim the studs placed on the bar, in combination with the openings L, L, to direct the minced meat &c., into the said openings, that is, directing the said minced matters into either one of the openings, every revolution of the block, to prevent the minced meat, &c. from undergoing unmincing as set forth.

JOHN G. PERRY.

No. 7124.—*Improvement in Distilling Oleaginous Matter.*

What we claim as our invention, and desire to secure by letters patent, is facilitating and improving the distillation of fatty and oleaginous substances by the introduction of steam, at or near the bottom of the boiler, containing such substance, substantially as herein described, in combination with the application of external heat as described.

And we also claim the process, substantially as described, of distilling fatty and oleaginous substances by means of a bath of melted lead, or any alloy which will melt at the same temperature, substantially as and for the purpose described—whereby we are enabled to effect the distillation of the lowest possible temperature, and have a practical indication of such temperature as described.

A. M. POISAT.
D. C. KNAB.

No. 7125.—*Method of giving a Rotary Motion to Metal in Casting Chilled Rolls.*

Having thus described my invention, while I disclaim any exclusive right to the use of the circular motion in casting chilled rolls, inasmuch as that ha been for many years known and used, what I do claim as my invention, a desire to secure by letters patent, is the use of the dam *d*, attached to the r, placed inside the mould in chilled rollers, and similar castings, as he before described, for the purpose of producing a circular motion in the m metal.

JOHN C. PAR

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in the retorts, for the purposes set forth. I also claim the compound retort, constructed and arranged as above specified.

CHRISTOPHER T. BROWN.

No. 7116.—*Improvement in Sofa Bedsteads.*

First. What I claim as my invention, and desire to secure by letters patent, is the ordinary seat of a sofa, (or other suitable article of furniture,) so arranged as to revolve on a centre at each end, in a frame so constructed, as to turn over and bring the top or stuffed side of the seat, (by revolving the same,) on a level with another seat or bed, placed under the ordinary seat.

Second. I also claim the use of the stuffed ends forming the support for the top seat when turned over and used as a bed.

No. 7117.—*Improvement in Connecting Hubs with Axles.*

What I claim as my invention, and desire to secure by letters patent, is enclosing the spring collars that fit and run in the groove of the axle, within a box at the inner end of the hub, substantially as herein described, when this is combined with the ring fitting to and turning on the outer periphery of the box, and acting on the ends of the spring collars for the purpose of drawing them out of the groove when it is desired to take off the hub, substantially as described.

JUNIUS FOSTER.

No. 7118.—*Improvement in Churn Dashers.*

What I claim as my invention, and desire to secure by letters patent, is the hinging the series of beaters *b*, *b*, to the dasher rod, in such a manner that their faces will be thrown into inclined positions by the upward movement of the dasher, and into horizontal positions by the downward movement thereof; when the said vibrating beaters (*b*, *b*,) are combined and act in concert with the series of vertical faced beaters or wings *d*, *d*, (upon the same dasher rod,) substantially as herein set forth.

ISAAC D. GARLICK.

No. 7119.—*Improvement in Iron Railings.*

I wish it to be understood, that I do not claim forming joints, or connecting irons by lead packing, as that has before been done, but what I do claim, and for which I desire to secure letters patent, is constructing the pailings or upright rails, as herein described with holes in them, by means of which they slide freely in the horizontal bars, and with a cavity for containing lead or other proper metal surrounding said bar, for the purposes of allowing the pailings to be placed and fastened at any desired distance from each other, substantially in the manner and for the purpose set forth, by means of which I form a cheap and perfect railing of different lengths with the same number of palings, and firmly secure the rails in place.

WM. HAMILTON

No. 7120.—*Improvement in Clothes Frames.*

Having thus fully described the construction and operation of my improved portable clothes frame, what I claim therein as new, and desire to secure by letters patent, is the combination of the jointed arm G, G, bars H, H, and rods I, I, with the collars B, C, D, E, F, and the mast A, by means of the stay cords *n*, *n*, and the cords *l*, *l*, and *m*, *m*, substantially in the manner and for the purpose herein set forth.

HUMPHREY KEMPTON.

No. 7121.—*Improvement in Refrigerators.*

Having thus fully described the construction, and operation of my improved refrigerator, what I claim therein as my invention, and desire to secure by letters patent, is the inclosing water space A, for cooling the preserving chamber B, in combination with the pipe *d*, for discharging the waste water, substantially in the manner herein represented and described.

EPHM. LARRABEE

No. 7122.—*Improvement in Scale Beams.*

What I claim as of my own invention, and desire to secure by letters patent, is the combination of two or more scale beams, (having fixed and independent points of suspension,) with each other at the points (*e*,) and (*f*,) where the weight is usually attached, substantially in the manner, and for the purpose herein set forth.

S. T. McDOUGALL.

No. 7123.—*Improvement in Meat Cutting Apparatus.*

Having thus explained my invention, I claim the studs placed on the bar, in combination with the openings L, L, to direct the minced meat &c., into the said openings, that is, directing the said minced matters into either one of the openings, every revolution of the block, to prevent the minced meat, &c. from undergoing unmincing as set forth.

JOHN G. PERRY.

No. 7124.—*Improvement in Distilling Oleaginous Matter.*

What we claim as our invention, and desire to secure by letters patent, is facilitating and improving the distillation of fatty and oleaginous substances by the introduction of steam, at or near the bottom of the boiler, containing such substance, substantially as herein described, in combination with the application of external heat as described.

And we also claim the process, substantially as described, of distilling fatty and oleaginous substances by means of a bath of melted lead, or any alloy which will melt at the same temperature, substantially as and for the purpose described—whereby we are enabled to effect the distillation of the lowest possible temperature, and have a practical indication of such temperature as described.

A. M. POISAT.
D. C. KNAB.

No. 7125.—*Method of giving a Rotary Motion to Metal in Casting Chilled Rolls.*

Having thus described my invention, while I disclaim any exclusive right to the use of the circular motion in casting chilled rolls, inasmuch as that has been for many years known and used, what I do claim as my invention, and desire to secure by letters patent, is the use of the dam *d*, attached to the rod *r*, placed inside the mould in chilled rollers, and similar castings, as herein before described, for the purpose of producing a circular motion in the melted metal.

JOHN C. PARRY.

No. 7126.—*Parallelogram Steering Apparatus.*

Having thus described my improvements, I shall state my claims as follows:

What I claim as my invention, and desire to have secured to me by letters patent, is a steering apparatus in which the operating screw, and nut are connected to, and turn the rudder post by means of a series of parallel arms and cross bars, arranged and combined together in the form of a parallelogram, and jointed together so as to turn freely, substantially as herein described.

JESSE REED.

No. 7127.—*Improvement in Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the flues W, C, and *a*, in the accompanying drawing, in combination with the funnel shaped air pipe E, in fig. 2, of the accompanying drawings, in such manner that a union will be formed between the oxygen of the atmosphere, and the hydrogen of the smoke at the lower extremity of the flue W, W, in the accompanying drawings, where the heat caused by the action of the fire on the partition between the flue W, W, and the flue C, in the drawings, and radiating from it will produce combustion of those gases as they ascend through the flue W, W, in the drawings accompanying this specification

PETER SWEENY.

No. 7128.—*Improved Hydrolator.*

I am aware that an elevating rope has been passed through an opening in a windlass drum, and confined to the shaft within the same, for the purpose of enabling the length of the rope to be regulated as circumstances might require, and therefore I do not claim this as my invention, but what I do claim as new and desire to secure by letters patent, is the combining with a hydrolator (for first elevating water or other substance, and then conveying the same to a distance,) a double acting drum, constructed substantially as herein described, in such a manner that the vertical raising and lowering movement of the bucket or its equivalent, may be at a slow movement, and an accelerated leverage and the horizontal or inclined conveying movement may be at an accelerated speed and a diminished leverage.

ZURIEL SWOPE.

No. 7129.—*Improvement in Apparatus for Making Coffee.*

The strainer *a*, and its spring contrivance in their application to the coffee receptacle or box, constitute what I have termed the spring expander, and in the employment of the same, I do not intend to confine my invention, to the precise form or arrangement of parts as exhibited in the drawings, as I am aware that the same may be varied in various ways, while the principle of the invention is still maintained. For instance, the spring may be placed between the tops of the two boxes F, and H, instead of on the outside of the top of the box H, as seen in the drawings. The spring expander may be disposed within the box F, but I do not consider such change as presenting the advantages of construction, operation, and repair, as are presented by the mode of making the improved cafetiene, as exhibited in the drawings.

What therefore, I claim as my invention, and as new, is the spring expander, in combination with the coffee box or receptacle, the same being for the object or purpose, substantially as herein before specified.

NATH'L WATERMAN.

No. 7130.—*Improvement in Machinery for Spinning Yarn and making Rope.*

What I claim as of my own invention, and desire to secure by letters patent, is—

First. Giving to the strand during the operation of spinning, a double twist to each revolution of the rings or flyers, in the manner described herein, the same being applied to, and claimed in the spinning of yarns from any fibrous material, and also in laying the strand into rope, in the manner set forth.

Second. I claim the combination of the weight (*l*,) and (*e*,) with the bobbin stands for the purpose of preventing those from being carried around with the rings or flyers; the whole being arranged and operated, substantially in the manner and for the purpose herein described.

CULLEN WHIPPLE.

No. 7131.—*Improvement in Invalid Bedsteads.*

What I claim therefore, as my invention, is the combination of the inclining frame B, with the back seat, foot frames and main bedstead, substantially in manner, as herein before specified.

A. W. BARKER.

No. 7132.—*Adjustable Cord Hook for Door Springs.*

Having thus described my invention, what I claim as new, and desire to secure by letters patent, is the use of the adjustable cord hook or attachment (H,) for the cord, whereby the tendency of the spring to close the door is made to vary at pleasure, as herein set forth. I also claim in combination with a spring and fuse, having the diminution of the diameter of the coils on the fuse more rapid than the decrease of elasticity in the spring, by uncoiling the moveable cord attachment (H,) whereby the tendency of the spring to close the door is varied more rapidly than would be due to the simple change of position of the hook alone, in the manner and for the purpose herein set forth.

WM. B. BARNARD.

No. 7133.—*Improvement in Machinery for Planing Slats for Blinds.*

Now, what I claim as my invention, and desire to be secured by letters patent, is the engaging and disengaging the propelling slide block and carriage, by the continued action and connection of the dart holder T, springs D, D, and expander S.

GEO. BONWILL.

No. 7134.—*Fastening for Hay and Manure Forks.*

What I claim as my invention, and desire to secure by letters patent, is forming the tines or prongs *B*, of the hay fork, and the additional tines or prong *C*, which connect the same into a manure fork, out of single bars of steel, bent to the desired form, and securing the same to the handle *A*, by inserting them through the slot or mortise in the same, and driving keys or pins (*b*, *c*,) behind the same, substantially as herein set forth

ALINZOR CLARK.

No. 7135.—*Improvement in Carriage Jacks.*

Having thus fully, clearly and exactly described, and represented the [illegible], construction, and operation of our improvement, in carriage [illegible]; what we claim therein as new, and desire to secure by letters patent, is [illegible]structing the lever (*c*,) or its equivalent, with teeth ([illegible]) [illegible]

(d,) or their equivalents, in such juxtaposition, the one with regard to the other, that when it is necessary to release the rack from its load, these parts of the lever appropriately unite in action with the teeth (c,) and the ways (b,) of the rack (a,) or their equivalents, and with the pendents (r,) and the tooth (n,) of the latch (j,) or their equivalents, to take the load off and release the catch, retreat and make the frame of the catch a fixed point of resistance for the prongs of the lever, force out the lever tooth from the rack tooth, (the cam the while putting pressure upon the ways of the rack,) and oppose by the cams the requisite friction, and consequently resistance to the descent of the rack, the whole being arranged, substantially in the manner and for the purpose set forth.

THOS. G. CLINTON.
GEO. H. KNIGHT.
EDWARD H. KNIGHT.

No. 7136.—*Improvement in Firing Kilns for Pottery Ware, Black Lead, Crucibles, &c.*

I am aware that rosin as fuel has been incidently substituted for wood and coal in various kinds of furnaces, for melting glass, &c., but I am not aware that it has ever been substituted for other kinds of fuel in baking pottery, bricks, or other kinds of earthenware, with the view to equalize the baking, and to prevent the action of oxygen on the surface of such articles to be baked as are injuriously affected by it, and therefore, I do not claim generally as my invention, the use of rosin as a substitute for other kinds of fuel; but what I do claim as my invention, and desire to secure by letters patent, is the use of rosin or the distillation thereof, as a combustible, for baking pottery and all other kinds of earthenware, substantially as described, as a means of preventing such articles from being "over fired," or "slack burned," and whereby also, the injurious action of atmospheric air on the surface of black lead crucibles, pottery ware, bricks, &c., is avoided as described.

JOS. DIXON.

No. 7137.—*Improvements in Looms for Figured Fabrics.*

Having now described the nature of my improvements and their mode of operation, I claim as my invention, and desire to secure by letters patent, the following, viz.:

Firstly. Obtaining the picking motion, or (otherwise expressed) giving action to the picking shaft, by means of the shaft D, carrying the picking fingers D', oscillating with the lay, in combination with the mode of raising and depressing the fingers D', by the combination of the cam a^c and lever e^4, the said cam being detached from the other parts of the loom, thereby enabling it to be easily changed, in the manner and for the purpose above specified.

Secondly. I claim the pattern plates p^3, made and worked in the manner and for the purpose herein fully made known, in combination with the pattern levers o, with the pins o' fixed in them, the lever T, and cam T^2, for the purpose of lifting said pattern levers o, the star driver p'', and the star plate p^9, the mitre wheel p^7, and p^8, shaft p^6, and bevel wheel p^4, and p^5, in connection with cylinder p. The respective motions herein referred to, being carried on or effected, substantially in the manner and for the purpose herein fully made known.

Thirdly. I claim the combination formed by the mechanism, for moving the shuttle boxes, that is to say, the cam s^3, lever s, and pulling catcher o^2, together with the bevel wheels K^2, ^{3}, ^{4}, ^{5}, and intermediate bevels K', and K^6, together with the star driver L, and star plate L', and pinion I, and the shaft K^7, bevels L^2, and L^3, and shaft L^4, together with the star driver M', and star plate M^2, said bevels, shafts, star drivers, and stars oscillating, with the lay, and acting from the same centre, so that the connection between the shuttle boxes and bevels, is never broken or detached. The whole being constructed and arranged in the manner and for the purpose herein fully described. I do not limit my claim to the precise arrangement herein set forth, nor to the moving of any particular description of shuttle boxes, but I do claim my combination of motions used for the purpose of moving shuttle boxes of any description, when such arrangements and combinations are, substantially the same with that herein described.

Fourthly. I claim the apparatus for holding the pins in star driver L, or the pins in the bevels K^2, ^{3}, ^{4}, ^{5}, and consequently the shuttle boxes connected therewith, in a proper position, or more particularly the lever D^2, and rod c^o, connected to the bracket or carrier a^o, and the action to said lever being given by the oscillation of the lay, in the manner and for the purpose herein specified.

SAMUEL ECCLES.

No. 7138.—*Improved Apparatus for Registering the Depth of Water in Vessels' Holds.*

What I claim as my invention, is the combination of the secondary index hand apparatus, with the primary index hand apparatus, or that which denotes the depth or rise of water, the secondary index hand apparatus being for the purpose of registering the extreme depth, as above stated.

NELSON EDWARDS.

No. 7139.—*Improvements in Machinery for Dressing Hemp and Flax.*

Having thus described my invention, what I claim is the combination of the toothed cylinder B, the wind passage P^2, the trunk O^2, the endless apron I, the set of feed rollers F, F, G, the concave K, and the waste apron N; the whole arranged and made to operate together, substantially in manner and for the purpose as above set forth.

And in combination with the feed apron, its roller F, and toothed cylinder B, I claim the projecting shield N^2, the same being for the purpose of protecting the apron from injury and wear as specified, also to protect the journals of the rollers from winding up with waste or lint.

WM. W. GRANT.

No. 7140.—*Improvements in Railroad Cars.*

Having thus pointed out the nature or principle of my invention, the manner of constructing and using the same, and the advantages thereof, what I claim as my invention, and desire to secure by letters patent, is supporting and connecting both ends of the main platform of a railroad car, each with the centres of secondary platforms, which secondary platforms are connected at each end with, and supported each on four wheeled trucks, all substantially in the manner and for the purpose specified

GEO. S. HACKER.

No. 7141.—*Improvement in Corn Ploughs.*

Having thus fully described my improved corn and potato plough, what I claim therein as new, and for which I desire to secure letters patent, is the moveable expanding wings, combined and moved, substantially in the manner and for the purpose herein described, by means of right and left screws on a cranked shaft, that can be turned while the plough is in motion.

ROBT. J. KING.

No. 7142.—*Improvement in Cooking Ranges and Air-Heating Furnaces connected therewith.*

What I claim as my invention, and desire to secure by letters patent, is—

First. Equalizing the heat in the oven, by allowing the air to circulate and ascend through the chamber, between the fire box and front oven plate, for the purpose, substantially as set forth.

Secondly. I also claim so constructing the contractors, as that two of the boiler holes may be changed into one of the same size as either of the other two, by which means a boiler hole may be had directly over the centre of the fire, or four boiler holes reduced to two, all being of the same size as described.

Thirdly. I claim in combination with the air-heating apparatus, the disposition or arrangement of the valves d', and t, t, with either of the valves s, s, on the door c', for the purpose of ventilation as described. The position of the valves are not material, so that their combined operation shall be as set forth.

JAMES McGREGOR.

No. 7143.—*Improvement in Air-Heating Furnaces.*

What I claim as my invention, and desire to secure by letters patent, is—

First. Making the heating cylinder in sections, in combination with the segments of tubes or vertical cavities, cast on the plates at the laps containing sand, substantially as described, whereby they are rendered air-tight, as described.

Second. I claim the mode of fastening the handle to the grate, and keeping the grate true with the handle, by means of the bolt (t,) by which they are connected with the two studs (v, v',) as substantially set forth.

Third. I claim the separate chamber for the fire pot, which is suspended below the chamber of combustion, to prevent the air heated by the fire pot from entering into the air chamber (b',) surrounding the heating cylinder for the purpose, and in the manner as substantially set forth.

Fourth. I claim admitting air and flame through the pipe (w,) and its aperture or apertures (z, z, z,) into the chamber of combustion and radiation, in the manner and for the purpose, substantially as set forth.

Fifth. I also claim this mode of introducing the heated air and flame, in combination with the descending draught as described.

JAMES McGREGOR.

No. 7144.—*Improvement in Cooking Stoves.*

Having thus fully described my improved coal cooking stove, what I claim as my invention, and desire to secure by letters patent, is the arrangement of the valve or damper A, above the back plate of the fire chamber in combination with the register F, for regulating the draft, as herein fully set forth.

CHARLES MURRAY NELSON

No. 7145.—*Improvement in the Composition for Enameling Hollow Ware.*

Having thus described the nature of our said invention, and the manner of performing the same, we would have it understood, that we do not confine ourselves to the details herein given, but what we claim is the new and useful glazing composition for coating articles of iron to prevent oxidation, substantially as specified.

CHARLES EMILE PARIS.
CHARLES HENRIE PARIS.

No. 7146.—*Improvement in Apparatus for Retaining Cars on the Rails.*

What I claim as my invention, and desire to secure by letters patent, is combining the trucks or other suitable parts of locomotives, freight, and passenger cars with the rails, by means of two bars, one vertical and one horizontal, connected in such way that oscillations and other vibratory movements of said cars, will be permitted without disengaging the hooks or rollers attached to the lower ends of the vertical bars, from the flange of the rails, the whole being arranged, substantially in the manner described herein.

W. PAYNE,
Late Capt. R. L. Engineers.

No. 7147.—*Improved Winged Metallic Cartridges.*

What I claim as my invention, and desire to secure by letters patent, is the method of enclosing the charge of powder in the hollow part of the ball, by slitting its rear end and bending in the parts so slitted, substantially as herein described, that when the ball is discharged the parts so slitted may be forced out, to become feathers or wings to guide the ball, substantially as described.

A. D. PERRY.

No. 7148.—*Improved process in the Manufacture of Glucose.*

What I claim as my invention, and desire to secure by letters patent, is the conversion of corn meal into a solution of grape, sugar, or glucose, by boiling the same under a pressure greater than that of the atmosphere in water, acidulated with sulphuric acid, substantially in the manner described.

GEORGE RILEY.

No. 7149.—*Improvement in the construction of Fire Places and Throats of Chimnies.*

What I claim as my invention, and desire to secure by letters patent, consists in constructing chimnies with an additional flue A, in the back of the fire place, made in the manner and for purpose herein fully set forth, in combination with the bringing down of the main flue D, of the chimney stack, as above described, with the horizontal offset c, at the top of the back of the fire place, and the spaces E, at the sides, all as herein fully set forth.

CHAS. W. RUSSELL.

No. 7150.—*Improvements in Mail Axles.*

What I claim as my invention, is the making open grooves of whatever form, cast, or cut in, or upon the large end of axle boxes upon carriage axles, technically known as mail axles, and upon axles for cars with short bolts, with whatever form of head, fitted into the grooves for securing the wheels and boxes upon such carriage axles, and upon cars in the place of, and to supercede long bolts, which are now in use for securing such wheels and boxes.

W. H. SAUNDERS.

No. 7151.—*Improvement in Cooking Ranges.*

What I claim as my invention, and desire to secure by letters patent, is extending back the front boiler chamber or chambers, to form the back boiler chamber or chambers, at the side or sides of the elevated oven, substantially as described, in combination with the partition or partitions at the side of the front boiler chamber or chambers, and extending back of the back boiler chamber or chambers, when the said partition or (partitions) is provided with flue holes at the side of the side boiler or boilers, and back of the back boiler or boilers, and leading to the flue around the elevated oven, substantially in the manner and for the purpose specified.

FRED. H. STIMPSON.

No. 7152.—*Improvement in Chimney Caps.*

What I claim as my invention, is the improved ventilator, constructed of a combination of a series of external plates, a series of internal plates and openings, or smoke passages, arranged, covered, and applied to a flue, and made to operate together, substantially in the manner as above specified.

EDWARD WHITELEY.

No. 7153.—*Improved Scraper for Removing Snow from Ice.*

Having thus described my improvements, I shall state my claim as follows: What I claim as my invention, and desire to have secured to me by letters patent, is an ice scraper, constructed substantially as above described, that is, in the form of a triangle, (so that in moving in either direction, the snow will be thrown by the diagonal sides at right angles to the course of the scraper,) and the base having guides which move in grooves forward in the ice, and control the motions of the implement, as herein above set forth.

NATH'L J. WYETH.

No. 7154.—*Improvement in Gas Metres.*

What I claim as my invention, and desire to secure by letters patent, is—the use of the four mercurial valve cups, as described, for filling and discharging alternately, the two measuring gasometers, as set forth.

I also claim the shaft *c*, in combination with the levers B, *e*, and pall *f*, for giving simultaneous movement to the hands of the dials, the valves, and the gasometers, as set forth.

JAS. LONG.

No. 7155.—*Improvement in the Spiral Spring Sash Stopper.*

What I claim as my invention, and desire to secure by letters patent, is—the combination with the ratchet and click, or any well known equivalent therefor, to arrest the action of the sash elevator, of the spring bolt (B), for fastening the sash, thereby giving double security against any disturbance of the position of the sash, substantially in the manner and for the purposes herein set forth.

WM. B. BARNARD.

No. 7156.—*Improvement in cutting Figures in Relief on Wood.*

Having thus described my invention, and exemplified the manner in which it may be carried into effect, I wish it to be distinctly understood, that I do not confine myself to the precise mechanical devices herein described for holding the material, for moving the carriages to and fro, for setting the cutters, or for holding the rack, teeth and blocks, but intend to vary them as circumstances may render expedient.

But what I claim as my invention, and desire to secure by letters patent, is the combination of an adjustable guide rack with an adjustable guide block, to produce the transverse, in combination with the longitudinal motion, for the purpose of producing on wood or other material, forms of a curvilinear, zigzag, or mixed outline, substantially as herein set forth.

I likewise claim the device for effecting the reversal of the shifting lever, constructed and arranged substantially as herein set forth, and composed essentially of the adjustable stops (*g*), springs (*i*), dotents (*k*), vibrating frame (F), and wheels (*d' d''*).

J. H. BRUEN.

No. 7157.—*Fastening of Terrets in Harness Saddles.*

What I claim as my invention, and desire to secure by letters patent, is—the combination of an adjustable pad (B,) and a terret (C,) with each other, and with one of the legs (A,) of a harness saddle-tree, by means of a single point, so constructed that neither the pad or the terret can be turned on their axis from their proper positions, substantially as herein set forth, to wit: by means of a rectangular opening in each leg A, of the saddle-tree, with lugs *d*, *d*, descending from its sides for the reception of the shank *f*, of a terret C, and by the ears *e*, *e*, rising from the upper side of the pad (B,) that receive between them the end of the shank (*f*,) of the terret, through holes, in which ears and terret shank the rivet (*i*,) passes, and holds the three parts A, B, C, securely together.

PETER B. COOL.

No. 7158.—*Improvement in ventilating Railroad Cars.*

What I claim as my invention, and desire to secure by letters patent, is—the employment of jets of air produced, substantially in the manner herein set forth, for preventing the entrance of dust into railroad cars or carriages of any description.

JAMES CUNNINGHAM.

No. 7159.—*Improvement in Furnaces for heating Sad Irons.*

What I claim as my invention, and desire to secure by letters patent, is—combining with a portable furnace of the usual construction, a surrounding heating chamber, provided with apertures or slots to admit of the insertion or removal of the flaps combined with the door or flap at top, substantially as described.

I also claim providing the said air heating chamber with a revolving top, provided with a single small door or flap, which, by the rotation, may be brought directly over the slots in succession, and the flats inserted or removed, substantially as described.

JOHN T. DAVY.

No. 7160.—*Improvement in coloring Photographic Pictures.*

What I claim as my invention, and desire to secure by letters patent, is—the application to photographic pictures taken upon paper or upon any transparent or translucent medium, of the mode of coloring I have described, or any other substantially the same, and which will produce a similar effect.

A. C. DAYTON.

No. 7161.—*Improvements in Pumps for deep Wells.*

Having fully described my improvements in pumps, what I claim therein as new, and desire to secure by letters patent, is the combination of the pump barrel, having a valve as described, with the water chamber at the bottom, and the lever at the top, substantially as described, so as to raise the water by elevating and depressing the barrel, thereby dispensing with the ordinary piston and piston rod, and avoiding the inconveniences incident thereto.

NEHEMIAH DODGE.

No. 7162.—*Improvement in Machinery for making Pill Boxes.*

Having invented an automatic or self-directing machine of great value in the manufacture of boxes, and having herein before described the same, what therefore I claim as my invention, is as follows:

I lay no claim to the particular tools or reducing cutters used in cutting the wood of a stick, but what I do claim is the above described peculiar arrangement of two or more sets of reducing cutters applied to one carriage V, as above set forth, two or more sets of reducing cutters, applied to another carriage W, in a similar manner, feeding apparatus applied as above set forth, to each cutting apparatus, and two circular saws playing between and acting in concert with the adjacent opposite cutting apparatus of both carriages V, W, the whole operating together, substantially as above specified.

I also claim the combination of machinery by which each of the circular saws, or their puppet heads or carriages, are alternately moved, first in one direction, and next in the opposite direction, and on their supporting ways; the said machinery consisting of the arm o', or p', affixed to the upright shaft K, the slide t', and its projecting pin applied to, and of the said arm, the grooved cam plate w^2, the lever or arm r', connecting rod s', the pin c^2 projecting from the under side of the carriage, and the springs a^2, b^2, the whole being constructed and made to operate, substantially in the manner and for the purpose as therein before specified.

ASA FESSENDEN.

No. 7163.—*Cultivating Seed Planter.*

What we claim as our invention, and desire to secure by letters patent, is: The combination of the roller and the harrow for crushing and pulverizing the soil, with the cultivator teeth for forming the furrows and depositing the seed; the roller preceding the harrow, and both preceding the cultivator teeth, as herein set forth.

WM. FLORY.
GEO. A. GROOVE.

No. 7164.—*Improvement in Air Heating Stoves.*

Having thus fully, clearly, and exactly described the nature, construction, and operation of my invention in heating stoves, what I claim therein as new, and desire to secure by letters patent, is inserting the vessel *(f,)* as described for throwing down jets of air directly upon the flames, and other results of combustion; the cylindrical vessel *(f,)* being of lesser diameter than the drum *(c,)* half way up, and within which it is placed, so that the flame and results of combustion are commingled with the jets of air, and more thoroughly consumed, and are also forced to lick the sides of the drum and thus cause the greatest possible radiation of heat. And in combination with the foregoing, I claim the pipe *(d,)* with the enlargement *(e,)* and the reservoir *(h,)* as described, for carrying a column of air through a pipe led through the heart of the fire, this pipe being enlarged about the level of the top of the fire bowl, so as to throw jets of air athwart the direction of the downward jets before described, and this pipe being also continued up to a reservoir on the top of the drum, through perforations in the top of which air reservoir, jets of heated air, are continually thrown into the domestic or other apartment; by which general construction of this pipe, I effect a complete, commingling, consuming, and outward forcing of the results of combustion against the sides of the drum, and at the same time, furnish to the apartment an agent for heating and keeping up an active circulation of the atmosphere in the room to which heat is to be imparted.

P. GOODHUE.

No. 7165.—*Improvement in Regulators for Drawing Rollers.*

What I claim as my invention, and am desirous of securing by letters patent, is the combination of the tube B, lever D, D, weight C, jointed bar E, E, oscillating shaft F, and pinion G, gears H, I, M, screw shaft N, nut O, arms P, P, with their belt guides Q, Q, belt V, cones R, R, shaft K, and level gears 1, 2, 3, 4, 5, 6, for changing and regulating the speed of the rolls, for equalizing the drawing or making the sliver the required size, substantially in the manner described in the foregoing specification.

WHITING HAYDEN.

No. 7166.—*Improvement in Oil Presses.*

Having thus described the construction and operation of my improved press, what I claim therein as new, and desire to secure by letters patent, is:

First. The construction and arrangement of a series of press cases, substantially as herein set forth, each box forming or carrying the follower of the one next above it, and all being supported when not in action, at suitable distances apart by the offsets on the guides.

Second. The combination of the perforated lining plates, with the grooves or channels on the interior of the press cases, substantially as herein set forth.

EDWIN HILLS.

No. 7167.—*Improvement in Noddle Irons for Saw Mills.*

What I claim as my improvement in noddle irons for saw mills, and desire to secure by letters patent, is the combination of the four pointed knuckle, with indented straps and screw tie bolts, the whole constructed and arranged substantially in the manner, and for the purposes set forth.

GIDEON HOTCHKISS.

No. 7168.—*Improvements in Looms for Weaving Piled Fabrics.*

What I claim, therefore, as my invention, and desire to secure by letters patent, is the method of inserting the figuring wire (or wires) into the open shed, and withdrawing the same from under the woven file or loops by means of a carrier (or carriers) to which one end of the figuring wire (or wires) is (or are) attached, when the said carrier (or carriers) is so operated, substantially as herein described, as to receive a motion from and towards the selvage of the fabric, to withdraw and insert the wire,—and towards and from the lay to carry the wire to the open shed, and when inserted back against the woven part of the fabric, all substantially as herein described.

I also claim combining with each carrier and figuring wire, a guide or support through which the wire passes, substantially as described, when the said guide receives a motion towards and from the lay in unison with the carrier, substantially as described. I also claim forming each range of figuring loops on two wires introduced from opposite sides, and over-lapping in the middle with the lapping ends champered or bevelled, substantially as described.

JOHN JOHNSON.

No. 7169.—*Improvement in Cast Iron Car Wheels.*

What I claim as my improvement, is the wheel, or combination of the arched support plate E, E, the curved spokes or arms F, F, and the curved plate C, C, with the solid or undivided hub and the chilled rim, all cast together, and in one piece, substantially as above specified.

LYMAN KINSLEY.

No. 7170.—*Improvement in Cast Iron Car Wheels.*

I am aware that a cast iron wheel with a hollow felloe, or made with two concentric rings connected at their sides, and having a space between them, was invented and patented, on about the 15th day of February, A. D, 1838, by one Henry R. Dunham. This wheel, however, had a series of straight spokes, and a split or divided hub, the hub being connected to the felloe by such spokes only. I do not claim as my invention, such wheel or any part thereof, although it was able to resist vertical blows or shocks, better than a wheel having a solid or single rim felloe, as usually made, it has not the requisite power or strength to resist the lateral strains against the flanch of its tread. Nor could it be cast in one piece, and with a solid or undivided hub and chilled rim.

What I do claim as my invention, is the wheel made with the chilled rim a hollow felloe, or a support plate E, extending around and within the chilled rim, a curved plate C, uniting the rim and hub, a series of curved arms F, F, F, &c., and an undivided or unsplit hub, all cast, or founded, and combined together in one piece, substantially in manner as above specified.

LYMAN KINSLEY.

No. 7171.—*Improvement in the Interior Arrangement of Steam Boilers.*

What I claim herein as new and of my invention, and desire to secure by letters patent, of the United States, is the troughs (*i*,) surmounting diaphragms (which separate the water space vertically, into as many isolated chambers,) and having sides which rise higher toward the outside, in order to collect such water as overflows, and to distribute it among the several parts when the boiler recoils.

SYLVANUS KNIGHT.

No. 7172.—*Improved Lever Lewis.*

And what I therefore claim as my invention, and desire to secure by letters patent, is attaching a bent lever having its foot resting against or hooking under one of the vertical sides of a stone, to that same vertical side of the stone, by any of the well known forms of lewis, substantially in the manner and for the purpose herein described.

THOMAS LIDGERWOOD.

No. 7173.—*Improvement in the Gauge for Water Casks.*

What I claim as my original invention, and desire to secure by letters patent, is the combination of the joints or rods E, E, with the piece A, C, D, scale F, and piece B, C, D, in the manner set forth.

JOHN MARQUART, Jr.

No. 7174.—*Improvement in Flouring Mills.*

Having thus described the manner in which I construct my improved flour bolting machine, and the operations thereof, what I claim therein as new, and desire to secure by letters patent, is the manner herein stated, in which I have arranged and combined the spouts *i*, *j*, *k*, *l*, and tubes *b*1, *b*2, *b*3, *b*4, &c., and their slides *c*, *c*, *c*, *c*, &c., with each other, and with the bottom of chest B, and with the boxed conveyers F, and L, by which complete control is obtained over the quality of the flour passed into the packing chest, and also to give a similar control over the quality and quantity of the flour carried from B, into L, to be returned through *f*, to the flour elevators, substantially as before described.

I claim the manner in which I have arranged and combined spouts *k*, *l*, pipes *b*, *b*, &c., and their slides *c*, *c*, *c*, &c., with each other, and with B, F, L, and M, and O, with F, and F, with G, and H, by which the flour and bran are mingled in any desired proportions, and passed together into H, so as to give complete control over the action and products of H, and to prevent the choking or filling up of the meshes of the bolting cloth, substantially as before described. I claim also the manner in which I have combined spout *d*, with the bottom of I, and top of L, and *g*, with the bottom of L, and the burrs, so as to pass to the burrs such portion of middlings as require regrinding, substantially as before described.

And while I do not claim as my invention, the separate parts of my bolting machinery, taken individually, I do claim as new, and of my invention, the manner of combining and arranging those parts, substantially as before described, so that entire control is given over the process of bolting, and it is made one entire and continuous action, and by machinery, by which any desired portion of the flour in the first bolting chest B, is passed through *i*, or through *i*, and *j*, into the packing chest; and any portion thereof passed through *k*, or *l*, into L, and thence through *f*, with the flour from I, through *e*, to the elevators, and any portion at the miller's discretion, passed through *b*, *b*, &c., into F.

And the flour unbolted from M, the flour from *b*, *b*, &c., and the bran from O, mingled and passed together in any proportions through G, into I, and H, and then thoroughly bolted and separated without any choking of the meshes of the bolt, the bran passed off through J, and the offal through *h*, in any required condition, the middling forced through *d*, into L, and from thence through *g*, to the burrs to be reground, while the flour is forced through *e*, into L, and meeting with the flour passed into L, from *l*, with it carried through *f*, to the flour elevators.

A. F. MENEFEE.

No. 7175.—*Improvement in Abdominal Supporters.*

Having thus explained my invention, I claim this abdominal supporter, constructed with the bodice A, as described, in combination with the trunk hose D, in the manner described, or in any other manner, substantially the same for the purpose set forth

MARY W. O'MEARA.

No. 7176.—*Improved Method of Operating Lock Bolts.*

What I claim as my invention, and desire to secure by letters patent, is operating by means of reciprocating slides, a vibrating lever provided with a bolt at one end, and projecting from the back face of the lock, substantially as described.

THOS. SLAIGHT.

No. 7177.—*Improvement in Brakes for Carriages.*

Having described my improvements, all that I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the suspended toothed or notched bar K, staple N, spring-hook rod Q, connecting rod H, and plate O, for actuating and locking the rubbers against the peripheries of the wheels, and unlocking the same in passing over plains, by the action of the horses, as described and represented.

WILLIAM T. WELCH, Jr.

No. 7178.—*Machines for giving Increased Twist in Cutting Rifles.*

Having thus fully, clearly, and exactly described the nature, construction, and operation of our invention, what we claim therein as new, and desire to secure by letters patent, is the jointing the guide (*i*, *i*, *i*, *i*,) in combination with the chord piece (*w*,) for sustaining it in position (or their equivalents) for the purpose of giving the guide as bent, when operated upon by the aforesaid lugs, or screws, or their equivalents, a rocking motion; making the point of attachment to the traversing bar, or other similar contrivance, describe a curve with reference to the bed which traverses beneath, thereby compelling the point of attachment to the traversing bar, or its equivalent, to recede in a gradually increasing ratio, (accompanied by an equivalent increased velocity of the rotary head,) from the axis of the mandrel, for the purpose of producing an increasing or decreasing twist to the groove in the bore, after the manner, substantially as herein described.

EDWIN WILLIAMS.
JAMES CULBERTSON.

No. 7179.—*Improved Method of Applying Fusible Metal to Boilers.*

Having thus described my protected safety fusible plug, what I claim therein as new, and desire to secure by letters patent, is inserting the fusible metal in a perforated cap which is protruded through, and screwed into any sheet of the fire or flue surface of the boiler, substantially as herein set forth; in such manner that the bottom of the cap is exposed directly to the action of the heat, the fusible metal within the cap closing the end of the tube through which the steam rushes, to give warning when the metal melts.

EDWARD H. ASHCROFT.

No. 7180.—*Improvement in Looms for weaving piled Fabrics.*

What I claim as my invention, and desire to secure by letters patent, is—

First. Cutting the loops in the grooved wires as the cloth is woven, by means of a reciprocating knife, combined with the weaving parts of the power loom, and operated substantially as herein described.

Second. Combining with the reciprocating knife for cutting the loops, a take-up roller provided with cogs, which enter between the looping wires, substantially as herein described, for the purpose of presenting the ranges of loops in succession, and in a proper position to the action of the knife, as herein described.

Third. Combining with the reciprocating knife for cutting the loops, beveled or wedge formed guides placed near the selvage of the cloth, substantially as herein described, for guiding the knife at the commencement of the cut, as described.

Fourth. Combining with the reciprocating knife for cutting the loops, a trough into which the wires fall from the cut pile, and a second trough, into which they are successively transferred, substantially as herein described.

Fifth. Combining with the second trough, into which the wires are transferred, chains with projecting wings or spurs, substantially as herein described, for taking the wires in succession from the said trough, and transferring them to a wire box attached to the lay, substantially as herein described.

And lastly. Guiding and supporting the looping wires as they are introduced under the warps by means of slots or notches in the dents, substantially as herein described.

MERTOUN C. BRYANT.

No. 7181.—*Improvement in Machines for planing Ornamental Mouldings.*

I do not claim to have invented or improved upon any plan of a planing machine whatever, neither do I claim to be the inventor of any plan of a machine for forming ornamental mouldings by a scraping process in which only one gauge and one scraper are used in combination with a tool frame or carriage, which has only a vertical motion.

But what I do claim, and desire to secure by letters patent, is the method of using two scrapers, one in advance of the other, in combination with a single gauge.

I also claim the method of using the universal joint, in combination with the swivel carriage and two gauges, the same being constructed, arranged and operated essentially as above set forth and described.

JOHN B. H. CHATAIN.

No. 7182.—*Improvement in Machines for making Hat Bodies.*

What we claim as our improvement, and desire to secure by letters patent, is the combination of the rotating brush for throwing the fibres, with the cards which take the fibres from the feed rollers, and separate and prepare them, and with the trunk which guides, and the exhausted former on which the fibres are deposited, substantially as herein described.

EDWARD F. CONDIT.
ALFRED TAYLOR.

No. 7183.—*Improvement in Weighing Frames.*

What I claim as my invention, and desire to secure by letters patent, is—the manner of constructing the portable frame for the scale beam, as set forth, said frame consisting essentially of the hinged beam *c*, moveable standard *e*, and platform *a*, these parts being arranged and combined, substantially as set forth.

CHARLES DOWNER.

No. 7184.—*Improved Apparatus for Trimming Vessels.*

What I claim as my invention, and desire to secure by letters patent, is—the herein described method of trimming vessels by means of a shifting weight operated by an adjustable cradle, substantially as herein set forth.

E. L. EVANS.

No. 7185.—*Improvement in Tools for preparing Hubs for Boxes.*

Having thus described the construction and operation of my improved hub excavator, what I claim as my invention, and desire to secure by letters patent, is the construction of the implement or tool above described and represented by the accompanying drawings, for excavating or cutting out the ends of hubs of carriage and other wheels by hand, for the reception of the ordinary wheel boxes and linch pins, the cutter P P′, being made to recede from the centre of the hub simultaneously with the operation of cutting the excavation in concentric circles, by the combined and simultaneous action of the screw G, and nut H, in connection with the recessed bar A, and handles B, B, transverse bar J, and box N, arranged and operating in the manner and for the purpose set forth. SAMUEL FAHRNEY.

No. 7186.—*Improvement in Abdominal Supporters.*

What I claim as my invention, and desire to secure by letters patent, is—two short elastic arms S shaped, connected with other parts of a supporter, with a pad upon each end, one pad to rest upon the short ribs behind the curve and free from the spine, while the other rests upon the flat plate of the os illium, each S plate being united at the middle to a long elastic arm, by a mortise allowing no motion but that of sliding in and out; the long arm and short arm always crossing at right angles through the mortise.

Secondly. I claim the invention of two long elastic arms, in connection with other parts of a supporter, and with the S shaped arms, by a mortise and screw bolts: these arms so cut as when laid upon a flat surface, that the edge will be convex, then concave, and then straight, and formed so as to set flat upon the person, rising above the hips with a point of rest about one-third of its length from the back, and falling down in front to a pad, and by so adjusting the shape of the arms and point of rest, as to press directly upon the hernial rings, and lift up the abdominal contents toward the top of the hips.

Thirdly. A supporter pad so formed as to be thicker on the inside, near its lower and outer edge at the point of termination or lower fastening to it, of the long elastic arms, so as to press directly on the hernial rings, the lower outer edges being cut so as to follow the course of the grain, and the lower edge yoked or cut convex, to go above the os pubes, thus acting upon all those parts occupied by the abdominal rings. S. S. FITCH.

No. 7187.—*Improvement in Seed Planters.*

I claim the levers constructed with their ends k, in the manner substantially as described, to prevent the slides from being actuated when the motion of the wheel is reversed. JOHN P. GROSHEN.

No. 7188.—*Improvement in Hoisting Machines.*

What I claim as my invention, and desire to secure by letters patent, is—the twist break, whether constructed as set forth, or in any other way, substantially the same, and whatever the nature or purpose of the machine to which it may be attached. SANDY HARRIS.

No. 7189.—*Process of rolling India Rubber Cloth.*

What we do claim is the new or improved process of applying and fixing rubber to cloth by means of rollers; the said improved process being a combination of the method of spreading the rubber by the pressure of rollers, and the method of grinding and fixing it at the same time, against and into the substance of the cloth, all as specified. FRANCIS D. HAYWARD.
JOHN C. BICKFORD.

No. 7190.—*Improved method of employing the Exhaust Steam.*

What I claim as my invention, and desire to secure by letters patent, is—the running the exhaust pipe into the main steam pipe, curving it, and providing it with an aperture and valve, substantially as herein described, by which the current of steam from the boiler has a tendency to open the valve at intervals, and draw into the steam pipe a portion of the exhaust steam. GEO. H. HOAGLAND.

No. 7191.—*Improvement in Cooking Stoves.*

What I claim therein as new, and desire to secure by letters patent, is—making the front part of what is usually an open flue under the oven, to consist of a hot air chamber *(d,)* as described, and the rear part of the same; and also the space at the back of the oven to consist of reverting flues, by compelling the draft to pass over the top of the oven down back corner diving flues, reaching from top to bottom of the stove, and then lick under the oven and around the division plate, between these diving flues and the discharge flue; thus prolonging the contact of the heat with the back vertical and horizontal positions of the oven, and equalizing the distribution of the heat and flame, so as to make the oven look well from all directions. HOSEA H. HUNTLEY.

No. 7192.—*Improved Beaters in Hide Handling Cylinders.*

What I claim as new and of my invention, and desire to secure by letters patent, is:—

First. The wheel having buckets diagonally across the surface, alternately from right to left, and left to right.

Second. The rollers or slats in combination with the chamber, substantially in the manner and for the purpose set forth. JAMES R. INNIS.

No. 7193.—*Improvement in Double Oven Cooking Stoves.*

1. What I claim as my invention, and desire to secure by letters patent, is the moveable flue $(i,)$ for dividing the oven into two parts, as above specified.

2. I also claim, forming an aperture in the division plate $(a,)$ between the front boilers, to protect it from the intense heat of the fire, and to supply air for combustion as described. JAMES M'GREGOR, JR.

No. 7194.—*Improved Centrifugal Propeller.*

What I claim, therefore, as my invention, and desire to secure by letters patent, is—the peculiar curve given to the propeller blades as herein set forth, to counteract the tendency of the centrifugal force to deflect the issuing water, obliquely to the axis of the propeller. JOHN WILLIAM NYSTROM.

No. 7195.—*Improved method of forming Sheet Metal Tubes.*

What we claim as our invention, and desire to secure by letters pater the method of forming sheet metal tubes, &c. upon a mandrel, supported by and obtaining its revolution from these rollers, one (or more) of which are adjustable, substantially in the manner herein described.

WM. OSTRANDER.
WM. WEBSTER.

No. 7196.—*Use of the Oxide of Tin in the Manufacture of India Rubber.*

Having described the nature of my invention, together with the best mode of manufacturing the same, I hereby declare, that I do not claim the combining of ochres, or pipe clay with India rubber, nor submitting rubber to high heat, nor mixing sulphur with rubber.

What I do claim as my invention, and desire to secure by letters patent, is the combining rubber with tin as set forth, and the combination of these with sulphur and heat; whereby, I produce a fabric having a black surface, and which is capable of withstanding all the elements which distinguish vulcanized from other preparations of rubber.

JOHN PRIDHAM.

No. 7197.—*Improvement in Steering Apparatus.*

I am aware, that a screw placed athwart ships, and acting upon a turning and travelling nut, attached directly to the tiller or its equivalent on the rudder head, has been employed for the purpose of steering vessels; I therefore, do not claim the invention of that arrangement.

In my apparatus, I introduce the lever, fig. 4, for the purpose of moving the rudder with the same length of tiller through a given space, with less turns of the wheel, than can be done in any other way with the same pitch of screw, by which I obviate a great objection in former apparatus for steering. To wit: the want of command over the rudder, by reason of the great numbers of turns of the wheel, or the great friction produced by increasing the pitch of the screw. These being the only two modes used by former inventors for obtaining this velocity in the improvement of the rudder, to wit: shortening the tiller, or increasing the pitch of the screw. In my apparatus any required velocity in the movement of the rudder may be obtained with the same length of the tiller, by diminishing or increasing the length of my lever, without increasing the pitch of the screw, as increasing the pitch of the screw, or shortening the tiller, makes it operate stiffly and unnaturally. And in fact, I am enabled by the introduction of the lever, to obtain that particular combination of power and velocity which the exigency of all occasions may demand in an apparatus for steering vessels.

Therefore, what I claim as my invention, and desire to secure by letters patent, is attaching the nut acted upon by the screw to an interposing lever arranged substantially as herein described, by which arrangement I am enabled with the same pitch of screw, and the same number of revolutions of the wheel, to move the rudder through a larger arc than in the old apparatus.

P. P. QUIMBY.

No. 7198.—*Improvement in Pumps for Ships, &c.*

What I claim as my invention, and desire to secure by letters patent, is—combining the pump barrel of suction pumps, in which are placed the check or stop valve and the piston, with the supply pipe or pipes, by means of an exhaust chamber into which the water flows by atmospheric pressure, and

from which it runs by gravity into the pump barrel, substantially as and for the purpose specified.

I also claim, in the combination next above specified, making a lateral hole through the pump barrel, and communicating with the exhaust chamber, substantially in the manner and for the purpose specified.

I also claim combining with the exhaust chamber, which unites the pump barrel and the supply pipes, and interposed between these, a strainer, sieve or filter, substantially as described, and for the purpose specified.

FRANKLIN RANSOM.

No. 7199.—*Improvement in Churn Dashers.*

What I claim in the foregoing as my invention, and desire to secure by letters patent, is the combination of the whirls with the revolving frame dasher; the several members being arranged and constructed substantially in the manner herein set forth. NATHANIEL ROUTZAHN.

No. 7200.—*Improved movement of the Pointing Dies in Spike Machines.*

Having thus described my improvements, I shall state my claims as follows:

What I claim as my invention, and desire to have secured to me by letters patent, is operating the curved dies for pointing a spike, by setting them in the adjacent ends of two sets of toggles arranged with the cam projections o', p', and guiding blocks q', r', and the whole operating, substantially as herein above described. EDMUND SAWYER.

No. 7201.—*Improvement in Machines for Sawing Marble.*

What I claim as my invention, is as follows, that is to say: I claim the combination of mechanism applied to the sprocket wheels, endless chain, windlasses and suspension chains of the saw frame: the said combination being for the purpose of gradually lowering the gang of saws in the proportion required, as the sawing process progresses. This combination consists of the train of mechanism which is applied to the lower sprocket wheel shaft, or axle b, and the driving shaft, and intervenes between the two, and is actuated by the revolutions of the driving shaft; said train of mechanism consisting of the tooth gear a, pinion c, gear wheel e, endless screw f, beveled wheel h, pinion i, and ratchet wheel l, together with the pawl x', arm m, connecting rod n, slotted plate o, rocker shaft p, crank q, screw t, screw nut u, washers v, w, cranks x, and z, and connecting rod y, as above specified; not meaning to claim as any part of the same, the crank l', click k', and ratchet wheel i', except in their combination therewith, and for the purpose of enabling a person to raise or lower the gang of saws, by applying his hand to the crank, it being understood, that, when these last contrivances are not used, the wheel e, must be firmly fixed to its axis and not placed loosely thereon, as it is when such contrivances are employed.

I also claim the employment of the two arms f', g', extended in opposite directions, above and below their rocker shaft p, and used in the manner and for the purpose as specified.

I also claim the vibratory tubular watering apparatus m', n', o', p', and mechanism combined with it, said mechanism consisting of connecting rod p 2, pulley q, endless band r', and pulley s', for giving to it, a reciprocating movement over the gang of saws and stone as specified.

ALBERT H. TINGLEY.

No. 7202.—*Improvement in Cast Iron Car Wheels.*

I do not claim, that the invention above described, is an improvement in the form of any part of railroad wheels, than that contained between the hub and the rim. But what I do claim as my invention, and desire to secure by letters patent, is the projecting ribs, in combination with the corrugated disk, in the manner and for the purposes herein set forth.

ASA WHITNEY.

No. 7203.—*Blind Slat Operator.*

I do not claim the construction of the bevel wheels, or the moveable joint as my invention, as they have been heretofore used and are old devices, nor do I wish to confine myself to the precise mechanical arrangement herein specified, as slight alterations may be made therein, without varying the principle of my invention.

What I claim, is the combination of the bevel wheels, and the moveable joint, essentially in the manner and for the purposes herein described.

DAVID R. WILLIAMS.

No. 7204.—*Improvement in Artificial Legs.*

Having described the nature, character, and action of my artificial leg, what I claim as my invention, and desire to have secured to me in this application, is the exclusive privilege of making artificial skeleton legs of thin metallic ribs or plates, and rings or hoops united together by rivets, or other suitable fastenings, substantially in the manner herein set forth, irrespective of any particular combination with other parts connected therewith.

GEO. W. YERGER.

No. 7205.—*Improvement in Apparatus for receiving and transferring to the pile sheets of paper from Printing Presses and Paper Machines.*

I claim and desire to secure by letters patent, the above described device, viz: the cylinder *c'c'*, *cc*, in combination with the rollers *a*, *a*, and the bands marked *o*, or any device, substantially the same, (the above named "fly" not being included) for receiving the printed sheets from printing machines or printing presses, upon a curved or cylindrical surface, and by means of said curved or cylindrical surface, transferring them with their printed sides upwards, to the pile, or the table provided to receive them.

I also claim the device embodied in the combination, consisting of the screws *l*, *l*, the pawl *m*, *m*, the lever *n*, the part *h'*, the click *p*, the wheels *r*, *r*, *r'*, and the tables *d*, *d*, or any device, substantially the same, for lowering the pile of sheets, the accumulation of sheets upon said pile governing the operation as aforesaid.

ISAAC ADAMS.

No. 7206.—*Improvement in Brick Presses.*

What I claim therein as new, and for which I desire to secure letters patent, is:

First. The employment of the mounted roller (*a*,) turning independent of the wheels on which it is borne, and forming a guiding carriage for the moulds, substantially in the manner, and for the purpose set forth.

I also claim the stop or weighted catch-lever, for guiding the moulds in entering under the grating.

COLLINS B. BAKER.

No. 7207.—*Improvement in Balloons and their Appendages.*

I would have it understood, that I do not confine myself to the precise details herein set forth; but what I claim as my invention, and desire to be protected under letters patent, is the application of one or more flexible partitions which I have termed the "septum membrane," to balloons for the purpose herein before described.

Secondly. I claim the application of a rotary motion, in conjunction with a hinge motion, for the purpose of producing motion in the fan or blade forming the tail, which motion is more or less assimilated to that of a bird's tail, in order to effect the steerage, substantially in the manner herein described.

Thirdly. I claim the use of the water grapnel for the purpose of arresting the motion of aerial machines, and also the application of elastic ropes to grapnels, either for land or water, and which elastic ropes may be formed entirely of elastic material, or by introducing some elastic material, or metal spring in its length.

And lastly. I claim the construction of the valve shown in figs. 3, 4, 5, sheet 2, as applied to balloons, in which the valve or plate during its motion, retains a position parallel to its seat.

HUGH BELL.

No. 7208.—*Improvement in Filters.*

What I claim therein as new, and for which I desire to secure letters patent, is the construction and arrangement of the filter with a woollen woven fabric wound on to a spool, substantially as herein set forth, and, admitting the water so as to pass down through the cloth presented edgeways, as above fully described.

CHAS. D. BIRDSEYE.

No. 7209.—*Method of connecting the Sections of Gold Washers.*

I do not claim the constructing of gold washers in sections, neither the connecting of said sections together by hinges; but what I claim as my invention, and desire to secure by letters patent, is the mode of connecting and holding firmly together said sections, by means of the strip of iron (J,) the rods (K, K,) the socket (L,) and the chain (T,) substantially in the manner and for the purpose above set forth.

RUSSEL BARTON.

No. 7210.—*Improvement in Exercising Chairs.*

What I claim therein as new, and desire to secure by letters patent, is connecting the moveable apron and back by means of adjustable arms, substantially as herein set forth, whereby the back and legs of the sitter can be so equally balanced that he can rock himself to and fro with the slightest exertion.

I also claim the adjustable self-adjusting foot-board, in combination with the moveable apron, substantially in the manner and for the purpose set forth.

SOLOMON CHAPIN.

No. 7211.—*Improvement in Blast Pipes for conveying Heated air and Gases to Furnaces.*

What I claim as my invention, applicable to heating and smelting operations, and which I desire to secure by letters patent, is the application of this method of creating such draught or partial vacuum, to the return of the smoke and other escaping products of combustion to the fire, in order that such of them as are combustible may be there consumed, the method or means consisting, substantially in the manner of employing the blast pipe F, enclosing the hot air pipe E, as herein set forth.

RANSOM COOK.

No. 7212.—*Improvement in Bee Moth Traps.*

What I claim therein as new, and desire to secure by letters patent, is the combination of the fluted roller, operated as described, with the moth entrance of the bee hive to act as a moth catcher and killer, substantially in the manner and for the purpose described.

GEORGE FLETCHER, Sen.

No. 7213.—*Improvement in Seed Planters.*

What we claim as new, and desire to secure by letters patent, is—

First. The introduction of a cleaning rod, operated as described, into the hollow share of a seed planter, for the purpose of removing extraneous matters that may have entered the orifice, tending to impair or prevent the action of the machine.

GEORGE FLETCHER, Sen.
TURNER BARNES.

No. 7214.—*Compound Hard and Soft Metal Packing.*

What I claim as my invention, and desire to secure by letters patent, is the compound metallic packing ring constructed of hard and soft metals, substantially as herein set forth, the hard rings being for the purpose of preventing the substance of the softer from squeezing out around the follower and flange of the piston.

A. FULTON.

No. 7215.—*Improvement in Printing Presses.*

What I claim as new and useful in the above described improvements, and desire to secure by letters patent, is first, the peculiar manner of constructing the nippers, so that their upper surface shall be even with the surface of the paper, and their inclined or curved surface shall incline away from the surface of said paper.

I also claim an adjustable table, to be adjusted to the nippers, the nippers being first adjusted to the type or form, substantially as above set forth and described.

I further claim a frisket operated on by the motion of the carriage, so that when the carriage goes in with the sheet its forward end shall raise under and support the paper, and (from the upward pressure of the nippers against the platen in giving the impression) grip it firmly and relieve it from the type after the impression is given, and on the receding of the carriage with the printed sheet, its forward end shall lower and allow the said sheet, which rests upon it, to slide or fall off into a box or drawer placed to receive it, operating substantially as above described.

I further claim the application of the vibratory power to the handle of a distributing roller, (see figs. 1 and 2) (said handle projecting from the frame of said roller midway from its respective ends) and not to the end of the roller frame, as in general use.

I further claim the combination and arrangement for opening the nippers when the carriage moves out with the printed sheet, and closing them just previous to its going in, which combination consists of the horizontal bars or polls y, (see figs. 3 and 4) the curved pieces a', the lever c', attached to the shaft b', (see fig. 9) the hub d', with its projection e', on the main shaft J, and the spiral spring y, one end of which is attached to the press frame; the whole being arranged and operating together, substantially in the manner herein above set forth and described.

GEO. P. GORDON.

No. 7216.—*Improvement in Correcting Magnetic Needles.*

What I claim as my invention, and desire to secure by letters patent, is the method herein described of producing perfect harmony and coincidence between the axis of a magnetic needle and the magnetic axis; and also of producing perfect harmony between any number of magnetic needles, to wit:—removing portions from the needle, whether by the formation of channels upon the upper or lower surface of the needles, of the form and in the position, substantially as herein set forth, or merely by grinding, or filing, or cutting away.

CALVIN GUITEAU.

No. 7217.—*Improvement in Fountain Pens.*

What we claim as our invention, and desire to secure by letters patent, is the combination of the moveable spring tongue, with the pen, (for the purpose of forming a fountain pen) when the whole is constructed, arranged, and combined, substantially as herein described.

ELLSWORTH H. HYDE.
ROLLIN L. DAWSON.

No. 7218.—*Improvements in Revolving Breech Fire-arms.*

I therefore claim as new and of my own invention, and desire to secure by letters patent of the United States, first, the arrangement of the arm k, slides l and m, or their equivalents, whereby the motion of half-cocking and cocking the hammer is communicated to the barrel, to open the joint formed by the grooves v, around the breech w, and also to close said joint on the discharge of the piece by the operation of the hammer, slides l and m, and spring 13, alone or in conjunction with the main spring g, substantially as described and shown.

Second. I claim the arrangement of the slide q, and circular ratchet s, or their equivalents, whereby the motion of the barrel sliding forward, is made to revolve the chambers the required amount, to bring the next chamber in line for the next discharge of the piece, substantially as described and shown.

H. IVERSON.

No. 7219.—*Machines for Forming Rotary Cutters.*

What I claim as of my own invention, and for which I desire letters patent of the United States, is the arrangement upon puppet heads having a sliding motion upon a bed plate, of adjustable slides, supporting disks, to which are attached the boxes in which the cutter shafts revolve, the disks being capable by means of vibratory motion on their axis, of adjusting the cutter shafts to any required angle with the horizon, and the whole machine being for the purpose of shaping at the same time, both faces of a revolving cutter, substantially as herein described.

ANDREW JENNINGS.

No. 7220.—*Improvement in Cultivator Teeth.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The manner of constructing the cultivator tooth, substantially as above described, by which a separate steel cutter is embraced between the two halves of the tooth, removable at pleasure, and by which wedges can be applied against the shoulders of the tooth and the under side of the beam, for the purpose of changing the angle of inclination of the share, in order to increase or diminish the depth of culture, the tooth turning on the bolt passing through the head of the same, and the beam, whilst inserting the wedges, the wings of the tooth being secured to the four-sided changeable share, by means of screws and nuts or other equivalent means.

LEWIS LAMBORN.

No. 7221.—*Improvement in Printing Floor Oil Cloth.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the stops G, H, I, J, K, with the block E, by which the printing of the floor oil cloth is performed, without moving the stops until the first printing is finished, and dispensing with a second block to cover the parts of the cloth not printed at the first operation, by simply changing the position of the hinged gauges on the block without moving the stops on the bar as above described, thus dispensing with the second block usually employed.

LEVERETT MOORE.

No. 7222.—*Improvement in Thrashing Harvesters.*

What I claim as my invention, and desire to secure by letters patent, is the mode of cutting and thrashing the grain by forcing the same against the knife (k,) and after being cut, between the teeth of the concave D, and the teeth of the gathering or thrashing wheel or shaft, of bars or beaters (i,) during the progress of the machine, as herein set forth.

SAMUEL S. REMBERT.

No. 7223.—*Improvement in Plough and Clevis.*

What I claim and desire to secure by letters patent, is—

First. Making the reversible point F, with the triangular shoulders F′, F″, in combination with the screws f', and nut N, for binding firmly together the landside E, mould board C, cutter G, and share H, as well as securing itself, in the manner herein fully described.

Second. I claim the device of fastening the reversible share to the flange on the lower part of the mould board, substantially as set forth.

Third. I also claim the manner of employing the inclined brace rod I, in combination with the box plate P, cast on the inside of the mould board, for adjusting the beam, to take more or less land, to act as a substitute for the clevis, and at the same time to brace or stiffen the wood work of the plough by attaching it to the cast iron mould board and land side, as described.

IRA REYNOLDS.

No. 7224.—*Improvement in Dental and Surgical Chairs.*

What I claim as my invention, and desire to secure by letters patent, is the application to chairs of the middle section B, B, substantially as herein described, whether operated by rack and gear, or by lever, or windlass, or screw, at two corners of the chair or at four, or at any intermediate point, provided the same results are obtained, by means substantially herein set forth.

FLAVIUS SEARLE.

No. 7225.—*Improvement in Cheese Presses.*

What I claim as my invention, and desire to secure by letters patent, is combining with cheese presses, two beds upon which the cheese is alternately pressed, which revolves together on a horizontal axis, substantially in the manner and for the purpose herein set forth.

AUGUSTUS N. SEVERANCE.

No. 7226.—*Improved Method of Dressing Cut Tobacco.*

What I claim as of my invention, and desire to secure by letters patent, is the method of dressing cut tobacco, by passing it through a revolving cylinder, having holes through it, to sift the short from the long pieces, and with hooks or pegs projecting from its inner surface towards the centre, for lifting the threads of tobacco, as described above.

GIDEON WALES.

No. 7227.—*Improvement in the Seed Roller of a Seed Planter.*

What I claim as my invention, and desire to secure by letters patent, is the before described mode of constructing the planting cylinder D, by which the cavities or cells M, in the periphery are enlarged or diminished, simultaneously by simply turning the plate (o,) or other similar device, having its section P, of male screws on its inner face, and causing said sections to act on all of the radial slides Q, forming the bottoms of the cavities at the same time, and holding them firmly in the required positions by the thumb screw i, or other equivalent mechanical device, substantially as aforesaid, by which like results are produced.

EDWARD WICKS.

No. 7228.—*Improvement in Printing Floor Oil Cloth.*

But what I do claim as my invention, and desire to secure by letters patent, is the employment of the before described combination of the gauge A, and stops C, constructed, arranged, and operated in the manner and for the purpose above set forth, for guiding the printing block without the use of pitch pine, during the operation of stamping the colors on the cloth, by which the work is rendered much more accurate, and is executed with greater despatch, and is not so liable to become blurred during the operation of handling the blocks, nor of having the colors to overlap, by a misplacement of the blocks.

N. B. POWERS.

No. 7229.—*Clamp to be used in the Manufacture of Wrought Iron Car Wheels.*

What I claim as my invention, and desire to secure by letters patent, is the construction and application of the above described combined cylindrical clamp, consisting of the following parts—namely, the ring A, A², of an L shaped section with handles (a, a,) attached, and ring D, and screw bolts E, applied for the purpose of confining and holding the wrought iron arms B, or spokes, in a true circle, together with the pieces c, d, e, in the centre to form the hub during the operation of welding the several parts together, as above described.

HERRICK AIKEN.

No. 7230.—*Improvement in Machines for Hoisting.*

What I claim as my invention in the above described machine, and desire to secure by letters patent, is the separate and independent action, each upon its own axis, of the two upper pulleys whereby the buckets or weights are suffered to pass freely between them, without let or hindrance, and in combination therewith, I claim also the swinging of the buckets or weights, between the chains, so that they shall always hang downward, in whatever position the parts of the chains to which they are attached may be.

WILLIAM C. ALLISON.

No. 7231.—*Improvement in Cooking Ranges and Heating Air.*

But what I do claim, is the employment and use of the combination of the furnace and oven, in the hot air chamber, with the radiating pipes E, flues and dampers D, and I, and H, J, K, and F, for the purpose, substantially as herein above set forth.

ELIAS T. BEERS.

No. 7232.—*Improvement in Chimney Caps.*

What I claim as new, is the injector G, in its combination with the cap plate C, tube A, and frustum B, and made stationary against the cap plate, all substantially as herein before specified; and in combination with the cap plate C, the frustum B, and tube A, I claim one or more flat plates or rain fenders E, as applied and used, substantially in the manner as herein before explained.

MICHAEL HENNY COLLINS.

No. 7233.—*Improvement in Churns.*

What I claim as new therein, and for which I desire to secure letters patent, is first, the self-adjustable float or slat (C,) which opens when churning the cream, and closes of itself when the dasher is turned in the opposite direction, to gather the butter, as before described.

R. W. DAVIS.

No. 7234.—*Improvements in Saw Mills.*

What I claim as my invention, and for which I solicit letters patent, is—

First. The combination and arrangement of levers T, U, V, X, (*n*,) with the catch bar W, and cam (*m*,) and sliding bar (*p*,) by which the depression of the foot lever V, is made to actuate the several levers T, U, X, (*n*,) and the cam (*m*,) made to lift the lever (*n*,) and thus operate the turning bar (*q*,) and with the gauge bars (*s*, *s*,) and thus set the log, and at the same operation elevate the foot lever V, and engage the reaching arm R, with the rag wheel Q; to feed the carriage forward, as described and represented.

Second. I also claim the combination of the upright gauge, turning bars (*s*, *s*,) with the horizontal weighted turning bar (*q*,) holding bars (*v*, *v*,) and eccentrics (*w*, *w*,) thereon, by which the log is set simultaneously at both ends, and the slides K', and L', prevented from moving, during the operation of sawing, by the holding bars (*v*, *v*,) as described and set forth.

Third. I also claim the arrangement of the shaft V, and pinion Z, for engaging with the rack of the carriage, simultaneously with the descent of the foot lever, for winding up a cord and weight, for relieving the tightening lever from the band G, and unwinding the same with the ascent of the foot

lever V, after the setting of the log, and gigging back of the carriage, to give motion to the crank shaft C, as described and set forth.

WEIGHTMAN DAVIS.

No. 7235.—*Improvement in Harness Hames.*

I will now claim, firstly, curving or inclining forward the upper and lower parts of the back or drawing surface, and the inner projecting edge of the hame, substantially in the manner and for the purpose herein described.

Secondly. The stock *k*, of the draught iron for securing the same to the hame, by means of the shank *f*, of the breast ring, passing through the said stock *k*, of the draught iron, and rivetted to the hame, as described.

Thirdly. The hook studs B, B, B, for receiving the straps which secure the upper ends of the hames together, when on the horse, so as to allow the straps to be easily shifted, constructed in the manner described, or in any other way, substantially the same.

ANDREW DEITZ.

No. 7236.—*Improved Atmospheric Churn.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the dasher with the stationary inclined air channels, on the churn tub, the two being made, arranged, and operating, substantially as herein set forth.

SIMEON F. EMERSON.

No. 7237.—*Improvement in Temples used in Weaving Double Cloth.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the jointed rods with the wheels or pulleys at the ends of the rods.

I also claim the wires fastened at one end to the bars or rods, and having the other end bent at such an angle as to enter a slot in or upon the breast beam, for the purpose of retaining the temple in a proper position.

I also claim the slot in or upon the breast beam, when the same is used in connection with the temple, as herein described.

STEPHEN EVERETT.

No. 7238.—*Improved Pocket Filtering and Drinking Tube.*

What I claim as my invention, and desire to secure by letters patent, is the fitting a filter to a tube of greater or less length, substantially in the manner herein before set forth, so that water may be strained by the very act of drinking.

ABIJAH FESSENDEN.

No. 7239.—*Improvement in Parlor Air heating Stoves.*

What I do claim as my invention, and desire to have secured to me by letters patent, is the combination of the cold air chamber L, and valve M, with the hot air annular chamber H, and the reservoir or chamber B, below the horizontal plate E, in the chimney flue, and behind the recessed fire-board A, as described, said chamber L, being provided with an opening R, to let the cold air into the annular hot air chamber H, and small openings N, to let a portion of the cold air into the reservoir B, and the valve M.

I likewise claim the combination of the hinged water holders J, with the recessed fire-board, said holders serving the double purpose of evaporator, stands and valves, as described, for moistening the air and admitting warm air from the reservoir or space B, behind the fire-board, or directly into the parlors.

I also claim the arrangement of the valves P, in the segmental top of the fire-board, as described, for letting the warm air from the recess of the fire-board into the reservoir B, to be conveyed thence wherever described.

L. W. GOSNELL.

No. 7240.—*Improved Sash Stopper.*

What I claim therein as my invention, and for which I desire letters patent, is the arrangement, substantially as herein described and represented, in one compact and connected mechanism of a pair of oppositely acting eccentric tumblers, held in contact with the jamb, by a single spring, or its equivalent, and both operated by the same key or other usual substitute, and so disposed and constructed as to oppose any attempt (except by one who has control of the catch) to either raise or lower the sash from the position in which it may be placed.

GEORGE H. GRAY, SEN.

No. 7241.—*Construction of Drill Teeth in Seed Planters.*

What I claim therein as new, and desire to secure by letters patent, is the spring coupling, constructed and arranged, substantially as set forth.

LEVI HAVERSTICKE.

No. 7242.—*Improved attachment of the Forge Hammer to its Helve.*

What I claim as my invention, and desire to secure by letters patent, is—limiting the depth of that portion of the hole in the helve, which receives the shank of the hammer, and at the same time, making the crown A', solid, excepting a hole of sufficient size through the same, to admit of a punch, substantially in the manner and for the purposes herein described.

DANIEL HICKS.

No. 7243.—*Improved Oscillating Self-adjusting Railroad Frog.*

What I do claim as new, and my invention, desiring to secure the same by letters patent, is a railroad frog, constructed, applied, and operating essentially in the manner, and only for the purpose herein set forth.

J. W. HOFFMAN.

No. 7244.—*Improved Revolving Plate and Tumbler Lock.*

What I claim as my invention, and desire to secure by lettters patent, is the arrangement of a series of permutation plates in a line, and on the same axis of motion, each having a central hole for the reception of the entire key, and a projecting tongue for the key to act upon, and a recess or recesses on the periphery, for the reception of the tumbler; but this I only claim in combination with a tumbler attached to and rotating with the cylinder, substantially as herein described.

I also claim making the recesses of the key plates (or the equivalent thereof,) of different lengths, but all starting from the same line, substantially as herein described, to facilitate the insertion and removal of the key as described.

I also claim the cylinder which contains the permutation plates, and which carries the tumbler as above described, in combination with the permanent flanch enclosing the same, and having a recess to receive and hold the tumbler when thrown out, substantially as described. And finally, I claim the arrangement of the eccentric for throwing the bolt with the rotating cylinder, carrying the tumbler, and containing the permutation plates, as described.

L. JENNINGS.

No. 7245.—*Improvement in Agitating Coal Grates.*

What I claim in the above described stove as new, and desire to secure by letters patent, is giving the compound vertical and horizontal oscillating motion to the grate bars, as herein set forth.

ABEL KEENEY.

No. 7246.—*Improved Blind and Shutter Opener and Fastener.*

What we claim as our invention, and desire to secure by letters patent, is the opening and closing of window blinds, and retaining them when open or closed, by means of the rotary opener B, (which is circular at its centre, and gradually enlarges into scroll-shaped extremities, having a groove *f*, in its surface, extending spirally from one of its scroll-shaped terminations to the other,) combined with the arm C, secured to the window casing, and the lever D, made fast to the blind, substantially in the manner herein set forth.

JABEZ F. LAWRENCE.
LUKE A. FARNSWORTH.

No. 7247.—*Improvement in Rotary Churns:*

What I claim as my invention, and desire to secure by letters patent, is—the devices of gearing as described, by which I change the motions of the churn box and dasher, with regard to each other, so that while one is stationary, the other shall rotate, and vice versa.

OSBERT B. LOOMIS.

No. 7248.—*Improvement in Spring Mattresses.*

What I claim as my invention or improvement, and desire to secure by letters patent, is so constructing a spring mattress, that the springs of the same shall project outwards beyond the light frame work, which supports them in their places, so that the whole upper and under surface, as well as the edges of the mattress shall present a yielding surface to the touch, by means of the projecting springs.

I also claim the manner of constructing the hair quilted upper or under coverings of the springs as set forth: that is to say, the hair covering which rests on or against the springs, is first made separately like a quilted bed-spread, and when drawn over the springs, by which the mattress, though long used, presents a uniform and elastic surface.

V. M'ELWEE.

No. 7249.—*Improvements in Cat Head and Shank Painter Stoppers.*

But I do claim as new, the application of the lock piece *g*, with the wedge or lug[1], to act in the mortise[3], to hold the link *d*, on the lug *e*, when put down for that purpose, or let the anchor "go" by raising it, without the intervention of any other moving part, such lock piece *g*, and lug or wedge[1], being connected or combined, and operating with the other parts, substantially in the manner and with the effects described and shown.

CHARLES PERLEY.

No. 7250.—*Improved Surface Condenser for Steam Engines.*

What I claim as my invention, and desire to secure by letters patent, is the combination of a surface or radiating condenser with a box or case in such a way, that the condensation of the steam shall be effected therein, without subjecting the said radiating condenser to atmospheric pressure, in the manner described.

Secondly. I claim the aperture (w,) or its equivalent, for maintaining the equilibrium, and as a passage for any steam which may remain uncondensed in the radiating condenser, in the manner set forth.

Thirdly. I claim connecting the evaporator with the chamber (h,) substantially in the manner described, whereby I am enabled to draw off the saturated water from the bottom of the evaporator.

JOSEPH P. PIRSSON.

No. 7251.—*Improvement in the Manufacture of India Rubber Springs for Cars.*

What I claim as my invention, and desire to secure by letters patent, is the method of making cylinders, or rolls, of prepared India rubber, by rolling up a thin sheet of prepared India rubber on a mandrel, whilst the said sheet is in a green state; and as it comes from the heated calendering cylinders, substantially as described. And I also claim as my invention, in combination with the calendering cylinders, such as are usually employed in the manufacture of prepared India rubber, a mandrel or cylindrical rod pressed against the periphery, or a cylinder, or roller, so that the thin sheet of prepared rubber, in the green state, and taken as it comes from the calendering cylinders, may be wound upon the mandrel, and the several windings made to adhere by pressure, substantially as described.

FOWLER M. RAY.

No. 7252.—*Improved Removable Teeth for Scrapers.*

What I claim as my invention, and desire to secure by letters patent, is securing the removable teeth to any common scraper, in the manner herein set forth, so that they can be attached and detached at pleasure, whereby the same scraper is adapted to ordinary earth excavation, or to the excavation of gravel or cobble stones, as described.

JOSEPH SWEET.

No. 7253.—*Improved Mantel Piece.*

What I claim therein as my invention, and desire to secure by letters patent, is the manufacture of mantel pieces, by the combination of cast iron frames of ornamental open work, with a back or ground work of plate glass, or other vitrified substance, colored in imitation of marble, or after any other style of decoration, the said ground work being secured to the frames by means of plaster of Paris, or any other means, that gives strength and support to the whole, substantially as described.

HIRAM TUCKER.

No. 7254.—*Spring Inclined Plane and Roller Sash Stopper.*

What I claim as my invention, and desire to secure by letters patent, is the depressed form of the spring or inclined plane, as I have called it, and the roller so adjusted to this depression by the slide, that in raising the window sash, it operates as a friction roller, but in lowering the window sash, it operates as a dog to keep it from falling, substantially as described above.

SETH E. WINSLOW.

No. 7255.—*Improved arrangement of Door Springs and Levers.*

What I claim as new, and of my own invention, and desire to secure by letters patent of the United States, is attaching the spring d, and rod f, to the jamb of the door or standing part of the hinge, when combined with a swinging rod attached to the door, or swinging part of the hinge, all the parts being arranged, substantially as described, whereby the spring tends to close the door until opened to its fullest extent, and then acts to hold the door open.

W. B. BARNARD.

No. 7256.—*Composition for Covering Hams.*

What I do claim as my invention, and desire to secure by letters patent, is the formation of a preserving composition for coating meats, fruits, vegetables, &c., by the union of resin, shellac, and linseed oil, substantially in the manner and in nearly the proportions as herein set forth.

HORACE BILLINGS.

No. 7257.—*Improvement in Dividers and Compasses.*

What I claim as my invention, and desire to have secured to me by letters patent, is making dividers or compasses, with the micrometer adjustment, herein above described, the combination of devices for the same, consisting of a circular rack bar, arranged in slots, in the legs of the divider, with a spring in the slots of the moveable leg b, b, and the micrometer screw, all working together, as herein above specified.

D. H. CHAMBERLAIN.

No. 7258.—*Improved Entrance to Bee Hives.*

What we claim as our invention, and desire to secure by letters patent, is the devices for opening and closing the entrance of the bee house, in the manner set forth.

JOHN E. DALTON.
THOMAS STEVENS.

No. 7259.—*Improvement in Rings for Harness, &c.*

What I claim as new in my invention, and desire to secure by letters patent, is the combination of a sliding bar or sliding bars, (either with or without guides or guard bars,) with a ring, in the manner, substantially as described, for the purpose of being applied to straps for harness, or for any other purpose to which it may be applicable.

ANDREW DEITZ.

No. 7260.—*Process for making Cast Steel.*

What I claim as my invention, and desire to secure by letters patent, in the above process of making cast steel, is partly decarbonizing pig or cast iron in an oven, stratified with pulverized oxide of iron, substantially as described, and then melting such decarbonized pig or cast iron in crucibles, substantially as described.

JOS. DIXON.

No. 7261.—*Improvement in Machinery for making Wire Heddles.*

I do not claim the old machine herein described, as being one heretofore used and by which an incomplete heddle is produced; but what I do claim as my invention, and desire to secure by letters patent, is the before described arrangement, combination and adjustment, with the said old machine, of the additional wheel (H,) on the main transverse shaft (Y,) fig. 1. The pinion (U,) and the shaft (S,) moved by it, wheel (*a*,) on the other end of the shaft, the short shaft (*d*,) and the two wheels (*c*,) and (*h*,) (*o*,) upon it, wheel P, and its attachments, and the cutter *a*, attached to the pincers as shown in fig. 5, for trimming off the burr at the end of the heddle, and also the levers (D,) (*f*,) (W,) (I,) (3,) (4,) (O,) (*e*,) and (*r*,) whereby the heddle is made complete in one machine, at one and the same operation, or any other combination, which is substantially the same thing, and by which analogous results are produced. I also claim what is herein termed wheel P, as herein described, and as shown in fig. 2, 3, and 4.

MILTON FINKLE.

No. 7262.—*Improved Method of Working the Pawl in Parallel Vises.*

But what I do claim as my invention, and desire to secure by letters patent, is the within described combination of the spring pawl *c*, and the metallic plate (or lever) *b*, with the foot of one of the crossed levers *a*, by which the spring pawl is made to act upon, and retain the rack bar *e*, when any article is grasped between the jaws of the vise, substantially as herein set forth.

JASPER JOHNSON.

No. 7263.—*Improvement in the Fluid Level.*

What I claim as my invention, and desire to have secured to me by letters patent, is a lever for determining a horizontal and perpendicular line, and the inclination of any slope with the same, constructed substantially as herein above set forth, that is, with a shallow cylindrical vessel or a tube, in the shape of an entire ring, half filled with quicksilver, or other liquid, in combination with a graduated annular dial, whether a floating needle or indicator be used or not, the whole arrangement being substantially as herein above set forth.

WM. G. LADD, Jr.

No. 7264.—*Improvement in Machinery for Cutting Screws on the Rails of Bedsteads.*

What I claim as my invention, and desire to have secured to me by letters patent, is—

First. The combination of the adjustive clasp I, screw H, and holder C, for suspending and confining the nut C^3, to the end of the rail, and centering the same, so that the axis of the nut shall always be coincident with the centre of the rail, whether the latter be of large or small diameter, substantially as herein set forth. I likewise claim the peculiar form and manner of securing the V cutter to the cylindrical head E, as described, that is to say, making the cutter as represented (in figure 7,) and letting the tapered end of the shank into the recess, at e^2, bringing the angular shoulder against the cylinder e', and sustaining the bevelled points against the interior bevelled surface of the cylinder head at e^3, by which arrangement the instrument, during the operation of cutting, is forced firmly against the head E, at e', e^2, e^3, the strain upon the confining screw T, being thereby greatly reduced, and the cutting tool itself strengthened.

SPENCER LEWIS.

No. 7265.—*Improvement in Harness Hames.*

What I claim as my invention, and desire to secure by letters patent, is

making the hame of a single piece of wrought iron, inclosing a piece of wood in such a manner as to present an entire iron surface, so that it may be readily finished in any convenient or ornamental way, and in a durable manner, when the hame is constructed, substantially as herein described.

JOHN LOW.

No. 7266.—*Process of making Paint from Bituminous Coal.*

What I claim as new, and desire to secure by letters patent, is the process of making black paint from bituminous coal, by the cleansing in water, grinding, mixing with acid, re-grinding in acid, and washing, substantially as herein fully set forth.

CHARLES MORTIMER.

No. 7267.—*Elastic Roller Sash Bearer.*

But what I do claim as my invention, and desire to secure by letters patent, is the combination of an elastic roller, with a shaft and box, the whole constructed and arranged as before described, for the purpose of supporting a sash in any desired position.

JULIUS A. PEASE.

No. 7268.—*Improvement in Gearing for Seed Planters.*

What I claim as my invention, and desire to secure by letters patent, is the employment of the latch plate M, in combination with the connecting plate O, carrier P, and intermediate cog wheel R, for alternately gearing and ungearing the cog wheel S, on the axle of the plating cylinder with the cog wheel T, on the hub of the driving wheel F, in the manner and for the purpose described.

JACOB PEIRSON.

No. 7269.—*Improvement in Apparatus for extinguishing Fires.*

What I claim, is the means of subduing and extinguishing fire by generating carbonic acid gas and other gases, resulting from combustion, in apparatus, substantially as herein described, and applying them by the pressure of their generation to the purposes above described.

W. H. PHILLIPS.

No. 7270.—*Improvement in Scale Beams.*

I claim in combination with the beam, and the knife edge bearings of the loop, the two vertical or nearly vertical projections, salients or knife edges *b*, *c*, as arranged with respect to the loop and beam, substantially in the manner and for the purpose herein before specified.

WILLIAM P. PIERCE.

No. 7271.—*Improvement in Endless Aprons for Thrashers.*

What I claim therein as my invention, and desire to secure by letters patent, is the endless grating composed of bars secured to the hide or leather straps, by twisting the latter in the manner and for the purposes herein set forth.

ADKINS NASH.

No. 7272.—*Improvement in Hydraulic Regulators for Machinery.*

In this invention, I do not claim the size, form, or shape of any piece or part as new, or the general combination of pumps, pistons or floats, or other parts connected to the machinery to be regulated, or to the motive power to be regulated, which are in use in the general combination of hydraulic motion regulators; but claim to have overcome two several difficulties, which have heretofore existed in this kind of regulators, as follows:

First. The want of sensitiveness to take early notice of any variation of motion, or quickness in motion to open or close the steam valve, of power energetically applied to overcome friction of steam valve.

Secondly. The difficulty which has always existed in obtaining and maintaining a uniform discharge of water or liquids, from under pistons, rising and falling as motion varied, connected to steam valve, and acted upon by water moved by pumps; but I do claim and desire to secure by letters patent of the United States, the combination of pump A, moved with a reciprocal motion, with the machinery sought to be regulated, and with the water or fluid acting on piston C, and parts connecting it to steam valve, which controls the steam moving said machinery in such a manner as to cause the piston C, to rise and fall at each action of pump A, without moving the valve, while the machinery has the proper speed, and moving, or opening, or closing said steam valve with a quick striking motion, or overcoming friction about said valve, as with the blow of a hammer, when the motion of said machinery is too fast or too slow, or any analogous arrangement which will produce the same result, substantially in the manner and for the purposes and objects herein before shown and set forth.

LEMAN B. PITCHER.

No. 7273.—*Improvement in Apparatus for Sprinkling Streets, &c.*

What I claim therein as new, and desire to secure by letters patent, is the combination of the sprinkling pipe and force pumps with the revolving water vessel, the several parts being arranged and operating, substantially as herein set forth.

JOSEPH D. PRICE.

No. 7274.—*Improvement in Plough Cleaners.*

What I claim therein as new, and desire to secure by letters patent, is the plough cleaner constructed of two shave blades, substantially as herein set forth, for the purpose of cutting in two the weeds and other obstructions, which accumulate upon the coulter, and thus detaching them therefrom.

JAS. F. REASIN.

No. 7275.—*Improvement in Chimney Caps.*

I lay no claim to the invention of a ventilator, made with a series of conic or pyramidal guards, fenders, or frusta as represented in figures 4 and 5; but what I do claim as my improvement, is one made with the helical continuous fender or guard, applied to the chimney or flue, and having its coils arranged or inclined with respect to one another, substantially as herein before specified.

AUGUSTUS M. RICE.

No. 7276.—*Improvement in Oil Cans.*

I claim the combination of the socket (C,) carrying the male screw (*d*, *d*,) and the taper tubes or spouts (D, D,) screwing into the socket (B,) with the collapsable gutta percha reservoir (A,) in the manner and for the purpose described, or in any way, substantially the same.

DAVID G. STARKEY.

No. 7277.—*Improvement in Machines for Raking and Loading Hay.*

What I claim as my invention, and desire to secure by letters patent, is the simultaneous raking and loading of hay from the ground by machinery, substantially as herein set forth; whereby, the labor of making windrows and cocking as in the usual process of hay making is saved, at the same time that the operation is both expedited and cheapened.

B. M. TOWNSEND.

No. 7278.—*Improvement in Wing Gudgeons.*

What I claim is the improvement of making the wing gudgeon (when cast or founded,) with a clear space G, between each of the wings, and the flanch or face plate B, the same being for the purpose herein above set forth.

MARK WILDER.

No. 7279.—*Improvement in Guitar Heads and Capio d'astra.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of tuning guitars by winding the strings each on a spindle, having a part below the guitar head of enlarged diameter, connected and combined with a peg of the usual construction by means of a cord, in the manner and for the purpose, substantially as described.

I also claim, combining an eccentric roller with a capio d'astra for moving and holding it down on to any desired part of a guitar handle, by means of a metal strap made to embrace the handle and capio d'astra plate, and attached thereto, substantially in the manner and for the purpose specified.

JAMES ASHBORN.

No. 7280.—*Improvement in Car Couplings.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the draw iron *a*, with the bearing *b*, the bolt *c*, the bed piece *d*, and the wedge or key *e*, in such manner that the draw iron *a*, makes a vertical joint with the bearing *b*, and through the bearing *b*, makes a horizontal joint with the bolt *c*, and the bed piece, *d*, and through the wedge or key *c*, all these joints are brought to any desirable rigidity of bearing.

I claim this particular combination of the parts described, whereby a free, but close horizontal and vertical joint, is at all times maintained between the bodies to which it is attached, and especially the applications of couplings upon this construction, to the connection of locomotive engines and tenders.

HIRAM BALDWIN.

No. 7281.—*Improvement in Machines for Breaking Hides.*

What I claim as my invention, and desire to secure by letters patent, is the breaking of hides, the working out of the lime and the bate, and the scouring of the tanned hides by means of revolving cylinders and beaters, substantially as herein set forth.

CHARLES BAUCHMAN.

No. 7282.—*Improvement in Cast Iron Car Wheels.*

What I claim as my invention, and desire to secure by letters patent, is the casting a "chilled railroad cast iron car wheel," giving a uniform chill to the wheel, by separating the arms B, from the rim of the wheel, by the inverted flanges D, forming a hollow rim, together with the combination of the

arches or ovals C, as herein described; thus using the solid hub to the chilled arches or ovals C, as herein described; thus using the solid hub to the chilled wheel, adding strength to the whole, and securing regularity in the wear.

JAMES BOON.

No. 7283.—*Improvement in Hydraulic Blowers for Furnaces, &c.*

What I claim as my invention, and which I desire to secure by letters patent, is the combination of the cavities or air cells, formed in part by the partitions D, D, D, on the periphery of the drum of the wheel or receiver of compressed air B, B, with said drum or receiver B, B, the exterior floating valves E, E, E, the interior valves H, H, H, and the hollow shaft O, all forming parts of, or connected with a wheel, to be turned when partially immersed in water, for the purpose of producing a blast of air through the hollow shaft O, to be used in heating, smelting, and other manufacturing and mechanical operations.

RANSOM COOK.

No. 7284.—*Improvement in Grates for Cooking Stoves.*

What I claim therein as new, and desire to secure by letters patent, is the manner herein described of arranging and combining the fire grate of cook stoves with the front fire plate A, and curve plate C, so that it shall retain its proper position for retaining the fuel in the chamber by its own weight, and shall be raised for removing coals and ashes, substantially in the manner and for the purpose herein described and represented.

JOHN T. DAVY.

No. 7285.—*Improvement in Submarine Telescopes.*

I claim, first, the main tube A, constructed with the side opening C, in it, to allow a spy glass B, to be used in combination with the telescope, as herein set forth.

Second. The mirror chamber constructed to allow the mirror to move through a space of about ninety degrees, and with a glass K, in the bottom of it, in the manner substantially as herein described, and for the purpose herein set forth.

Third. I claim the arrangement of the lamps or artificial lights on each side of the mirror, and leading the feeding draft from the main tube to the lamps under the mirror and lamps, and carrying the smoke away through the separate passage J, in the manner substantially as herein described, or in any other manner substantially the same.

WILLARD DAY.

No. 7286.—*Improvement in Preparing Clay for Brick Machines.*

What we claim as our invention, and wish to secure by letters patent, is the method of constructing the grinding apparatus or mill, in such a way that the knives on the shaft shall be set so as to describe a spiral line at their junction with the shaft, in order that no two of them shall be able to pass between any two pairs in the curb at the same instant, and under the same circumstances. It being understood that we do not claim, in general, this mode of setting the knives on the shaft, but only the use of the same, in connection with the fixed knives in the curb, for the purpose specified.

CHARLES M. FERRIS.
NATHAN SWAN.

No. 7287.—*Improvement in Electro Magnetic Engines.*

What I claim therein as new, and for which I desire to secure letters patent, is first, the employment of induced electricity, as above stated, in producing magnetism, in the secondary electro magnets, to be used as a motive power, in connection with the prime mover, and to neutralize the secondary currents of the principal magnets formed by the direct current from the battery.

I claim the combination of the magnet changer (h, h',) and pole changer (k, k',) substantially in the manner and for the purpose set forth.

JOHN H. LILLIE.

No. 7288.—*Trap for catching Flies.*

What we claim as our invention, and for which we wish to secure letters patent, is the application of the devices for conveying flies into a box or vessel by wheels or belts between floats or projections, moving either by a circular or straight forward motion, in the manner and for the purpose herein specified.

JOSEPH B. FULLER.
GEORGE W. PIERCE.

No. 7289.—*Combined Shutter and Sash Fastener.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The lever f, secured by a fulcrum pivot to the sill of a window frame, when it is so arranged that the hook at its outer end can be made to interlock with the holder g, made fast to the blind, and when in that position the inner end of the lever be so connected with the apparatus for fastening down the sash, that the lever cannot be operated without previously unfastening the sash, substantially as herein set forth.

Second. I also claim the arrangement of the lever f, placed upon the window sill, the holder g, secured to the blind, and the latch l, secured to the lower bar of the sash, by which, when the blind is closed, and the window sash is raised, the descent of the sash will operate the lever, and thereby securely fasten the blind, substantially as herein set forth.

Third. I also claim the arrangement of the lever f, the holder g, the latch l, and the spring catch m, (respectively secured to the sill of the window frame, and to the blind and sash,) in such a manner that the closing of the sash will securely fasten it down, and at the same time operate and firmly retain the lever f, in such a position that it cannot be detached from its hold upon the blind, without previously unfastening and raising the sash, substantially as herein set forth.

THOMAS HARVEY.

No. 7290.—*Improvement in Carriages.*

What I claim as my invention, and desire to secure by letters patent, is—making the king bolt, the fixed ring of the fifth wheel, and perch in one piece, whereby the liability to accident is diminished, and the durability of the parts is increased, as herein described.

I likewise claim connecting the perch and its braces with the hind axle tree, and the thills with the fore axle tree, by screwing them into pipe clips, as herein described, whereby the great number of screw-bolts and nuts generally employed, are dispensed with, and a cheap and durable connection is obtained which at the same time admits of the ready disconnection of the parts.

JAMES PATTERSON.

No. 7291.—*Improvement in the Construction of Bases for Stands.*

What I claim therein as new, and desire to secure by letters patent, is the mode herein described of employing a base piece, that the legs or feet may hook into, and be held firmly in place by the cap plate, and rod running through the centre, the same being constructed and operating, substantially in the manner and for the purpose described and represented.

EZRA RIPLEY.

No. 7292.—*Improvement in Piano-Forte Action.*

First. I claim the spring tongue, in combination with the under angular lever M, for the purpose set forth, not limiting myself to the exact construction of it, as herein described, while the same effects by a like combination may be produced.

Second. I claim the regulating screw Q, for the purpose set forth, viz: to regulate the strike key separately, as set forth.

JOHN RUCK.

No. 7293.—*Improvement in Attachment of Harrow to Seed Planter.*

What we claim as our invention, and wish to secure by letters patent, is connecting with the machine a harrow, constructed with spring teeth, so arranged by means of a slide hinge *g*, *g*, that the wheel track towards the land to be sewed, can always be left undisturbed as an accurate guide in returning across the field.

MARCUS SAGE.
SILAS S. SAGE.

No. 7294.—*Improvement in Gearing of Seed Planters.*

What I claim as new, and for which I desire to secure letters patent, is—

First. The sliding frame R, in combination with the rod D, for the purpose of raising and depressing the drills A, A, and also for stopping the feeding, simultaneously, as above set forth.

Second. I do not claim the simultaneous throwing out of, and into action, the feed roller and its respective drills, nor do I claim the slide or shut-off J, as I am aware these both have been done. But what I do claim, is operating the shut-off J, and lever I, by means of the arm D, as set forth, for the purpose of causing the same to be self-acting, either when coming in contact with any obstruction, or when desired for sowing pointed or irregular lands.

ANTHONY SANDOC.

No. 7295.—*Compound Tubular Rail.*

What I claim as my invention, and desire to secure by letters patent, is the making of a two part break joint hollow rail, substantially as herein described, and in combination with the two part rail made hollow, as specified, I claim the blocks, inserted in such hollow, at the junctions of the sections, substantially as described.

ALFRED B. SEYMOUR.

No. 7296.—*Improvement in Sewing Machines.*

What therefore, I claim as my invention, is the herein before described disposition of the thread eye of the needle, (that is to say, the said eye, being placed near the point of the needle,) in combination with the afore described manner of supporting the needle, and applying it to the machinery which produces the corrugations or foldings of the cloth, not meaning to lay claim to

the combination of a needle and gears or other analogous contrivances for producing sewing, as the same have heretofore been applied and used, but meaning only to claim my improvement as constructed and made to operate, substantially as above specified.

DAVID M. SMITH.

No. 7297.—*Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is causing the heat and products of combustion to enter the flue over the oven, on one side, and carrying the same across the top of the oven, down the other side thereof, in a broad sheet, thence under the oven, and thence up in a broad flue to the smoke pipe, substantially as described.

WM. ABENDROTH.

No. 7298.—*Improvement in Churns.*

What I claim as my invention, is the combination of the external chambers, their plungers and discharging passages, with the middle or air chamber, the whole being constructed, applied, and used, substantially as specified, and in combination with the above, I claim the air entering passages *d*, *d*, &c., applied and used, substantially in manner and for the purpose above specified.

JOHN ANDREWS.

No. 7299.—*Improvement in Dentists' Chairs.*

What I claim, and desire to have secured to me by letters patent, is the manner in which I arrange the operating parts within the frame work, and under the seat, in combination with the seat, so made as to move up and down within the frame work, and appear like an entire seat, as herein set forth.

A. MERRITT ASAY.

No. 7300.—*Improved Method of Attaching the Cylinder in Revolving Fire Arms.*

What I claim, is the improved mode of attaching the cylinder of barrels to the stock, viz: by means of the cylindrical tube B, in combination with the flanch and stud, or their equivalents, whereby I dispense with the usual spindle and hole for its reception in the centre of the cylinder of barrels, being thus enabled to enlarge the bore of the barrels in a cylinder of equal size.

D. H. CHAMBERLAIN.

No. 7301.—*Improvement in Machines for Drilling Stone.*

What I claim therein as new, and desire to secure by letters patent, is the combination of the lever (*z*,) with the cranks and pitman, which operate it, for the purpose of rotating the drill periodically, by impingement against the cogs of the pinion (*a'*,) at its greatest elevation, returning to position when the pinion is removed from its range, the whole arranged and operated, substantially in the manner and for the purpose set forth.

GEORGE FLETCHER, Sr.

No. 7302.—*Submerged Rocker for Separating Ores.*

What I claim as new in my invention, and desire to secure by letters patent, is the combination of the rocking frame C, the pans F, F, F, the levers B, B, and the bars E, E, attached, secured, and adjusted to the box A, or to a platform or boat, in the manner and for the purpose, substantially as herein described.

OLIVER EDES.

No. 7303.—*Improvement in Safety Lamps.*

What I do claim as my invention, and desire to secure by letters patent, is the sliding tubes I, I, in combination with the screw C, the said screw C, being furnished with the opening E, through which to fill the lamp, substantially in the manner and for the purpose described.

J. W. HOFFMAN.

No. 7304.—*Improvement in Double Cooking Stoves.*

What I claim and desire to secure by letters patent, is the construction of a double cooking stove, having two compartments I, I, and a smoke flue K, passing round one compartment first, and then around the other, in such manner that one shall be heated in a much higher degree than the other, arranged and constructed, substantially as herein described, and for the purposes set forth.

HENRY JACKSON.

No. 7305.—*Improved Arch Truss for Bridges.*

What I do claim, is the so combining or arranging them with respect to each other, and with the radial suspension rods, and on the cord or beam to which they are applied, that they and their suspension rods may overlap one another, and have the feet or parts of each which rest on the cord, upheld by the crown and suspension rods of the central part of an adjacent arch, all substantially as above specified.

HENRY LANERGAN.

No. 7306.—*Improvement in Coal Stirrers for Furnace Grates.*

What we claim as new, and desire to secure by letters patent, is—

First. The rake frame having numerous vertically moving fingers, constructed and operating to stir and clean the fire only by a vertical movement, said fingers being distributed beneath the grate, substantially in the manner, and for the purposes described.

Second. We also claim, in combination with the passages round the rim of the grate, admitting warm air above the fire, the vertically moving rake teeth, which open passages for the free escape of combustible gases, to be burned by said warm air, thereby maintaining a copious volume of flame all around the interior of the fire box, as herein set forth.

WILLIAM R. NICHOLS.
BURNITT C. BOYES.

No. 7307.—*Improvement in Cotton Gins.*

What I claim as new, and of my own invention, and desire to secure by letters patent of the United States, is—First. The making card cylinders with gutta percha, or other similar substance, filled in among the teeth, to form a regular surface, and stiffen the teeth, whether such cylinders, so fitted, are used for this or any other purpose for which they are available.

Second. I claim the application of one or more card cylinders with gutta percha, or other similar substance between the teeth, in connection with an equal number of smooth cylinders, to card cotton from the seed, substantially as described and shown.

Third. I claim the application of the wire gauze drum G, and roller h, beneath; first, for the purpose of allowing the blast to drive the dust and chaff from the cotton; and second, for the purpose of leading the cleaned cotton

duces the contig-

out in a sheet, or bat, whether this roller and drum be applied to act with card or with the common saw gin.

STEPHEN R. PARKHURST.

No. 7308.—*Improvement in Piano Fortes.*

I claim the manner of constructing the tuning block, substantially as herein described, of the arched slab A, and the back piece B, with the wedge or piece a, and the diagonal bolts or keys b, b, b, whereby it is made capable of withstanding the great strain of the strings.

I also claim the metal plate D, carrying the ribs d, d, d, projecting from and forming part of it, the plate being attached to the upper surface of the tuning block, each of the strings of the instrument passing over and resting on a rib, and passing through a hole in the rib immediately behind, whereby the strings obtain a solid bearing on the tuning block, which will make them produce a full, round, clear tone.

JOHN RUCK.

No. 7309.—*Improvement in Brick Presses.*

What I claim therein as new, and for which I desire to secure letters patent, is first, the combination of the grated disk and hopper, constructed and arranged, substantially in the manner and for the purpose set forth, and in combination with the revolving moulds.

Secondly. I do not claim the mould as herein described, or the manner of holding the brick firmly while being cut off, these claims having already been granted to me in my patent of September 27th, 1844, but

What I do claim is the arrangement of the moulds (whether conical or otherwise, as before patented) in a revolving cylinder, with pistons revolving with them, and working under a stationary cam, as herein described, in combination with stationary cutters, or cutters revolving on their own axes, working in a groove, near the lower ends of the moulds, and also below the moulds, in the manner and for the purposes herein set forth.

Thirdly. I claim the apparatus for trimming the bricks, consisting of a stationary cutter and a piece in front thereof, to press up against the brick as the clay is cut.

Lastly. I claim the combination of adjustable headed pistons, with stationary cam, as herein fully specified.

NATHAN SAWYER.

No. 7310.—*Improved Arrangement of Propellers and Chimneys for Canal Boats.*

What I claim as my invention, and desire to secure by letters patent, is the employment, in combination, of two propellers, arranged in a recess at the stern of a boat, each being on a separate shaft, one above the other, and one of the propellers being placed back of the other, substantially as herein described, whereby a greater amount of paddle surface can be obtained within a case, and with a given width of stern, than by any other known plan.

And I also claim, in combination with the propellers arranged with a part of one of them above the water line, and enclosed in the recess at the stern of the boat, substantially as herein specified, the employment of a fan for exhausting the chimney of the steam boiler furnace, and for discharging the products of the combustion into the recess in which the propellers work, substantially in the manner and for the purpose specified.

BENJAMIN M. SMITH.

No. 7311.—*Lathe for turning a Peculiar Species of Curve.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of turning the periphery of steam wheels, or other articles, with regularly curved projections and depressions from a true circle, by combining with the mandrel of a lathe, or (what is equivalent thereto,) the shaft of the steam wheel, a cutter, which, in addition to the usual longitudinal motion parallel with the axis, receives a reciprocating motion towards and from the axis, by means of a cog wheel, and pinion and crank, or their equivalents, as herein described.

H. G. THOMPSON.

No. 7312.—*Improvement in Smut Machines.*

What I claim therein as new, and now desire to secure by letters patent, is as follows: the peculiar construction of the rubber pieces *o*, substantially as described and represented, whereby all parts of their surfaces may be successively appropriated to the rubbing action, each plate being susceptible of four changes before it becomes necessary to replace it by a fresh rubber.

DAVID ULAM.

No. 7313.—*Improvement in Brick Presses.*

What I claim as my invention, and desire to secure by letters patent, is the clearer *s*, *s*, as used in connection with the two plungers O, and P, for the purpose of delivering the brick and preventing the plunger O, and P, from becoming foul at their passing ends, and the clearer itself being kept clean, and polished by the action of the plunger P, upon its lower surface.

SHEPHERD WHITMAN.

No. 7314.—*Improvement in Instruments for Measuring Cloth.*

What I claim, is the manner herein described, of measuring cloth or other fabrics, by causing the material to pass over and give rotary motion to the roller B, carrying on its axis the endless screw gear E, gearing into the teeth of, and giving motion to the traveller wheel H, carrying an indicator *f*, pointing out the distance travelled by the periphery of the roller B, in the graduated adjustable index plate I, or by any other mechanical combination, substantially the same.

E. F. WHITON.

No. 7315.—*Improvement in Adjustable Shares of Corn Ploughs.*

What I do claim as my invention, and desire to secure by letters patent, is increasing or diminishing the angle of the ploughs with the central line of draft, by shifting the screws K′, K′, to the holes (*c*,) in the ploughs, and the screws L′, L′, to other holes in the beams C, C, without changing the position of the shanks J, J, and braces, M, M, by which more or less earth may be thrown toward the row of plants under culture, as described.

DAVID WOLF.

No. 7316.—*Improvements in changing a Reciprocating Motion into a rotar Motion.*

What I claim as new and of my own invention, and desire to secure b letters patent of the United States, is the application of the levers *h*, *h*, 1, catc blocks 8, 8, with the bevels 9 and 10, and springs *i*, *i*, or their equivalents, t interlock and unlock with the crank arms *g*, and *g*, 1.

And I claim, also, making the governing bar adjustable in combination with the levers *h*, *h*, 1, in such a manner as to give either a direct or reversed motion to the pulleys, *F*, *F*, 1, and I claim the above applications severally, and in combination in the whole and in the parts; the apparatus being constructed and operated, substantially in the manner, and for the purposes described and shown.

PETER YATES.

No. 7317.—*Improvement in Reed Musical Instruments.*

What I claim as my invention, or improvement in reed instruments made with a sounding board, is to make the reed opening *c*, directly through the wooden sounding board, in combination with the applying of the reed directly to the same, and fastening it to the sounding board, instead of using any metallic frame, for the opening and reed, as has been the customary method of making and constructing such instruments.

CHARLES AUSTIN.

No. 7318.—*Coupling for Pipes and Hose.*

I claim the construction of couplings for hose and tubing, by forming one part thereof into a hollow cylindrical cup or box, having wedge shaped flanges of metal inside and next to the edge thereof, and by forming the other part of the coupling of a flange equal in diameter to the first described coupling, having its face edge ground with the edge of the first coupling to make a tight joint with a cylindrical ring, (whose bore is equal to that of the tubes to be coupled) projecting from said flange concentric with it, and in diameter just large enough to pass between the flanges of the cup or box, and to reach just to the bottom of the cup, whose bottom face with the outer face of said ring are ground together to form a tight joint. Also said ring having on its periphery at the outer edge, wedge shaped flanges similar in form and angle to the flanges of the cup or box, and so arranged as to pass between the intervals of the same, so that by being turned round underneath them, they compress the ground surfaces of the couplings together firmly.

A. HEYER BROWN.

No. 7319.—*Improvement in Apparatus for Drawing Water.*

What I claim as my invention, and wish to secure by letters patent, is the plan herein described, of bringing water upon a level, over a hill, or in any situation where the fountain is not higher than where the water is wanted for use, viz: I claim the combination of the weight and its cord, pulley and ring, with the cord by which the bucket is drawn, and the hook or catch upon the carriage, the whole being arranged, substantially as described, for the purpose of drawing the empty bucket from the place of discharge over the highest point of the way to the spring.

CAIN BROYLES.

No. 7320.—*Improvement in Machines for Holding and Dressing Slates.*

What I claim therein as new, and desire to secure by letters patent, is the endless series of clamp carriages operating, substantially as herein set forth, to hold and carry the slates beneath the cutters.

SAMUEL E. CROCKER.

No. 7321.—*Improvement in Grain Driers.*

What I claim as new and useful in the foregoing, and desire to secure by letters patent, is the construction and arrangement of the apparatus as herein described, by which a stratum of air is forced into a case enclosing the grain cylinder where it protects the grain from the direct action of the heat from the fire, and is there heated and conveyed through the grain so as to carry off the moisture therefrom, substantially in the manner and for the purpose set forth.

M. R. DUDLEY.

No. 7322.—*Improvement in Gearing for Regulating Speed.*

I claim, therefore, as my invention, and for which I wish to obtain letters patent, the employment of the wheel or pulley F, in combination with the cone and governing shaft O, substantially in the manner and for the purpose set forth

HOSEA ELLIOTT.

No. 7323.—*Improvement in Gauges for Spreading Plasters.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the adjustable, expanding and contracting frame with the adjustable, expanding, and contracting bed, the several portions of the combination being arranged and constructed, substantially as herein set forth.

JAMES M. KEEP.

No. 7324.—*Improvement in Let-off Motion of Looms.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the yielding, weighted, and the stationary whip rolls, in connection with the let-off motion, as herein set forth, whereby the texture of the cloth is rendered more uniform than has been heretofore done, while it can be varied at will.

JONATHAN KNOWLES.

No. 7325.—*Improvement in Hanging Saws in Saw Mills.*

What we claim as our invention, and desire to secure by letters patent, is the method of hanging a mill saw, from guides in advance of its front edge, which sustains the whole pressure caused by the advancement of the wood on the carriage against the saw teeth, the plate of the saw swinging on the advanced guides as pivots, so that when cutting, it is kept running in a plane passing through the guides, in the direction in which the carriage moves, as a vane is kept by the wind in the direction in which it blows.

E. HERVEY PARSONS.
SANFORD E. PARSONS.

No. 7326.—*Improvement in Holding Daguerreotype Plates.*

What I claim as my invention, and wish to secure by letters patent, is the construction of a moveable holder for securing daguerreotype plates, by pressure from within, outwards, while the plates are being polished, burnished, buffed, or cleaned.

I also claim as new, the construction or arrangement of a holder composed of two parts with springs between the parts, pressing them from within outwards, against the bent edges or corners of the daguerreotype plate, and secured from contraction by a button or wedge, substantially as in the drawings. And in combination with such a holder, I claim the bending of the edges or corners of the plate so as to secure the same to this holder.

I also claim the adaptation of a daguerreotype plate, with its edges or corners bent, as shown in the drawings, to a moveable holder, constructed substantially as above described.

SAMUEL PECK.

No. 7327.—*Improvements in Apparatus for Splitting and Stretching Leather.*

I claim the construction of a machine performing the business of rolling, splitting, and stretching leather, at one operation, as set forth in the above specification and drawings, viz: the following combination of machinery, one roller (G,) driven by the motive power, having another roller N, moving above it, between which two rollers, the leather is to be compressed, the upper roller running free upon its own axis, which is fixed in a vibratory frame, in order that said upper roller may be adjusted thereby, to any variable or determinate pressure upon the leather, by proper power applied to said frame. A second roller placed a short distance in front of, and parallel with the first named one, running free on its own axis. A smaller roller (placed in a second vibrating frame, similar to, and adjustable like the first mentioned frame,) running above the last mentioned roller, to perform the functions of compressing the leather and holding it firmly, to receive the cut of the knife. A knife supported by strong springs and placed just in front of the last mentioned pair of rollers, with its cutting edge a short distance from the point of compression of these rollers, so as to act upon the leather directly, as it leaves the rollers.

A moveable frame to carry the leather to be operated on, moved by a gearing connecting it with the first roller (G,) and giving it a certain proportional rate of movement, compared with that of the roller, by which the quantity of stretch to be imparted to the leather can be regulated. An apparatus for gauging the knife to cut the leather to a given thickness, consisting of a pair of eccentrics *g*, and *g*, on the ends of a shaft, running parallel with the knife, and operating upon each end of it equally, as the said shaft is turned round, with an index plate *z*, and set lever *y*, to regulate and fix the same, during the operation of the machine.

BRADFORD ROWE.

No. 7328.—*Improvement in Vats or Press Boxes for Cheese.*

What I claim as my invention, and desire to secure by letters patent, is providing cheese vats with a moveable joint which is operated by a crank or lever, to enlarge and diminish the size of the vat, substantially in the manner and for the purposes herein set forth.

AUGUSTUS N. SEVERANCE.

No. 7329.—*Improvement in Roasting Coffee.*

What we claim as our invention, and desire to secure by letters patent, is the application of steam or vapor to the grains of coffee, just previous to subjecting them to the action of a dry roasting heat, within an apparatus constructed and operated, substantially in the manner herein set forth.

W. H. TRIPLER.
ELIAS BRECHT.

No. 7330.—*Machine for Making Wrought Iron Railroad Chairs.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The double or parting die F, *f*, substantially as described, parting by means of a joint at the top or otherwise, for the purpose above set forth.

Second. The vertical shears and benders V, V, working in connection with the double die F, *f*, in such manner as to cut and form the lips of a chair at one operation, substantially as described.

Third. I also claim the combination of dies, shears, punches, benders, and

clearers, arranged and operated in the manner and for the purpose above set forth, or any similar arrangement, wherein the combination is essentially the same.
WILLIAM VAN ANDEN.

No. 7331.—*Improvement in Board and Log Rules.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the log table and board rule, in the way and manner and in the form described and illustrated herein.
BENJ. M. VAN DER VEER.

No. 7332.—*Pipe Coupling.*

What I claim as my invention, and desire to secure by letters patent, is fastening together the abutting ends of two pipes, by forcing a sleeve of some hard substance over a belt of a softer substance, which envelopes the seam and is thus compressed between the sleeve and the pipes.
CHAPMAN WARNER.

No. 7333.—*Improvement in the Rubbers of Smut Machines.*

What I claim therein as new, and desire to secure by letters patent, is the vibrating rubber (e,) in combination with the feeding and rubbing cylinder (d,) constructed and operated, substantially in the manner and for the purpose described.
FRANKLIN WRIGHT.

No. 7334.—*Method of preventing Accidental Discharge in the Prussian Gun.*

What I claim therein as new, and for which I desire to secure letters patent, is the guard (n',) to prevent the discharge of the arm when all the parts are not in proper position, constructed, combined, and arranged with the arm, and operated substantially in the manner and for the purpose set forth.
JOHN WURFFLEIN

No. 7335.—*Improvement in Printing Presses.*

I claim the mode of governing the vertical motion of the type bed N, by the conjoint application of the crank L, and two part pressing bar M, made as a hollow cylinder and slide, with stop shoulder, to give the upward motion and pressure, and arranged to lengthen by sliding out at the back motion of the crank L, and the combination therewith of the grooved cam $b5$, and backing bar b, b, to regulate the descending motion of the type bed, substantially as described and shown.

I claim the application of the rotating cams $c3$, to act through the fork $c4$, and connect or disconnect the clutches 26, to give the shaft $c6$, a rotary motion during half of the rotation of the shaft b, and suspend the motion of the shaft $c6$, by the disk $c8$, and pins t, on the fork $c4$, during the other half rotation, so that the shaft b, goes two continuous revolutions to one intermitted revolution of the shaft $c6$, such intermitted revolution being applied to give an intermitted alternate motion to the double paper carriage in a printing press, or to give any similar intermitted alternate motion by any competent means, substantially as described and shown.

I claim the application crank $c9$, male wheel d, fixed female wheel $d1$, and connecting bar $d2$, for the purpose of communicating the intermitted alternate motion to the double paper carriage $d3$, substantially as described and shown.
F. G. AUSTIN.

No. 7336.—*Improvement in Bran Dusters.*

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the exterior stationary shell or cylinder E, the intermediate revolving cylinder D, covered in sections with wire cloth of different qualities, and the central revolving cylinder A, with the ventilator y, for the admission of air, and the openings between the staves in the cylinder, for the emission of air to drive the flour and other stuff separated from the bran, through the wire cloth; the several parts, with their driving gear and apparatus, being constructed and arranged, substantially as herein described, and intended for the purposes set forth.
E. R. BENTON.

No. 7337—*Improvements in the construction of the Frame, Roof, and Floor of Iron Buildings.*

What I claim as my invention, and desire to secure by letters patent, is the method substantially as herein described, of making the frame work of iron houses of more than one story, by means of beams cast in sections, with end flanches, which receive bolts for uniting and drawing them together, and with top and bottom parallel flanches, when this is combined with columns, pilasters, or posts cast with horizontal flanches at top and bottom, the top flanche of one column, and the bottom flanche of another, being secured by bolts to the horizontal flanges of two beams, one column above and the other below, the point at which the beams are joined, for the purpose and in the manner substantially as described.

I also claim the method, substantially as herein described, of making the floors by means of thin plates of metal, formed with a groove on one edge, and tongue on the other, by riveting narrow strips of metal to their under surface, and near the edges, the plates so formed being put together breaking joints, substantially in the manner and for the purpose specified.

I also claim the method, substantially as described, of covering the roofs of houses by means of series of thin metal plates, formed each with a groove on one edge, by riveting narrow plates or strips to the under surface thereof, that the edge of one plate may fit into the groove on the lower edge of the next above, and so on throughout the series, substantially as described, when these plates are also provided with the lapping pieces or plates, riveted or otherwise secured to the upper surface of one end of each plate in each series, to lap over the end of the contiguous plates of the next series, the said lapping pieces of each series being also made to lap one over the other, substantially as and for the purpose specified.
JAMES BOGARDUS.

No. 7338.—*Improvement in Air Heating Stoves.*

What I claim as my invention, and desire to secure by letters patent, is—

First. A grate combined with and around the hollow cylinder through which the air passes and becomes heated.

Second. A conical hood placed above the air cylinder and the grate, and connected with a smoke pipe for the purpose of creating a draft, concentrating the heat, and conducting of the smoke or gas from the burning wood or coal.

Third. The placing the grate on friction rollers, as described, in connection with the cylinder, for the purpose of clearing the grate of ashes, or bringing any part of it under the operation of a stronger draft or current of air.

Fourth. The combination of the air pipes, or air passages with the hood, as described, by which the air that has become heated in the cylinder, is conveyed to the room, or place to be warmed.

Fifth. The circular fender, which is also made to answer the purpose of a blower, by being raised and connected with the hood, as described.

Sixth. The method of introducing air into a hollow cylinder or air chamber, connected with and inside of the grate, and taking the air from beneath the hearth.

JAS. L. CATHCART.

No. 7339.—*Improvement in Bedstead Fastenings.*

What therefore I claim, is the lip N, in combination with the pawl and ratchet arc, substantially in the manner and for the purpose as described, and when the bedstead bottom is made of the said flexible strips, having such a flexibility as to enable them to be readily wound upon the windlass, and unwound therefrom, as stated.

CHAS. C. COOLIDGE.

No. 7340.—*Adjustable Mouth Piece for Road Scrapers.*

What I claim as my invention, and desire to secure by letters patent, is combining with the body of a scraper, a mouth piece which can be adjusted to form various angles with the bottom of the scraper, substantially in the manner and for the purpose herein described.

SHADRACH DAVIS.

No. 7341.—*Improvement in Mechanical Leeches.*

What I claim as my invention, and desire to secure by letters patent, is:

First. The arrangement of the wire G, L, of the button H, and of the covering of the instrument I, connected with the piston rod by the India rubber tube K, which allows the cylinder D, placed in the vacuum produced by the piston to work without admitting the air.

Second. The blades of the lancet, shaped like a V.

M. DELLUC.

No. 7342.—*Improvement in Defecating Sugar.*

I claim the process as described, for the immediate separation of the sugar from all foreign matter, which injures the purification by the manner above set forth, by forming a solid saccharate of baryta, pressing, decomposing, and separating the solid cakes and finishing the process as set forth, to the almost total suppression of heat necessary to evaporation.

ROBERT DE MASSY.

No. 7343.—*Improvement in Over Shoes.*

What I claim therein as new, and for which I desire to secure letters patent, is an over shoe covering the front of the boot at the sole, substantially in the manner and for the purpose set forth.

PETER DORN.

No. 7344.—*Improvement in Plough Cleaners.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the lever, notched arm, and vertical wheel B, with a conical roller placed under the beam and upon the cutter of the plough as above de-

scribed, for the purpose of operating the conical roller and cleaning the plough in the operation of ploughing, as set forth.

DANIEL D. GITT.

No. 7345.—*Improvement in Cooking Stoves.*

What I claim therein as new, and desire to secure by letters patent, is:

First. The mode herein described of constructing fire boxes for stoves, furnaces, &c. in two pieces, so that they are not confined as they are when made whole, or four pieces as described, but are free to move on their bed plate.

Secondly. I claim the manner herein described, of dividing the sliding hearth of cook-stoves in such a manner as to admit of its sliding under the stationary part, and be entirely out of the way; the whole being constructed in the manner and for the purpose, substantially as herein described and represented.

JAMES R. HYDE.

No. 7346.—*Improvement in Screw Excavator.*

What I claim as my invention, and which I desire to secure by letters patent, is:

First. The employment of a screw excavator combined with an adjustable tube as above described, for the purpose of excavating and conveying off earth, said tube being placed at any angle, or vertically, or horizontally as the case may require.

I also claim the apparatus for sustaining, moving, and guiding the excavator as above described, by which it is combined with the prime mover, so as to be readily pointed in any direction, said apparatus consisting of a ring with shifting bearings and a moveable bearing for the shaft to rest in which is connected with the prime mover by universal joints.

R. MONTGOMERY.

No. 7347.—*Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the method of protecting boiler covers against the injurious action of varying temperatures, by combining therewith a lining made of metal, so formed that in its cross section, it shall present a curved line, that is, a line longer than a straight line as described.

And I also claim the method of supporting the doors of stoves, by means of a lever or levers so connected with the doors, substantially as described, that the said lever shall be moved in and out by the closing and opening of the door as described.

JORDAN L. MOTT.

No. 7348.—*Improvement in Working a Rotary and Vertical Churn Dasher.*

I claim the application of the shaft B, to communicate a vertical reciprocatory movement to the dasher F, and a rotary one, and the dashers M, and G, so that either can be used as desired, as herein set forth.

WILLIAM R. NASH.

No. 7349.—*Improvement in Straw Carriers.*

What I claim therein, and for which I desire to secure letters patent, is an elongated apron, or pierced platform, hung upon and worked by cranks connected with and forming a part of the thrashing and separating machine, substantially in the manner and for the purposes herein described.

WILLIAM PIERPONT.

No. 7350.—*Arrangement of several Slide Valves in the same Steam Chest.*

What I claim as my own invention, and desire to secure by letters patent, is the arranging of two or more valves in the same steam chest, to open and close the several steam ports or passages, leading to and from the cylinder of a steam engine, arranged and operated to graduate the admission of steam into the cylinders of steam engines in the manner and for the purpose, substantially as above set forth, in the foregoing specification.

CYRUS RICHARDSON.

No. 7351.—*Improvement in the Manufacture of the Oxide of Zinc.*

What we claim as our invention, and desire to secure by letters patent, is:

First. The use of a draft of air, through the suction tubes Q, Q, described above for oxidizing the metal, and carrying forward the products and the arrangement of tubs or basins for the reception of the heavier portion of the products as described herein.

Second. The arrangement of the oxidizing chamber, in combination with the receiving chambers, so as to allow the products which they contain, to be gathered without entering the chambers.

E. LECLAIRE.
E. BARNELL.

No. 7352.—*Improvement in the Melodeon.*

What I claim as my invention, and desire to secure by letters patent, is:

First. The employment of the arms P, in combination with the top O, of the bellows in the manner and for the purpose set forth in the foregoing specification.

A. L. SWAN.

No. 7353.—*Improvement in Oscillating Valves of Steam Engines.*

What I claim as new, and desire to secure by letters patent, is the recess j^2, sunk in the oscillating valve, and communicating with the steam passage *f*, in combination with the recess *k*, formed in the valve chamber, the same acting in the manner and for the purposes herein specified.

T. C. THEAKER.

No. 7354.—*Improvement in Machines for Polishing Stone.*

What I claim as my invention, is the manner or mode of giving a compound or double motion to the rubbers by means of two carriages, or a double carriage, each carriage moved by its respective cranks, substantially in the manner and for the purpose herein described, so that one motion of said rubbers will not interfere with the other motion; said machine can be propelled by any power now in use.

AMOS WALTER.

No. 7355.—*Improvement in Machines for Slitting Clothes Pins.*

What I claim as my invention, and desire to have secured to me by letters patent, is cutting the two sides of the outer end of the slot or fork of a clothes pin, on a regular sweep, by means of knives formed alternately on each side of the circular saw, which cuts the straight part of said slot, and in the direction above explained, whether said knives be made of portions of the plate of said saw, and bent outwards, as described, or in separate pieces, and attached to said sides of said saw.

HORATIO P. ALLEN,

No. 7356.—*Improvement in Stoves.*

What I claim as new therein, and which I desire to secure by letters patent, is first, the air chamber in which the air is heated, previously to its admission to the fuel, in combination with the spiral apertures, by which the heated air is caused to impinge on the upper surface of fuel, substantially in the manner and for the purposes as described.

ANSON ATWOOD.

No. 7357.—*Improvement in Connecting Rods of Steam Engines and other Machinery.*

What I claim as new and of my own invention, and desire to secure by letters patent of the United States, is the application of prepared India rubber, or of any similarly effective elastic substance, in the parts forming the joints of connecting rods of steam engines and other machinery, for the purposes of preventing jars, and breakage of the parts, when a reciprocating motion is changed to a rotary, substantially in the manner described and shown.

LEVI BISSELL.

No. 7358.—*Improvement in Steaming Grain preparatory to Grinding.*

I claim, in combination with a steam pipe (I,) and grain passage (B,) the deflecting partition (C,) for directing the steam upward, and the grain downward, whereby the current of grain is steamed by direct contact with the current of steam at the moment before entering the mill, substantially as herein set forth.

BENJAMIN F. BROOMELL.

No. 7359.—*Improvement in Balancing Sash.*

What I claim as my invention, and desire to secure by letters patent, is—

First. In connection with the grooves in the sash, the distribution of the several pulleys and friction wheels, and the cord attached to the bottoms of the sashes, instead of their tops, whereby the cord and pulleys are kept entirely out of view.

Second. The combination of the barrel axle, ratchet wheel and pin, with its case or bearings, or their equivalents, with the cord and pulleys, the whole arranged and operating, substantially as herein set forth.

HIRAM C. BROWN.

No. 7360.—*Tooth Segment Lock for Fire Arms.*

What I claim as my invention, is the moveable toothed segment G, and escapement or spring pawl I, or any mechanical equivalent therefor, (the said segment and escapement being arranged within the trigger,) and the toothed segment or arc C, (of the hammer,) in combination together, and with the trigger, hammer, and stock, and made to operate, substantially in the manner as herein before specified.

D. H. CHAMBERLAIN.

No. 7361.—*Cylinder and Trough Gold Washer.*

What I claim as my invention, and desire to secure by letters patent, is the separating gold or other heavy substances from others of less specific gravity, and water with which it may be mingled, by the use of a wheel or cylinder, and trough, the periphery of the former, and the bottom of the latter being covered and constructed, substantially in the manner herein set forth.

THOS. M COLLINS

No. 7362.—*Revolving Jaw Wrench.*

I claim the revolving jaw block N, and feather E, as combined together, and with the screw shank A, and made to operate, substantially as herein before specified.
NATH'L COLVER.

No. 7363.—*Improvement in Connecting Skeins with Axles.*

What I claim as my invention, is the combination with the skein of the screws g, g', for the purpose of tightening the skein on the axle tree, as set forth in the foregoing specification.
ABEL COMBS.

No. 7364.—*Improvement in preventing Fibres from Winding on Drawing Rollers in Spinning Machines.*

What I claim, is the improved manner of applying and using the roller, the same consisting in placing it not exactly in contact with the lower front drawing roller, but at a distance therefrom, and by means of separate or additional machinery, giving to it a rotary motion, at the same velocity, and in the same direction with those of the said lower front drawing roller, the whole being, substantially in the manner and for the purpose, as herein before specified.
JOHN C. DODGE.

No. 7365.—*Improvement in Machines for Washing Table Furniture.*

What I claim as my invention, and desire to secure by letters patent, is the construction of a cylinder with a cylindrical rack, supported by an upright shaft resting upon and being within, and supported by the cylinder, the rack having within it a conical rack and hoop, to receive and hold table furniture, in combination with a curb, containing a horizontal wheel with buckets to throw water upon the cylindrical rack; the whole supported by a frame, and by these mechanical means cleansing the surface of table furniture, without the use of hands, the entire machine being arranged, combined, and operated, substantially as is herein fully set forth.
JOEL HOUGHTON.

No. 7366.—*Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is—

First. I claim making the cover of the feeder, projecting in front with curved sliding doors, substantially as described.

Second. I claim forming the bottom grate by casting projections, from the edge of the fire back, or the equivalent thereof, substantially as described.

Third. I claim giving the required strength to the fire brick lining of stoves, to prevent them from breaking or separating when cracked by the heat by the insertion into them of metal rods, wires, or wire cloth, substantially, as described.

Fourth. I claim the combination of the two series of flue tubes, arranged one above the other, and with a space between them, all for the circulation and radiation of heat; for the purpose of giving a greater heat at the bottom of the oven, substantially as described; and this I also claim in combination with the above arrangement of flues, as described.

And lastly, I claim the method of supporting and bracing the door or doors, by means of the bracing rod hinged to the door, and passing through a hole below, (or the equivalent thereof,) and bearing against the bottom of the stove or a stop, or the equivalent thereof, substantially as described.
JORDON L. MOTT.

No. 7367.—*Improvement in Splint Machines.*

What I claim as my invention, is the combination of the circular or tubular cutters e, e, their lateral wing knives or cutters, their rib knives or cutters h, h, and the waste escape passages for the waste strips f', f', f', substantially in the manner and for the purpose above specified.

I also claim the improvement by which I am enabled not only to make round or cylindrical splints, but to introduce them to the dipping frames; that is, I do not claim the combination of cutters, dipping frames and passages leading from the cutters to the dipping frames, as these have been before invented and used for making square splints, and setting them in the frames, but I claim, in combination with cutters for forming the round splints and passages m, m, for receiving them and conducting them to the dipping frames, the passages i, i, or F, for the escape of the waste wood or strips f', f', f', the same being applied together and made to operate in connection with the reducing plane iron e, and the plates C, D, substantially as above specified.
HORACE PATTERSON.

No. 7368.—*Improvement in Thrashing Machines.*

What I claim as my invention, and desire to secure by letters patent, is First. The peculiar serrated and duplex conformation of the beaters B, substantially after the manner and for the objects herein described; that is to say, consisting of a pair of plates B, and c, c, c, diverging rectangularly from each other, and the latter consisting of teeth chamfered off from their inner side at their points, as represented in fig. 4.
A. S. PELTON.

No. 7369.—*Improvements in Sewing Machines.*

What I claim as new in my invention, and desire to secure by letters patent, is Firstly. The adaptation of the bearded needle (a,) such as is used in knitting or stocking frames, in combination with the manner of closing the beard or hook thereof previous to drawing it back with the thread, to prevent the point tearing the cloth, by passing it through the hole (v,) in the plate (t,) in the manner substantially as herein described.

Secondly. The combination of the spring thread leader or guide V, the arched spring (k,) and the friction roller (j,) for the purpose of leading the thread under the point of the beard of the needle.
O. L. REYNOLDS.

No. 7370.—*Improvement in Suspender Buckles.*

What I claim as my invention, and desire to secure by letters patent, is the constructing a buckle, by combining a curved plate (c,) with an angular lever (d',) substantially in the manner herein set forth.
WM. SCARLETT.

No. 7371.—*Shell Propeller.*

What I claim therein as new, and desire to secure by letters patent, is giving the shell of a submerged propeller the form of a section cut from the open extremity of sea shells, of the class of which that represented in the drawing may be considered a type, the mouth of the helical tube at which the water enters, being of greater area than its hinder extremity, at which the water is discharged.
JAMES TREES.

No. 7372.—*Improvement in the Joints of Stove Pi...*

No. 7372.—*Improvement in the Joints of Stove Pipes.*

What I claim as my invention, and desire to secure by letters patent, is the stove pipe herein described, as a new article of manufacture.

JAMES N. WARNER.

No. 7373.—*Improvement in Machines for Polishing Raw Hide Whips.*

What I claim as my invention, and desire to secure by letters patent, is the before described method of grinding, smoothing and polishing raw hide whips, in the manner and for the purpose herein fully set forth; that is to say, by the combination of the endless revolving belts D, D, between which the rough raw hide whip is placed, the suspended frame containing the upper endless belt, being arranged and operated in the manner and for the purpose set forth.

CHARLES BAEDER.

No. 7374.—*Improved Arch Girder.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as above described, of strengthening arches by means of metal straps, chains, or ropes, which constitute the cords, and pass around the ends and over the arched surfaces thereof, without being attached thereto, substantially in the manner and for the purpose specified.

I also claim providing the arch or beam with rollers at the ends around which the strap, chain, or rope passes, substantially as described, when this is combined with a coupling and tightening screw for varying the length of the said strap, chain, or rope, substantially in the manner and for the purpose specified.

JOHN BEVAN.

No. 7375.—*Improvement in Machines for Drying Bagasse.*

What I claim as my invention, and desire to secure by letters patent, is the employment of a revolving or rotary inclined flue, as applied and used for drying the bagasse or compressed sugar cane, or any other green or wet substance intended for fuel, with the heat and the flame coming from the furnace under the sugar kettles, or from any furnace whatever, all passing into and through this said inclined or rotary flue, at one and the same time, causing thereby the said bagasse or compressed sugar cane, or other said substance, intended for fuel, to become dry and combustible, and prepared for fuel, the moment that it has passed through said flue, using such machinery or mechanical means as I have herein described, or any other suitable mechanical agency or means that will enable me to carry out and put into practical execution or use, the principle or principles herein set forth, described and claimed, and to obtain the intended objects and results in combination as a whole.

JAMES HARRISON DAKIN.

No. 7376.—*Arrangement and connexion of Screw Propellers.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the principal and auxiliary propellers, connected by cog-gearing, or its equivalent, with that of the water pipes, in the manner and for the purposes, substantially as herein set forth.

PATRICK T. DEVLAN.

No. 7377.—*Improvement in Harness Buckles.*

What I claim as my invention, and desire to secure by letters patent, is a buckle constructed, substantially as herein set forth, of a fixed plate, and of a moveable plate, between which the strap is retained, by pins secured to the one, and engaging in the other.

JACOB S. EMBICH.

No. 7378.—*Improvement in Hand Looms.*

What I claim as my invention, and desire to secure by letters patent, is the shedding the web by the direct action of the lathe on the treddles, by means of the moveable finger Y, fig. 6, and the finger staff W, fig. 6, or any similar fixtures for the purpose, bearing down the treddle, and thereby producing a shed in the web at the backward vibration of the lathe.

I also claim as my invention, the combined action of the hand, fig. 10, cam wheel, fig. 4, finger staff W, fig. 6, and the finger Y, fig. 6, upon the treddles K, fig. 9, as above described, for the purpose of shedding the web by the backward vibration of the lathe.

I also claim the combined action of the hand, fig. 10, cam wheel, fig. 4, by the zigzag groove *n*, fig. 4, lifting slide, fig. 8, and drivers fig. 7, upon the picker staff P, fig. 3, as above described, for the purpose of throwing the shuttle back and forth alternately at each backward vibration of the lathe, immediately after the shed is produced, the loom to be propelled by hand or other suitable power. All of the above parts being substantially as herein described.

JOHN G. GARRETSON.

No 7379.—*Improved Wickets for Lock Gates.*

What I claim in the foregoing as my invention, and desire to secure by letters patent, is making and arranging a sliding wicket gate, in such manner that when shut, it shall rest upon its seat, and make a tight joint; but when moving to or from its closed position, shall be raised from its seat and supported on wheels to diminish the friction, and consequently the expenditure of power required to open or close it; the power for operating it, being applied through a lever, (or its equivalent,) so as to move the gate very slowly but with great force, until it is started from its seat, and the weight thrown upon the friction wheels, and then to act upon it with diminished force, but move it faster until it is fully open, thus counterbalancing as near as may be the force and the resistance.

I do not claim the mere counterbalancing of the weight of the gate, and the pressure of the water on its upper edge, by means of the pressure of the water acting upon a flange at its lower edge. But what I do claim, is placing a flange for this purpose in an inclined position, substantially as described, so that the rena contracta shall not prevent the issuing water from pressing against it.

JOHN JACK.

No. 7380.—*Improvement in Machinery for Sawing Staves.*

What I claim as my improvement, is the mode of steadying a long cylinder saw, viz.: by means of a shaft and proper connections at one end of the saw, in combination with a series of friction rollers and their supporting frame applied outside of the saw, and made to bear against the curved surface of the same, and at or near its other or serrated end, substantially as herein before explained.

EDWIN JENNEY.

No. 7381.—*Improvements in Machines for Sawing Wood.*

What I claim as my invention, and desire to secure by letters patent, is—

1st. The combination and arrangement of the suspended vibrating feeding lever S, and rotating forked arm X, jointed reaching arm (N,) rack M, and slide bar H, with the self-champing, self-adjustive hinged jaws *k*, *k'*, for holding the wood firmly during the operation of sawing, the feeding of the log being effected by means of the rotating forked arm X, actuating the feeding lever S, in the manner described and represented.

2nd. I also claim the combination and arrangement of the suspended lifting lever O, and rotating lifting arm W, on the shaft E, with the swinging sash F, as described, by which the descent of the swinging sash will cause the lever O, to advance towards the rotating lifting arm W, when the wood is cut, and thus elevate the swinging sash F, in the manner and for the purpose herein set forth.

3d. I likewise claim the combination of the transverse bent lifting arm T, and suspended lifting lever O, with the suspended feeding lever S, bent rod V, for unlocking the spring dog U, and vertical spring catch R, as described, by which the feeding lever S, is engaged with the jointed reaching arm N, simultaneously with the ascent of the swinging sash, in the manner and for the purpose set forth.

SPENCER LEWIS.

No. 7382.—*Devices for Discharging Ashes from Tuyers.*

What I claim, and desire to secure by letters patent, is combining with the valve E, on the end of the discharge pipe, a scraper, substantially as herein described, so that the opening of the valve by the stopping of the blast, shall cause the scraper to act in the manner and for the purpose herein specified.

JAMES A. MAYNARD.

No. 7383.—*Method of giving Rotary Motion to Fluid Iron in Casting Rolls.*

What I claim as my invention, is the combination of the paddle or fan *h*, with the rod *i*, and rod *r*, and the frame work and gearing for giving motion to the face, for the purpose of producing the rotary motion of the iron in casting chilled rolls and similar castings.

JOHN C. PARRY.

No. 7384.—*Improvement in Feed Regulators for Canals.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the box G, the float L, sliding valve T, segment gate B, C, and float Z, arranged and connected with the mechanism, whereby they have an united action in the manner and for the purpose herein described.

CHARLES ROSS.

No. 7385.—*Improvement in the Form of Rubbing surfaces for Regulating Abrasion.*

What I claim as my invention, and desire to secure by letters patent, is the application of the curved form above described, to the rubbing surfaces of cocks or valves, pivots of upright shafts, mill-stones, or other parts of machinery in general, where the rubbing surfaces have to bear a pressure in the direction of their axis.

CHRISTIAN SCHIELE.

No. 7386.—*Improvement in Attachments for Mills for preparing Corn in the Cob for Grinding.*

What we claim as new, and desire to secure by letters patent, is the block (*e*,) with its arrangement of inclined planes, knives, throats, and other devices

which adapt it, to operate on corn cobs or ears of corn received from a suitable feeder, and also to be inserted in the eye, and be driven by the irons of the runner stone of grinding mills, substantially in the manner and for the purpose described.

We also claim the block (*e*,) arranged as described, in combination with the tubular feeder arranged, substantially in the manner represented in fig. 1, and for the purpose described.

JOHN M. SEELY.
WM. E. TOMLINSON.

No. 7387.—*Improvement in Power Looms.*

What I claim therein as new, and desire to secure by letters patent, are

Firstly. The imparting to the heddle bearer (*r*,) a motion simultaneous with, and in opposite direction to the vertical one of the cylindrical jacquard (*i*, *j*, *k*,) by an arrangement of supplementary levers (*x*,) and their appendages as herein described, or by mechanism, substantially equivalent, the scroll cam or split pulley *v*, *w*, being so arranged as to act alternately as a lock and guide, and as a cam.

Secondly. The arrangement and combination, substantially as described and represented, of a segmental shell (*k*,) and stoppers (*t*,) for the ready adjustment of the jacquard to the pattern.

JOHN SHUTTLEWORTH.

No. 7388.—*Machine for Grinding Spiral Knives.*

What I claim as my invention, is the employment and use of the radial arm M, and its pivots or contrivances for supporting the knife, substantially in the manner and connected with the other parts of the mechanism, as herein before specified.

SILAS STEVENS.

No. 7389.—*Improvement in Apparatus for Setting Logs in Saw Mills.*

What I claim and desire to have secured to me by letters patent, is the combination of the alternating cylinder I, eccentric sliding dog P, cog K, notch L, and spiral spring O, with the common vibrating hand lever G, and concentric circles of teeth E, inclining in opposite directions for turning the ratchet wheel B, on the end of the pinion axle C, to the right or to the left, for moving the log on the head or tail block, either to the right or left, toward or from the saw, as before described.

T. C. THEAKER.

No. 7390.—*Improvement in Lathes for Turning.*

I claim the central stock heads G, and the chuck H, and the large spur wheel I, with the slots in them, to allow the axle to be placed in and taken out of the chuck sideways; the spur wheel I, being driven by spur wheels G, S, S, and T, T, the one T, acting as a compensation gearing to the other, while the slot of the large spur wheel is passing the other spur wheel T, in the manner, substantially as set forth.

J. D. WHITE.

No. 7391.—*Improvement in Quilting Frames.*

I claim the the folding and rolling the layers of any fabric, (which it may be desirable to quilt,) verily by the use of check rods attached to rollers as herein described, the rollers when operating, made to revolve alternately till the fabrics are folded and strained to the desired tension and position.

WILLIAM T. BARNES.

No. 7392.—*Improvement in Apparatus for Jointing Slats, Boards, &c.*

What I claim as my invention, is the combination of the frame A, with supporting rails a, a, the adjustable support or bed bar C, its supporting a elevating screws and contrivances, and the moveable clamping bars L, l with their clamp screw mechanism, the whole being applied and made to op rate together, and in connection with the plane, substantially as above specifie

ALANSON BLANCHARD.

No. 7393.—*Improvement in Making the Reservoirs of Metallic Lamps.*

What I claim as new in my invention, and desire to secure by letters paten is making the shell A, of the lamp reservoir, with the feeder a, standing o from one side of one single plate of metal, so as to require only one seam o solder joint, in the manner substantially as herein described.

P. J. CLARK.

No. 7394.—*Improvement in Galvanic Registers for Steam Boilers.*

What I claim is a galvanic battery or generator of electricity, and its cur rent wires or conductors, an alarm or bell apparatus, and a mercurial colum tube, combined with a steam boiler, and made to operate, substantially i manner and for the purpose of indicating the temperature or pressure of stea in the boiler, as specified.

ARTHUR DUNN.

No. 7395.—*Improvement in Apparatus for Jointing Boards.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the grooved plane, with the guides A, the sliding posts I, and adjusting screws G, and H, arranged in the manner and for the purpose herein described.

DAVID FOSTER.

No. 7396.—*Improvement in Smut Machines.*

What we claim as new in our invention, and desire to secure by letters patent, is—

First. The combination of the cup Q, with the shaft H, for the purpose of receiving the grain, and conducting it all around between the plates C, and F, as herein described.

Second. The adjustable bearing or guide, for setting the shaft H, vertical, consisting of the box M, blocks N, N, N, N, and the screws n, n, n, n, constructed and arranged as herein set forth.

Third. The circular revolving winged and slotted drum E, in combination with the scouring plates C, and F, in the manner, substantially as described, producing a current of air for carrying off the smut, dirt, and other foreign matter.

SAMUEL S. GOULDTHRITE.
CYRUS D. GORDON.

No. 7397.—*Improvement in Machinery for making Copper Tubes.*

What I claim as my invention, and desire to secure by letters patent, is the employment of the horizontal heat retaining conducting tubes h, in combination with the grooved rollers r, arranged and operating in the manner and for the purpose herein set forth.

EDWARD HAMILTON.

No. 7398.—*Improvement in Machinery for making Four Sided Buckles.*

What we claim as our invention, and desire to secure by letters patent, are—

First. The combination of the vibrating carriage F, (in which is placed the die c,) the toggle levers or benders K, K, the gauge bars L, L, detacher, e, holders M, and N, and cutting lever O, the whole constructed and operating, substantially as herein described, by means of which a four sided buckle is formed.

Second. The combination of the sliding frame J, and the vibrating hook i, (fig. 10,) with the grooved die H, and the fly punch C′, the whole constructed and arranged, substantially as described.

Third. The combination of the vibrating jaws U, the cam P′, and levers V′, with the forming block and rod Q′, k', and sliding bar O′, the whole constructed, arranged, and acting, substantially as herein described.

ALAM NORTH.
OLIVER B. NORTH.
STEPHEN FRINK.

No. 7399.—*Improvement in Processes for Preserving Wood.*

Therefore, what I claim as my invention or improvement, is the combination of the processes of immersion, absorption, exhaustion, pressure and decomposition, substantially in the manner and for the purpose herein before explained.

CHAS. PAYNE.

No. 7400.—*Improvement in Fanning Mills.*

What I claim as my invention, and desire to secure by letters patent, is the employment of the racks A, perforated gauge plates H; hooks (i,) and confining rodes I, in combination with the shoe (s,) for confining and adjusting the riddles D, D, and screen G, in the shoe, in the manner described. I also claim the arrangement of the vibrating longitudinal inclined conducting trough T, in combination with the transverse inclined conducting trough Q, attached to the vibrating shoe, for receiving the cleansed grain from the screen and conducting it directly into the measure or bag, as described.

JESSE ROBERTS.

No. 7401.—*Improvement in Water Backs for Cooking Ranges.*

What we claim as our invention, and desire to secure by letters patent, is casting the induction and eduction pipes of the hollow back of cooking ranges, each with a convergence towards the other, when the lines of the inside of the top and bottom of the hollow back converge with the same angle, and coincide respectively with the lines of the induction and eduction pipes, for the purpose and in the manner described.

We also claim constructing the hollow back itself, with the lines of the inside of the top and bottom converging towards each other, for the purpose of preventing the accumulation of air, and securing a ready flow of water, as described.

H. H. STIMPSON.
FRED. H. STIMPSON.

No. 7402.—*Improvement in Tailors' Measures.*

What I claim as my invention, is the instrument as above represented at fig. 3, for ascertaining the slope of the shoulder, also the instrument represented at fig. 2, for ascertaining the measure from the socket bone to a line perpendicular to the most prominent parts of the back, substantially as scribed, and for the purposes set forth in the specification.

AMOS STOCKER.

No. 7403.—*Improvements in the Preparation of Pile for Rugs, &c.*

What I claim, is the herein before described mode or process of combini or arranging together, and in the pile, the threads or yarns composing the fi ure or figures, the same consisting in winding the said threads on a beam roller, by the aid of a collar, pattern and index, and other contrivances, e sentially as specified, and cutting the said threads and transferring them, and by means of the roller, to the pile in the machine, in which they are con pressed, cemented and cut, all as herein before explained.

JAS. TAYLOR.

No. 7404.—*Improvement in Sofa Bedsteads.*

What I claim as new therein, and desire to secure by letters patent, is—

First. The drawer with castors, made so as to serve the double purpose o a receptacle for the bed clothes, and a support for the back, as described.

Second. I claim the sliding head and foot boards, so connected with th back that they slide in or out as the back is raised or lowered by the contri vances as above described, or other equivalent devices.

A. G. WARREN.

No. 7405.—*Improvement in Fanning Mills.*

What I claim as my invention, and desire to secure by letters patent, is— my improved construction and arrangement for shaking and operating the sieves in a winnowing mill, in the manner herein described.

JOHN WIEDMAN.

No. 7406.—*Improvement in Electro Chemical Telegraphs.*

What we claim, and desire to have secured to us by letters patent, is recording telegraphic signs on the surface of a revolving metallic cylinder, plate, or other equivalent surface, by means of an acidulated liquid, or saline solution, or water, held between the point of the wire conductor, and the metallic recording surface, by means of a non-conducting porous substance contained in a glass, or other non-conducting reservoir, in which the recording fluid is contained, to which the electric current from a battery is applied, by means of any of the known forms of manipulators and anvils used for making and breaking the circuit, the recording fluid being applied to the metallic recording surface, substantially in the manner herein fully set forth, by which the use of every description of paper is dispensed with, thereby saving great expense in telegraphing.

C. WESTBROOK.
HENRY J. ROGERS.

No. 7407.—*Improvements in Machines for Shearing Cloth.*

What I claim as my invention, and desire to have secured to me by letters patent, is—First. A flexible rest constructed substantially as herein above described.

Second. Making the rest susceptible of extension on each or either end, by combining with the ordinary stationary rest, and on each side thereof, a flexible and moveable rest, as herein above specified.

Lastly. I claim making an extension or flexible and moveable rest, self-ope ing, or so as to be changed by the cloth itself, in its passage through the achine, all as herein above set forth.

AMASA WOOLSON.

No. 7408.—*Improvement in Suspending Venetian Blinds.*

What I claim as my invention, and desire to secure by letters patent, is— e combination of pulleys *e*, *f*, and *g*, with cords *i*, *i*, for the independent ovement of the supporting slat *d*, *d*, in the manner and for the purpose de ribed.

JOSEPH BOHRER.

No. 7409.—*Improvement in Ventilating Railroad Cars.*

What we claim as our invention, and desire to secure by letters patent, is e method of ventilating the cars of a railroad train, and keeping out dust, noke and sparks, by combining therewith a tube made in sections, and uni d by flexible joints at the junctions of the cars, which tube receives a cur nt or currents of air forward, of the chimney of the locomotive, and dis harges it into the cars, through apertures, all substantially as herein described.

HEZEKIAH BRADFORD.
EPH'M MORRIS.

No. 7410.—*Improved Gun Harpoon.*

What I claim therein as new, and desire to secure by letters patent, is— ttaching the line to both the shank and the head of the harpoon, in such nanner that the extremity of the line is loaded with the harpoon into the gun, nd lays in recesses made in the shank, and when the gun is fired, the line vill trail from the butt of the shank, and will not tend to depress the head luring its flight.

ROBERT BROWN.

No. 7411.—*Improvement in Fire Place Grates.*

What I claim therein as new, and for which I desire to secure letters patent, s—First. The combination with the open fire place or grate, having the side draughts as described, of the air heating chambers, consisting of an air chamber surrounding the fire, and a projecting chamber above, surrounded by heat, ubstantially as above set forth.

Secondly. I claim dividing the draught of an open fire, and causing the products of combustion to be drawn off at each end of the fire, as herein de cribed. I also claim the sliding collar, at the exit pipe, in the manner and for the purposes specified.

GARDNER CHILSON.

No. 7412.—*Improved Method of making Shafts, &c., of Sheet Iron.*

What I claim as new therein, and which I desire to secure by letters patent, is the constructing of hollow plate iron shafts, of short cylinders, combine and connected together, in the manner and for the purposes above described.

CHARLES F. FISHER.

No. 7413.—*Improvement in Printing Presses.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The application of the toggle lever *x*, working on the stationary cam *y*, to raise the platen, in the manner and for the purpose herein describe

Secondly. I claim the combination of the toggle lever x, and toggle w, and v, with the stationary cam y, substantially in the manner and for the purpose herein set forth.

Thirdly. I claim the combination of the toggle lever x, and toggle w, and v, with the swing platen, as herein set forth.

Fourthly. I claim the combination of the spiral springs J, and the trip G, when used in combination with the swing platen, substantially in the manner and for the purpose herein described.

CHARLES W. HAWKS.

No. 7414.—*Improvement in Brick Presses.*

What I claim therein as new, and desire to secure by letters patent, is operating the roll (N,) for holding the mould box, the gate (P,) for regulating the discharge of clay, and the piston (E,) for compressing the clay into the moulds, by means of a wheel (J,) furnished with series of teeth (H, H′, H″,) secured to it, and acting through trundles, shafts, cranks, and connecting rods, connected with the roll (N,) the gate (P,) and the piston (E,) respectively, substantially as herein set forth.

JOHN W. HOPE.

No. 7415.—*Improvement in Gang Ploughs.*

What I claim as new, and desire to secure by letters patent, is the spur wheel (3,) so constructed and arranged within the periphery of the driving wheel, that it may be made at pleasure to pass its rowels through the holes or notches in the tire, into the surface of the ground when under compression, and thereby grapple and gain adhesion to the ground, substantially in the manner herein set forth.

Second. I also claim the combination of parallel bars (P, P′,) to regulate the breadth of each separate furrow, with the adjusting curve (a',) for determining the horizontal direction of the draught, so as to adapt the amount of work done by a single traverse of the engine, to the adhesive power of the wheels when applied to the particular kind of land under cultivation, substantially as herein set forth.

Third. I also claim preventing the choking of the plough, by means of the recurved point (E,) of the mould board, acting to turn aside and guide backwards the choking material, as herein set forth.

Fourth. I also claim the manner of connecting the harrow to the locomotive, so that the conductor may at pleasure, by turning a crank, reverse its advancing side for the purpose of freeing the harrow teeth from choking materials, in the manner, substantially as herein set forth.

J. D. HOPE.

No. 7416.—*Improvement in Board and Log Rules.*

What I claim as my invention, and desire to secure by letters patent, is the combination with the inner revolving plate of the rotary tape measure, of the several tables thereon, substantially as described.

CHARLES B. HUTCHINSON.

No. 7417.—*Improvement in Shuttle Motion of Looms.*

What I claim as my invention, and desire to secure by letters patent, is attaching the bat wing, by an adjustable connection to one extremity of a lever

ose outer extremity is connected by a short strap with the picker stick, the er turning on a single adjustable vertical pivot, and being interposed between wiper, operating as described, and the picker stick motion from the wiper ng transmitted through this lever, strap, and picker stick, to the driver, so to cause it to throw the shuttle with the proper degree of suddenness and ocity, when the loom is working at a high speed; this arrangement adting of the easy and quick graduation of the suddenness and velocity with ich the shuttle is thrown, as herein set forth.

OLIVER A. KELLY.

No. 7418.—*Improvement in Nursery Chairs.*

claim the improvement of the moveable back piece L, and its sustaining ures, in their application to the back and seat, substantially as specified, for the purpose of using the chair either as a cradle or as a lolling chair, stantially as specified, the said improvement consisting in so combining one he arms with the seat, by means of a slide adapted to such seat, that both arm and slide may be moved in a direction away from the other, or staary arm, so as not only to lengthen the seat so as to enable it to support a ttress or bed, disposed on it, but to render the arm a foot guard, for an int or child, placed on the said mattress or bed.

SAMUEL S. MAY.

No. 7419.—*Improvement in Flying Horses.*

What I claim as my invention, and desire to secure by letters patent of the ited States, is the combination and arrangement of the undulated cams with levers, and these with the flexible connections to the front part of the horses, the purpose of, and by which I produce the rising and falling motion, which erm the galloping motion, as herein before described and represented.

ELIPHALET S. SCRIPTURE.

No. 7420.—*Improvement in Electro Magnetic Machines for Shocks.*

What I claim therefore, as my invention, and desire to secure by letters ent, is separating the shock derived from the initial secondary current of double coil magneto electric machine, for that of the terminal secondary, causing the latter to pass through a closed circuit, substantially in the nner and for the purposes set forth. I also claim the manner of adapting the ne machine to transmit both the initial and terminal secondary currents at asure, by bearing off the spring (G,) by the arm L, substantially as deibed.

SAM'L B. SMITH.

No. 7421.—*Improvements in Carding and Mixing Wool and Cotton.*

What we claim as our invention, and desire to secure by letters patent, is picking and carding of the wool and the cotton, separate from each other, the drawing them off together from the second carding machine, and n mixing their fibres with each other, by means of the finishing or condeng card.

STEPHEN H. ADAMS.
JOHN A. WOOD.

No. 7422.—*Improvement in connecting Whiffletrees with Carriages.*

What I claim as of my own invention, and which I desire to secure by lets patent of the United States, is the stops or blocks (e, e,) cast upon or otherwise affixed to the box (*a*,) and the stops or blocks (*n*, *n*,) cast upon or affixed to the follower (*h*,) in such manner that when the two are joined by a central bolt passing through, they will interlock and form a stop coupling, secure from derangement from external causes, the whole being constructed, substantially as herein described.

JAMES BARNES.

No. 7423.—*Improvements in Hydraulic Apparatus for producing Blast.*

What I claim as my invention, and which I desire to secure by letters patent, is—

First. The use and application of boxes, tubs, or cavities, attached to wheels, disks, or arms, by moveable joints or journals, and then carried in a rotary direction alternately, through air and water; said boxes or cavities, moving at the same time on their own journals, in such a manner that they shall enter the water with their open sides downwards, and when beneath the same shall empty or discharge the air which has been compressed within them by the water, into a receiver which is separate from such wheels and air boxes; all for the purpose of producing a blast of air to be used in heating, smelting, and other mechanical operations.

Second. I also claim, for this purpose, the disk, recess or concavity of the wheel, so as to allow the receiver to project over the mouths of the air boxes, to receive their compressed air.

Third. I also claim for the same purpose, the cam D, the cranks J, J, J, and the cranks K, K, K, attached to the air boxes, together with the piece U, U, in the open side of the boxes, the mouth T, for discharging their compressed air and the block G, for throwing forward the cranks J, J, J.

RANSOM COOK.

No. 7424.—*Machine for Cutting Leather into Hollow Ware Forms.*

What we claim therein as new, and desire to secure by letters patent, is the combination of the vibrating knife with the fluted rollers, constructed and operating, substantially in the manner and for the purpose above fully set forth, one of which rollers being fluted longitudinally and the other circumferentially, serve firmly to hold the leather in any position.

DURAND & PECQUEUR.

No. 7425.—*Improved method of Forming Embankments, Levees, &c.*

What I claim as my invention, and desire to secure by letters patent, is the method herein described of depositing earth, to form embankments, levees, etc. and to fill up low situations by means of filtering dams or their equivalents, and a trough or conduit conveying earth and water from a higher level, substantially as herein specified.

DUFF GREEN.

No. 7426.—*Improvement in Adjusting Packing for Oil Boxes of Axles, &c.*

What I claim as new, and desire to secure by letters patent, is the employment of an adjustable band surrounding the oil packing of rail road cars or other journals, so as to admit of adjustment from the outside of the box, in adjusting the packing around the journal, and render the box oil tight in the manner and for the purpose, substantially the same as herein described and represented.

WARNER GROAT.

No. 7427.—*Improvements in Cars for Plank Roads, Wooden Rails, &c.*

What I claim as my improvement, is the combination of a chain of rollers with broad bearing surfaces running around a stationary rail or track, on the carriage with an independent chain, which forms a track for said rollers to travel over when resting on the ground, and which passes around outside of said chain of rollers.

I also claim the mode of constructing said track chain (*k*,) by lapping the links thereof, so that the rollers shall have a constant bearing on the three plates, which form two succeeding links, and break joint with each other, as clearly represented in fig. 2.

GIDEON MORGAN.

No. 7428.—*Improvement in Bedstead Fastenings.*

What I claim in the above described bedstead as new, and desire to secure by letters patent, is the device for securing the ends of the side rails to the posts, consisting of a headed tenon on the rail and two wedge-shaped and dovetailed boxes in the post, the latter held in place by the pendant arms and tie rods, by which the mattress is stretched, substantially as herein set forth.

CHAS. H. PARKER.

No. 7429.—*Improvement in Spring Mattresses.*

What I claim as my invention, and desire to secure by letters patent, is the construction of the jointed spring mattress, substantially as set forth in the specification.

WM. F. RESSEGINE.

No. 7430.—*Improvement in Thrashing Machines*

What I claim as my invention, and desire to secure by letters patent, is surrounding the twisted wings with an unperforated case, and placing the same inside the thrashing cylinder—the whole revolving together in the manner and for the purpose set forth.

Second. Constructing the concave of adjustive star or other shaped teeth attached to rods fastened to the frame, substantially as described and set forth in the specification.

I am aware that such teeth have been used in the throat of the feeding apparatus of a corn sheller to aid in feeding, and therefore, I only claim them when used for the rubbing surface of the concave.

Third. Placing the curved spring rack between the concave of adjustive teeth, and the vibrating separator, in the manner and for the purpose described.

ELISHA S. SNYDER.

No. 7431.—*Arrangement of Mirrors in Traps.*

What I claim therein as new, and desire to secure by letters patent, is the arrangement of the mirrors, substantially in the manner and for the purpose set forth.

JAMES STEVENS.

No. 7432.—*Improvement in Planes for Tonguing and Grooving, &c.*

What I claim as my invention, and desire to have secured to me by letters patent, in said apparatus, is the combination of a gouge or gouges (for removing the bulk or greater portion of a shaving in forming tongues or grooves, in boards or planks) with smoothing tools having a chisel edge, a cutting and side lip on either, or both sides thereof, (for smoothing the sides and bottom of the grooves, and the edges about the tongues as set forth,) said gouges being set in front of said smoothing tools, and the whole being arranged and operating, substantially as herein above set forth.

JAMES A. WOODBURY.

No. 7433.—*Improvement in Machines for Finishing Morocco.*

What we claim as our invention, and desire to secure by letters patent, is—

First. A sliding head with finishing tools (one or more) attached, said tools to be held down by weight or springs; said sliding head to do its work while in a backward or forward motion, and running on straight ways, as herein set forth.

Secondly. We claim as our invention, the application of one or more clasps (G, G,) for the purposes described in the specification, in combination with one or more finishing tools, whose motions are parallel with said clasps.

We also claim the application of one or more finishing tools which are held stationary while rubbing the skin or paper, and allowed to revolve a little when required to equalize the wear on the peripheries of the same.

EDWARD BOOKHOUT.
HENRY COCHEN, Jr.

No. 7434.—*Improvement in Spring Teeth of Hay Rakes.*

What I claim as my invention, and desire to secure by letters patent, is the construction of the spring teeth of the hay rake of a double wire, in place of the single one generally used, as described in the specification.

ZEPHANIAH BREED.

No. 7435.—*Improvement in Attaching Neck Yokes to Poles of Carriages.*

What I claim as my invention, and desire to secure by letters patent, is the mode herein described of constructing the neck yoke, (either solid or divided,) and fitting the tongue or pole of the carriage, and these so constructed and fitted, in combination with the moveable band on which are projections, as in fig. 3, or knobs, by which means the whole are securely connected, and thus form a universal joint for the purpose stated, and not otherwise.

JAMES M. BROWN.

No. 7436.—*Improvement in Parlor Stoves.*

What I claim therein as new, and for which I desire to secure letters patent, is the arrangement of the flues in combination with the fire chamber, substantially in the manner and for the purposes set forth.

GARDNER CHILSON.

No. 7437.—*Improved method of making Nails by Rolling.*

What I claim as new therein, and which I desire to secure by letters patent, is the auxiliary furnace, in combination with the machinery for rolling nails, &c., as above described, for retaining the heat of the plates or rods of iron, while they are separately passed into the machine.

E. H. COLLIER.

No. 7438.—*Improvement in Machines for Dressing Stone.*

What I claim as my invention, and desire to secure by letters patent, is dressing stone by means of chilled cast-iron burrs, substantially as herein set forth.

ROBERT EASTMAN.

No. 7439.—*Improvement in Furnaces for Calcining Gypsum.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the pan or boiler with the three chambers, when they are combined with the beams, slides and dampers, when the whole is constructed, arranged and combined, so as to operate, substantially according to the method and to effect the purpose, substantially as herein described.

BENJ. FOWLER.

No. 7440.—*Improved Spike Machine.*

What I claim therein as new, and desire to secure by letters patent, is:

First. The rising and filling guide and cutter frame, in combination with a moving series of dies, whereby the spike rod is guided into the moving dies and a slip of proper length cut off to form the spike, the knives being operated by levers which force them towards each other whenever the movement of the frame brings the levers in contact with stationary arms projected from the main frame.

Secondly. The forked and hinged clamp (J,) constructed substantially as herein set forth, in such manner that when open its inner fork performs the office of a gauge, to regulate the length of the spike, and when closed, its outer fork gripes the shoulder of the spike during the heading, and its inner fork is withdrawn to allow the formation of the point.

Thirdly. The combination of the arm L, with the clamp J, and its tongue *m*, by means of which the heading, griping, and pointing of the spike are effected, substantially as herein described, at one operation.

AMMI M. GEORGE.

No. 7441.—*Improvement in Upright Piano Fortes.*

What I claim as my invention, and desire to have secured to me by letters patent, is—First. Combining with each of the standards *a*, *a*, *a*, *a*, of the frame, a sustaining and strengthening rod, arranged in a curved groove in the back of said standards, and operating substantially as herein described.

Second. I claim connecting the stem *s*, *s*, to the rocker bar, fastened to the key lever, as described, and also to the horizontal arm *t*, *t*, on which the jack, &c. is supported, by which the whole action becomes attached to the key lever, and the hammer is made to return when the end of the key lever descends, all as herein above set forth.

I also claim combining the back catch with the fly of the jack, as above set forth, and in combination with a jack and back catch, so arranged, the curved arm *l'*, *l'*, projecting from the hammer stem, and having a regulating button *m*,' connected to said arm, as above set forth.

Lastly. I claim regulating the throwing off the hammer from the strings by the projection O', from the centre block of the hammer, and below its centre of action, in combination with a regulating button passing through the fly of the jack.

LEMUEL GILBERT.

No. 7442.—*Improvement in Apparatus for Raising the Grate in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the apparatus for lowering and raising the grate, so constructed as to act without liability to obstruction from the baking of ashes between the parts of machinery, having sliding pieces or racks, furnished with perforations instead of cogs, in combination with pinions acting upon them by cogs, said pinions having the spaces between the cogs beveled, bringing them to a kind of edge, thus admitting no flat spaces to intervene where ashes may accumulate to prevent the working of the machinery.

BENJ. K. MALTBY.

No. 7443.—*Devices for Moving and Holding a Piston Breech Pin.*

I claim as new, and of my own invention, and desire to secure by letters patent of the United States, the arrangement of the parts described and shown, in which arrangement the radius bar *a*, is connected to the rear end of the sliding breech pin *c*, by a tenon 10, and slot 9, taking a pin 8, on the jaws 6, at the rear end of the breech pin, for the purposes of holding the breech pin in place while the charge is exploded, removing the breech pin to receive successive charges, and forcing the charge into the barrel by replacing the breech pin for the next successive discharges; the whole constructed, arranged, and acting substantially as described and shown.

WM. W. MARSTON.

No. 7444.—*Improvement in Safety Stirrups.*

What I claim as my invention, and desire to secure by letters patent, is the safety bar A, and the spring H, arranged in the form set forth, or in any other form, substantially the same in principle.

Second. The arrangement of the loop cap, by which I place the stirrup bars S, S, at right angles with the stirrup strap.

Third. The flat bar U, rising from the top of the loop V, to prevent the rolling of the stirrup in the strap.

NATHAN POST.

No. 7445.—*Improvement in Feed Apparatus for Mills.*

What we claim as new therein, and desire to secure by letters patent, is the feeding apparatus, as above described, for keeping a regular supply constantly fed to the grinding surfaces.

JOHN SHERLOCK.
WM. BRACKBILL.

No. 7446.—*Improvement in Apparatus for Parti-coloring Yarn.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of parti-coloring yarns by winding them on reels arranged in frames, so constructed as to admit of immersing in dying liquor, such portions of the yarns as are desired to be dyed, and shifting the same for dying other parts in like manner, substantially as described.

And I also claim connecting one or both of the reels in each frame, by means of slides, to admit of removing the reel from contact with the yarns, whilst in the process of dying, substantially as specified.

ALEXANDER SMITH.

No. 7447.—*Improvement in Mills for Grinding.*

What I claim as my invention, and desire to secure by letters patent, is the combination of crushing rollers with a disintegrating apparatus, arranged and operating substantially in the manner and for the purpose, as herein set forth.

J. R. STAFFORD.

No. 7448.—*Combination of a Guide Tooth with an Inclined Scraper.*

What I claim therein as new, and for which I desire to secure letters patent, is the guiding tooth or revolving cutter, combined with the inclined scraper, substantially as above stated, for regulating the course of the machine.

JOHN F. WOOD.

No. 7449.—*Model for Vessels.*

What I claim as of my invention, and desire to secure by letters patent, is the forming a vessel with a scow shaped bow, having on its sides two wide keels running the whole, or a part of its entire length, and so constructed that a portion of the inclined surface of the bottom shall always be above the water at the bow, and this with or without the supplementary keels forming small channels, by which construction air enters at the bow, in the manner set forth, and is retained under the bottom of the vessel, for certain purposes described herein.

SOLOMON ANDREWS.

No. 7450.—*Improvement in Connecting and Disconnecting Hubs and Axles.*

What we claim as our invention, and desire to secure by letters patent, is the method herein described, of securely fastening the hub of a wheel to its axle, or easily detaching the same therefrom, to wit: by means of the two sliding plates B, B, combined with the double scroll shaped cam A, in such a manner that by turning the said cam, in one direction the sliding plates (B, B,) will fasten the axle journal within the hub so securely, that it cannot be unfastened by any jar or shock upon the wheel; and by turning the said cam in an opposite direction, the sliding plates (B, B,) will be detached from their hold upon the axle journal, and permit the wheel to be detached therefrom.

A. M. BILLINGS.
T. A. AMBROSE.

No. 7451.—*Improvement in Setting Artificial Teeth by Atmospheric Pressure.*

What I claim therein as new, and which I desire to secure by letters patent, is the air chamber (*e*,) constructed and arranged, substantially as herein above set forth, and for the purposes described.

JOHN A. CLEVELAND.

No. 7452.—*Improvement in Looms for Weaving Cut Pile Fabrics.*

What I claim as new and of my invention, is—

First. The use in power looms for weaving cut pile fabrics, of intersecting plates, entering between the two pieces of cloth, and allowing the pile warps to cross and recross, from one to the other, which extend through the reed, thereby forming on the upper surface a plane upon which one of the shuttles is supported, in passing through the web, substantially as described.

Second. The continuing of the intersecting plates to the outside of the warps, by adding the within described false reed, or otherwise, for the purpose of supporting the ends of the intersecting plates, and for guiding the warps by them, substantially as described.

MERTOUN C. BRYANT.

No. 7453.—*Improvement in Brick Presses.*

What we claim as our invention, and desire to secure by letters patent, is the method of preventing clay from adhering to the surfaces, which make pressure on it, or in which it is pressed or moulded, by the application of artificial heat to such surfaces, substantially as herein described.

And we also claim the method of elevating the followers of the moulds for discharging the bricks, by combining with the carriage of moulds, a platform or carriage, which slides on inclined ways, and which receives motion from a carriage of moulds, substantially in the manner and for the purpose specified.

THOMAS CULBERTSON.
GEORGE SCOTT.

No. 7454.—*Improvement in Atmospheric Churns.*

What I claim as my invention, and desire to secure by letters patent, is a hollow staff, connected with a square or round hollow plunger, with a valve placed at the top, or at any point inside of said staff, said valve to be so arranged, that when the said staff and plunger are raised, the valve will open; and when said staff and plunger are forced down, the valve will close, and the atmospheric air in the plunger will be forced through the body of the milk or cream, by which operation butter will be formed; said staff, dasher, and valve, to be used in any vessel containing milk or cream.

PETER F. ELLICOTT.

No. 7455.—*Improvement in Electric Telegraphs.*

What I claim as my invention, is the above described new, or improved electro-caustic telegraph, or application to telegraphic purposes, and substantially as specified, of heat generated by electric apparatus, or a current or currents of electricity, passed through a fine platinum wire or other proper conductors or equivalents therefor, as explained; the marks produced in or through the paper or other material, used in connection with the heated wire, being regulated in their length and number, so as to be characters or expressions of letters, figures, or words, indicative of any message which it may be desirable to transmit, from the battery end of the telegraph, to the other end of the line, all essentially as set forth, or in the manner generally understood by telegraphic operators.

G. H. HORN.

No. 7456.—*Machine for forming Washers and attaching them to Carpet Tacks.*

What I claim as my invention, and desire to have secured to me by letters patent, is the spring nippers *s, s, s, s*, arranged on a vibratory arm, and having a tapering bore, formed one half in each of said nippers, for guiding the point of the tack to the centre of the washer. Also the combination of said nippers with the circular die, and vertical moving punch, arranged and operating, as above set forth.

I also claim a machine for preparing carpet tacks, consisting of the parts above stated, in connection with an adjustable feeding motion, composed of the double endless bands, ratchet, and pawl, and parts which connect the same with the driving lever, as herein above set forth.

JASON G. HOWARD.

No. 7457.—*Improvement in the Hinge of Rolling Iron Shutters.*

What I claim therein as new, and desire to secure by letters patent, in constructing the hinges or joints of rolling iron shutters of thin slats of iron, is having a bar or wire inserted within the coiled edges of the joint or hinge, to give strength and stiffness to the joint, said bar having its ends bent, to prevent the several strips of iron composing the shutter, from sliding laterally on each other, and the projecting bent ends of the wire being curved by eaves projecting from the ends of the strips, and turned down, thus forming an even edge to the shutter, which will slide easily in the groove of the frame in which it is placed, the whole being constructed, substantially as herein described.

A. LIVINGSTON JOHNSON.

No. 7458.—*Improvement in producing Photographic Pictures upon Transparent Media.*

What we claim as our invention, and desire to secure by letters patent, is—

First. The taking of photographic pictures upon transparent media, by coating them with some suitable vehicle for the sensitive material, substantially as set forth.

Second. We claim the process of preparing and using the sensitive coating or film upon surfaces, whether of transparent, translucent, or opaque bodies, substantially in the manner and for the purposes set forth.

JOHN A. WHIPPLE.
WM. B. JONES.

No. 7459.—*Improvement in Cooking Stoves.*

What I claim, and desire to secure by letters patent, is the combination of the flues with a single damper (*e*,) so that by a single movement, I cause the hot air to traverse once or twice entirely round the oven at pleasure, substantially as described.

ABRAHAM KEAGY.

No. 7460.—*Improved Arrangement of Sash Stopper.*

What we claim as our invention, and desire to secure by letters patent, is placing the eccentric J, within the bar or stile of the window sash E, in such manner as to act upon a weather strip S, instead of against the frame or casing of the window; the former being thereby firmly pressed against the latter, and all defacement of the window frame by the eccentric avoided, as described.

NATHANIEL MYERS.
FRED. C. SMITH.

No. 7461.—*Improvement in Mounting the Knife of Straw Cutters.*

I claim of the above arrangement, the placing of the pivot N, of the knife upon a spring, for the purpose of enabling the operator to give the knife a draw or sliding cut.

JOHN R. NELSON.

No. 7462.—*Machine for Repairing Roads.*

What I claim as new in my invention, and desire to secure by letters patent, is hanging the cutters E, E, for cutting off the ridges at the sides of the ruts, the scrapers F, F, for scraping the dirt into the ruts, and the roller D, for pressing and smoothing the road, upon the same frame; all the said parts operating together, in the manner and for the purposes, substantially as herein set forth.

NATHANIEL POTTER.

No. 7463.—*Improvement in the Weed Cutters of a Cultivator.*

I claim the combination of the bar *a*, with the weed cutter *b*, in the manner and for the purpose set forth and represented.

CHARLES RODGER.

No. 7464.—*Improvement in Water Wheels for Increasing or Diminishing their Diameters.*

What I claim therein as new, and desire to secure by letters patent, is the double adjustable arm, constructed as above described, for expanding or contracting the size of the wheel, for the above specified purpose, so that the absolute diameter of the wheel and arms shall be reduced or expanded, to go within a suitable curve.

T. R. TIMBY.

No. 7465.—*Improvement in Self-acting Cheese Presses.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the rollers H, H, and K, K, and wedges I, I, in combination, with the inclined planes D, D, acting in the manner and for the purpose herein set forth in the foregoing specification, to produce a sufficient pressure upon the cheese, or other article to be pressed.

JOHN UNDERWOOD.

No. 7466.—*Improvement in Boot Trees.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the sliding wedges A, A, and the right and left screws B, B, with the inclined planes or grooves C, C, substantially in the manner and for the purpose above set forth, the screws B, B, being made to play within the groove D, and being confined to its place longitudinally, by the bar E, working in the groove H.

WILLIAM UPFIELD.

No. 7467.—*Improvement in Carriages.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the open elliptical axletree (*i, j*,) with the sliding slotted frame (*n*,) attached to the body of the vehicle, and passing through the upper half of the axletree, and attached to the upper leaf of the elliptical spring, placed inside of the axletree, the lower leaf of said spring being secured to the inner side of the lower half of the axletree, the several parts being arranged, and operating in the manner and for the purpose herein fully set forth.

MILES T. WATKINS.

No. 7468.—*Improvement in Waste Gates.*

What we claim as our invention, and desire to secure by letters patent, is a waste gate which is hung upon a vertical axis, the lower part of which is made wider one side of the axis than it is the other, the side which is narrowest towards the bottom of the gate, being sufficiently wider than the other towards the top, that the balance of the pressure of the water will change from one side of the axis to the other, and open and close the gate as the water rises and falls.

HIRAM TAN.
THOMAS P. HOW.

No. 7469.—*Improved Method of fitting the Bows of Vessels.*

What I claim as my invention, and desire to secure by letters patent, is making the rear edge of the cut water to project on each side of the stern, to form a recess on each side, substantially as described, in combination with the sheathing pieces which fill up such recesses, and which cover and protect the ends of the plankings, and which also admit of giving better lines for the passage of the bow of the ship or other vessel through the water, substantially as described.

BENJAMIN BARSTON

No. 7470.—*Improved Method of Distributing the air over the Heating and Cooling Surfaces of Air Engines.*

What I claim as of my own invention, and desire to secure by letters patent, is causing the air entering and leaving the cylinder, to pass over the heating and cooling surfaces in a thin stratum, by means of the plates (*i, i'*,) or their equivalents, substantially in the manner and for the purpose set forth.

ERNST BUCKUP.

No. 7471.—*Improved Sash Stopper.*

What I claim as my invention, and desire to secure by letters patent, is the triangular shaped double acting wedges or fasteners *f, f*, placed within recesses of corresponding shape, formed in the front or rear sides of the sash side bars (or in the side slats of a window frame,) acted upon by any kind of handles or levers, in such a manner that they will press the sashes inwards or outwards, in contradistinction to side ways, and thus retain them in any desired position, and render them air tight within the window frame.

CHARLES C. CAMERON.

No. 7472.—*Improvement in Straw Cutters.*

What I claim as my invention, and desire to secure by letters patent, is the method of feeding straw, fodder, and other substances, to a series of rotating cutters, by means of a continuous motion by a roller armed with pointed teeth, and hung in a swinging frame, substantially as described.

I also claim the method of cutting straw, fodder, and other like substances, by means of the cutting cylinder, provided with cutters, the outer faces of which, from the cutting edge, are curved or inclined in towards the axis, so as to admit of continuous feed, the blades of the cutters acting as gauge plates for the length of the cut, in combination with the feeding the straw, fodder, or other substance to be cut, by a continuous motion, substantially as set forth.

REUBEN DANIELS.

No. 7473.—*Improvement in the Feeders of a Straw Cutter.*

What I claim as my invention, is the guard piece S, in combination with the feed rollers, to carry the straw or other material to the cutters, as described.

JOHN E. ERB.

No. 7474.—*Improvements in Setting the Teeth on the Concave of a Clover Thrasher.*

What I claim and desire to secure by letters patent, is the right to use and manufacture machines for the purpose of thrashing and hulling clover and other seeds of a similar nature, having the teeth of the concave, or the stationary set of teeth so inserted in leather on a bed of cork, as to give them an elasticity sufficient to cause them to resume their original position when misplaced by the passage of any foreign substances which may be introduced by accident or otherwise into the machine.

JONATHAN HIBBS.

No. 7475.—*Improvement in the Cutters and Rakers of a Grain and Grass Harvester.*

What we claim as new, and desire to have secured to us by letters patent, is—

First. Making the pointed cutters N, concave on the faces towards each other, in the manner and for the purpose set forth, by which the cutters are rendered self-sharpening, and bending the upper plate over the back of the lower, or sliding cutter plate, and bringing the notched or turned edge against the lower plate, in the manner and for the purpose described.

Second. The arrangement of the stationary cyma reversa fingers P, in combination with the vibrating hook teeth or claws (*o*,) bands *c*, and the appendages for operating the same, by which the grain is collected into sheaves or gavels, before being discharged upon the ground.

Third. The combination of the hook teeth or claws *o*, rock shaft *m*, bent arm (*n*,) lever (*s*,) spring (*j*,) and revolving arm *l*, for arresting the grain whilst removing the gavel or sheaf from the cyma reversa fingers P, on to the ground, as described.

We likewise claim the combination of the pinion H, perch *p*, and axle F, the former working into the segment on the front axletree, for steering the forward part of the frame and cutters.

HENRY C. BEVINGTON.
HAZARD KNOWLES.

No. 7476.—*Improvement in Respiring Apparatus.*

What I claim as my invention, and desire to secure by letters patent, is the valve represented by figs. 2, 3, 4 made of any metallic substance, and a nose piece represented by fig. 5 and 6, having an air tight tube surrounding that part which is designed to fit about the nose to accommodate the features of any person, and the use of these together with a cylinder vessel, air chamber, or bag, for the purpose of enabling a person to breathe with perfect ease, air which has been condensed more or less in any such cylinder vessel, air chamber or bag, which is to be confined to the person of the wearer while the surrounding air is impure from any cause.

BENJ'N J. LANE.

No. 7477.—*Improvement in Collimating Levels.*

What I claim, and wish to secure by letters patent, is the mode, substantially as herein described, of forming a levelling instrument, by combining the spirit level with the collimator having a partial lens, viz: by means of a partial reflector so placed as to reflect both the cross wire and the spirit level bubble in such manner, that the image of the latter may be seen bisected by the image of the former when the instrument is horizontal, the image of the cross wire being at the same time seen in optical contact with the distant point, which marks the level with the observer's eye.

JOHN LOCKE.

No. 7478.—*Improved Re-immersing Amalgamator.*

What I claim as new, and desire to secure by letters patent, is the combination of the revolving basin, and its attached tubes, or spouts with the trough containing mercury, the tubes having sufficient length to force the issuing currents to the bottom of the mercury, or nearly so, and their discharging

orifices being above the surface of the mercury, which latter peculiarity causes the streams, as they pass and enter in succession, to force below the surface any particles of metal which may not have been amalgamated by the first immersion.

J. R. MILLER.

No. 7479.—*Improvement in the Seeding Apparatus of Seeding Planters.*

What I claim as my invention, and desire to secure by letters patent, is:

First. The employment of a reciprocating sliding gauge plate, when said plate is provided with oblique feed openings, in combination with openings in the grating plates of different obliquity and bottom of the hopper, for increasing or diminishing the quantity of seed to be sown while the machine is in motion, by adjusting the end of the connecting rod *m*, nearer to or farther from the fulcrum of the vibrating bar (*p*,) and thus increasing or diminishing the traverse or sliding movement of the gauge plate *j*.

Second. I also claim the combination of the hooked connecting rod (*m*,) arm (*l*,) vibrating plate (*p*,) provided with a series of holes (arranged in the arc of a circle scribed from the pivoted end of the rod *m*,) and undulatory cam *s*, with the reciprocatory sliding gauge plate (*j*,) by which the reciprocatory movement of the sliding gauge plate is regulated for the purpose of increasing or diminishing the feed or sowing of the seed.

LEWIS MOORE.

No. 7480.—*Improved Lock Bolt for Shutters.*

What I claim therein as new and of my invention, and desire to secure by letters patent, is the bolt, having a slot through which the key passes, which will admit the bolt to be moved back sufficiently far to prevent the spring catches from catching in the notches in the bolt, in combination with a key hole in the guard, which renders it necessary to remove the key before the shutters can be opened, substantially in the manner and for the purpose set forth.

JOSEPH NOCK.

No. 7481.—*Improved arrangement of Cutters in a Grain and Grass Harvester.*

Having thus fully described the nature of my improvements in mowing and reaping machines, what I claim therein as new and original, and desire to secure by letters patent, is the arrangement, substantially as herein described and represented, of cutters bolted to an endless belt *s*, revolving in a vertical orbit, and moving on a rail *m*, guarded and disposed after the manner described.

JACOB PIERSON.

No. 7482.—*Improvement in Machines for cutting Lozenges.*

What I claim, and desire to have secured to me by letters patent, is the adjustive spring fingers *g*, connected to the two wheeled car *i*, *j*, *k*, *l*, said car being appended to the axle *b*, of the revolving cutters, the wheels and the screws that fasten the finger plate to the transverse bar, preventing the finger plate from touching the sheet of paste during the operation of cutting the lozenges therefrom, as herein fully set forth.

JOHN W. PEPPER.

No. 7483.—*Improvement in the construction of Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is making the fire bottom, and front hearth, or summer arrangement, of the class of stoves herein specified, in one piece, connecting the two with inclined plates placed within the front plate of the stove, substantially as described, whereby I am enabled to have the hearth below the level of the fire bottom, whilst the inclination given to the connecting parts are not visible, thereby effecting the purposes herein specified.

I also claim the above method of making the hearth and fire bottom, in combination with the method of connecting them with the oven bottom and stove bottom, by means of tongues and grooves, whilst the fire bottom extends under the fire back, substantially in the manner and for the purpose specified.

And I also claim, in combination with the above described method of making the hearth and fire bottom, the extension of the front stove plate, down in front of the parts which unite the hearth and fire bottom, the said front stove plate, being provided with projecting pieces to rest against the inclined joints to aid in securing in place, the said united hearth and fire bottom, substantially as described.

S. H. RANSOM.

No. 7484.—*Improvement in Safety Tubes for Lamps.*

What I claim as my invention, and desire to secure by letters patent, is the application or addition of inner pipe or pipes, (one or more, as the case may be,) inserted into a piece of metal or other material, as before described, being either stationary or revolving, thereby preventing the top of the lamp from being removed, without drawing it over the inner pipe or pipes, and thus extinguishing the flame.

FRANKLIN STEWART, M. D.

No. 7485.—*Improvement in Machines for Cutting Felloes.*

What we claim as our invention, and desire to secure by letters patent, is the causing the shaft E, of the cutter head, to automatically descend during its forward motion, until the felloe has been formed by the cutters in the cutter head, and then be thrown upwards to its starting position, substantially in the manner herein set forth, to wit: by resting the said shaft E, upon the moveable bar L, which bar is forced upwards by a spring or weight, and has a rack *k*, and a pin *l*, connected to its moveable end; the said rack *k*, being connected with, and caused to descend, by the forward movement of the cutter head shaft, through the medium of the band *v*, the shaft *f*, and the pinions *h*, and *i*, on the shaft *g*, which movements are thrown out of gear with the rack *k*, at the proper time, by the pin *l*, and the spring *s*, which act upon the levers N, and M, and the shaft *g*, substantially as herein represented and described.

JOSEPH ADAMS.
LEVI ADAMS.

No. 7486.—*Improvement in Condensers of Steam Engines.*

What I claim, and desire to secure by letters patent, is combining with a tubular condenser, the receiving and heating reservoir, which is connected at or near its top, with the exhaust passage, and with one end of the series of condensing tubes, and at or near its bottom with the other end of the series of tubes, and with exhausting and feeding pump, the whole constructed, substantially in the manner and serving the purposes herein specified.

ETHAN BALDWIN.

No. 7487.—*Improvement in Lath Cutting Machines.*

What I claim therein as new, and of my invention, and desire to secure by

letters patent, is the arrangement of the lever N1, in combination with the quadrant Y, rack X, pinion Z, ratchet G1, screw T, and wheel P, thereby moving the periphery of the log being cut, an equal distance at each stroke of the knives, (the log being moved by the chuck Q, instead of applying the power to the periphery of the log,) by which arrangement I can cut laths from square logs, substantially in the manner and for the purposes set forth.

WM. BULLOCK.

No. 7488.—*Improvement in Quilting Frames.*

What I claim as my invention, and desire to secure by letters patent, is the adjustable quilting frame, constructed in the manner herein described, whereby the strained surface of the quilt can be placed in an inclined position, and at any convenient height, thus enabling the quilter to preserve an erect position of the head and chest while at work.

C. H. COOK.

No. 7489.—*Improvement in Apparatus for Cutting Dried Beef.*

First. What I claim as my invention, and desire to secure by letters patent, is the combination of the knives E, and F, F, forming an angle to each other, as described.

Second. I claim the combination of the bed B, with the other parts, to graduate the thickness of the shavings, as described.

DANIEL W. GOBLE.

No. 7490.—*Improvement in Spiral Churn Dashers.*

What we claim as our invention, and desire to secure by letters patent, is the application of a re-acting spiral revolving dash, (the wings of which may be constructed of wood or tin, or any other suitable material,) to a box churn, as described and set forth in the above specification and accompanying drawings, or to any of the usual forms of churns, to which it may be attached, to good advantage.

CORNELIUS R. HIGHT.
JOHN HIGHT.

No. 7491.—*Improvement in Carts for spreading Manure.*

What I claim and desire to secure by letters patent, is the combination of the box B, bottom D, rollers C, cylinder E, cog wheels F, and A, lever G, arranged and operated, substantially in the manner herein described.

J. K. HOLLAND.

No. 7492.—*Improvement in Lamp Tubes.*

What I claim as of my own invention, and desire to secure by letters patent, is the combination of the two conical tubes, as shown, for forming a regulator for the flame of a lamp, substantially as described.

ISAIAH JENNINGS.

No. 7493.—*Improvement in Revolving Hammer Fire Arms.*

What I claim as my invention, and desire to secure by letters patent, are as follows:—First. A central hammer, to be shifted from some convenient position, so as to bear on the central cone, and to be driven by the usual operations of the lock.

Second. A revolving carriage, to carry and turn the hammer.

Third. A trigger turning on a pivot in the cocking lever, and which is thrown forward into a position convenient to be drawn, by pulling said cocking lever, the whole to be substantially as herein described.

GEORGE LEONARD, Jr.

No. 7494.—*Improvement in Sounding Boards for Pianos.*

What I claim therein as my invention, and desire to secure by letters patent, is the supporting the bridge (C,) upon a thin base piece (B,) secured over an opening formed in the ordinary sounding board (A″) substantially in the manner and for the purposes herein set forth.

CONRAD MEYER.

No. 7495.—*Improvement in Seeding Apparatus of Seed Planters.*

What we claim as new, and desire to have secured to us by letters patent, is constructing the tubular drill tooth with a hook shaped arm, in the manner and for the purpose herein set forth, by which the drill tooth is braced laterally whilst in operation, and hooked to the axle when not in operation, and by which the angle of the drill tooth may be changed at pleasure, by changing the position of the wooden pin in said arms, and by which the drill tooth may be folded towards the drag bar in backing the machine, or turning short round, whilst the drill tooth is in the ground, without breaking the wooden pin, said wooden pin resting upon the top of the drag bar, instead of passing through it, as herein fully set forth.

We also claim the spiral or any other form of spring, in such combination with the hopper, grate and seeding cylinder, or the distributing apparatus, as will make the said cylinder and grate, and hopper, self-adjustant, each to each, and to the others in case there should be a want of evenness or uniformity upon the surface of the seeding cylinder or distributing apparatus, for the purpose and in the manner above set forth.

SAMUEL PENNOCK.
MORTON PENNOCK.

No. 7496.—*Improvements in Chargers attached to Fire Arms.*

What we claim, is the revolving ball magazine, in connection with the revolving cylinder.

ORVILLE B. PERCIVAL.
ASA SMITH.

No. 7497.—*Improvement in Machinery for Measuring Pulp in the Manufacture of Paper.*

I claim, in combination with the measuring vessel herein described, the adjustable lid D, constructed with an opening in it, communicating with the pulp chamber in the cylinder, and with the atmosphere, through the small cylindrical chamber E, and the pipe F, the communication being closed and opened by the ball, in the manner substantially as described, for the purposes set forth.

HENRY POHL.

No. 7498.—*Improvement in the Boilers and Gearing of Locomotive Engines, for working Heavy Grades.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of operating the two horizontal

auxiliary driving wheels of locomotive steam engines, by connection with the auxiliary engine, when this is combined with the connection of the piston rods of the two auxiliary engines, with a crank shaft, having the cranks thereon at right angles, substantially as described, whereby the engines are made to alternate in their action, as specified.

I also claim the method, substantially as described, of establishing a connection between the dome and the forward end of the boiler, when this is combined with the extending of the flue tubes to the top of the boiler, as described, whereby the boiler is adapted to heavy grades, as described.

I also claim, in combination with the water ways surrounding the fire chamber, the water channel at the bottom of the boiler, as described, whereby a circulation of the water is established between the two ends of the boiler.

GEO. ESCOL SELLERS.

No. 7499.—*Improvement in Machines for Cutting Screws.*

What I claim, therefore, as my invention, and desire to secure by letters patent, is, substantially as herein described, of determining the pitch of the threads of wood screws by means of a leader, the threads of which are alternately engaged and disengaged from the teeth of a comb on a sliding bar, when this is combined with a relief and return cam, which, at the end of each threading motion, pushes the comb forward to relieve the leader before it is disengaged from the teeth of the comb, and then eases off the return motion of the comb bar, substantially as described.

THOS. J. SLOAN.

No. 7500.—*Improvement in Store Counters.*

I claim the construction of a store counter made in two parts, in the manner described; for the purpose of varying the capacity within, and at the same time to give better security in case of burglary, and aid transportation in case of fires, as herein set forth.

EVAN C. THOMAS.

No. 7501.—*Improvements in Joints for Compasses for Measuring.*

What I claim as new therein, and which I desire to secure by letters patent, is a compass joint, formed of two surfaces held together by centre screws, passing through a cap piece, substantially as herein described.

THEODORE ALTENEDER.

No. 7502.—*Improved Machinery for Double Folding Wide Cloth.*

What I claim as my invention, and desire to secure by letters patent, is the use and application of the rigid prong or extension piece A, to act upon the middle of the piece of the cloth in the process of folding it, in connection with the winding rollers C, D, to secure the exact double folding of the cloth, as above described.

ZACHARIAH ALLEN.

No. 7503.—*Improvement in Self-Weighing Machines for Grain, &c.*

What I claim therein as new, and which I desire to secure by letters patent, is the combination of a steel yard with a weighing box, having several compartments which receive the grain alternately, and when a certain quantity has been received the full compartment is discharged, being disengaged by the depressed position of the steel yard; at the same time, another compartment is presented for filling; the apparatus being operated by the weight of the grain itself, so as to form an automatic weighing machine, by which, with the aid of a register or index the amount weighed is ascertained, substantially as above set forth.

W. W. W. H. T. BRAMBLE.

No. 7504.—*Improvement in Horse Powers.*

What I claim, and desire to secure by letters patent, is the eccentric pivot, which by being turned round allows the entire wheel to be withdrawn from the pinion, and when raised by the lever (t,) the wheel can be tilted up for the purpose of taking the horses in or out, substantially as set forth.

JAS. L. CATHCART.

No. 7505.—*Improvement in Hill Side Ploughs*

What I claim, is the combination of the adjustments of the hooked bar r, with those of the main brace K, whereby the pitch of the mould board may not only be increased or diminished; but the proper support of the upper part of the plough share, be maintained under any angle of pitch, all as specified. The same also admits of a change of the mould board, viz: the substitution of one larger or smaller.

I also claim the above described peculiar construction of the sword cutter with its groove, to receive the sharp edge of the land side, in combination with the notch in the land side of the share for receiving its lower end, and the notch or shoulder in the upper part of the sheath for receiving its upper end, substantially as specified.

MARK S. CHASE.

No. 7506.—*Improvement in Steam Boilers.*

What I claim as my invention, and desire to secure by letters patent, is:

First. Arranging a series of bent water tubes within the flue space of a boiler, and connected at each end with the body of water in the boiler, substantially as herein described, by means of which the circulation of water is greatly increased, and the injurious effects due to expansion and contraction avoided, substantially as described.

Second. I also claim surrounding the crown sheet to which the ends of circulating tubes or their equivalents are attached with a rim, substantially as and for the purpose specified.

Third. I also claim extending the ends of the tubes, or the equivalent thereof, above the crown plate or roof of the fire-box, or any other plate or plates, one side of which is fire surface, to which they are attached when the other or lower end communicates with a water space or spaces below or beyond the plate to which the upper ends are attached, substantially as, and for the purpose specified.

I am aware that a patent was granted to Richard Prosser, in England, February, 1839. See Newton Journal, vol. 15, conjoined series, page 271, in which are represented circulating tubes with one end projecting above a plate. I do not claim such an arrangement, believing that described by me to be substantially different, and producing an entirely different effect.

Fourth and lastly. I claim giving a forced circulation to the water through the boiler or generator by mechanical means, substantially as, and for the purpose specified.

F. F. DIMPFEL.

No. 7507.—*Improvement in Spring Saddles.*

I claim the springs g, g, or springs of any other form producing the same effect, placed between the moveable seat B, and the body of the saddle A, in such a manner as to be easily taken out and changed, as herein described.

GEORGE FISHER.

No. 7508.—*Improvement in Spike Machines.*

What I claim as my invention and improvement, and desire to secure by letters patent, is the method of imparting to the header D, a compound motion for first bending the end of the spike downward, and then moving it forward against the die, to form the hook end simultaneously with the operation of rolling the opposite end to the form of a wedge, with a roller of the same width of periphery, as the thickness of the spike, the said header being fixed to the end of a turning shaft E, passed through the lever H, and inserted into a segmental cogged or toothed plate F, made to match into a fixed segment rack G, by which the angle of the header is changed to correspond with the required form of the head of the spike, as the lever H, is vibrated by the motion of the cam shaft M, and the roller U, being moved in the arc of a circle as it rotates on its own axis, by being attached to the short arm of the bent lever T, whose long arm is attached to a wrist of the wheel or plate W^2, on the cam shaft M, as herein fully set forth.

MOORE HARDAWAY.

No. 7509.—*Improvements in Knitting Machines.*

What I claim as my invention, and desire to secure by letters patent, is:

First. The projecting and withdrawing the needles separately and singly, with their arrangement as described, by which I am enabled to knit closer work with stouter needles, substantially as described.

And secondly. In combination therewith, I claim the combination of the jack, the sinkers and depressers, substantially as described.

Thirdly. I claim the thread bearer (V,) having an extended sideway motion to and fro at each stitch, by which it lays the thread across the needle at each stitch, and returns with it to be ready for the next stitch.

Fourthly. I claim the spring vice for regulating the supply of thread to the needle opened by the rod (w,) substantially as described.

Fifthly. I claim the particular arrangement and combination of the several parts of the machine, by which their various motions are derived from a single crank and screw thread, substantially as described.

JOSEPH HOLLEN.

No. 7510.—*Improvement in Surveyors' Compasses.*

What I claim as my invention, and wish to secure by letters patent, is the application of the partial lens, or lens of reduced size, by means of which to view a cross-wire or a sight mark in optical contact with the object aimed at, either in the compass in gunnery, or for any other purpose requiring and using a sight, in the manner herein described, or any other, substantially the same, and which will produce the intended effect; especially do I claim also, the arrangement by which my compass sight is made susceptible of having either end used as the eye piece, and by which back and forward sights can be taken without disturbing the instrument.

I claim also, the convenient model of the compass to be used with the sight here described, viz: with a super imposed plate, and with the sight planted and supported upon it, and with the opposite readings at such places as are required, in order to obtain indirectly the reading of the occasionally concealed end of the needle, as in fig. 6 and 7.

JOHN LOCKE.

No. 7511.—*Improvement in Sizing Compounds for Warps or Yarns.*

What I claim, consists first, in the combination of the same, and the composition of animal tallow, oil, and caoutchouc, in or about, in the proportions specified, and for the purpose described. I also claim the combination of alcohol, with the composition of resinous alkaline, and other matters as specified, and for the purposes as above stated. WILLIAM MALLERD.

No. 7512.—*Improvement in Machines for cutting Veneers, &c.*

What I claim as my invention, and desire to secure by letters patent, is the application to machines for cutting veneers and thin boards, of a sliding carriage, (or gate,) with knife and spring, substantially in manner and for the purpose herein described.

C. POPPENHUSEN.

No. 7513.—*Improvement in the Seeding Apparatus of Seed Planters.*

What I claim as my invention, and desire to have secured to me by letters patent, is—

First. The combination and arrangement of the segmental plates h, or valves secured together by circular rings and heads i, i, and arranged over the circumference of the cylinder c, adjacent to the opening therein, with the rotating cylinder, constructed as described, for the purpose of partially or entirely closing the openings in the cylinder, through which the seed passes to the depositing tubes, and thus regulate or check the discharge of the seed, as described and shown in the drawings.

Second. The arrangement and combination of the elliptical spring (p,) rising and falling beam (n,) pivoted beam (m,) and hand lever (f,) with the depositing tubes and drill teeth, by which all the depositing tubes and drill teeth may be raised and lowered simultaneously as described, without stopping the planting.

Third. The arrangement of segmental shields or covers (w,) on either side of the upper portion of the rotating cylinder (c,) in combination with the intermediate semicircular spouts or gutters x, beneath the cylinder, by which any waste of the seed is prevented, during the rotation of the cylinder or its discharge from the openings before passing the segmental shields or covers, as described. GEORGE ROHR.

No. 7514.—*Improvement in feeding Apparatus for Straw Cutters.*

What I claim as new, and of my invention, and desire to secure by letters patent, is attaching the feed hand to the reciprocating knife gate, below the bottom of the feed trough, when said bottom is made with an opening next the knife, in which the feed hand operates, and through which all extraneous and hard substances descend before reaching the knife, so that whilst the said feed hand acts on the hay or straw, or whatever is to be cut, at its most compact part, it at the same time offers no obstruction to the insertion of the straw, as it stands entirely out of the way, and leaves the top open and free, the opening in the bottom of the trough serving to rid the hay or straw, or corn stalks, or sticks, stones and other objectionable substances which would tend to injure the knives.

DAVID STILES, Jr.

No. 7515.—*Improved Apparatus for regulating the contraction of Car Wheels.*

What I claim as my invention and improvement, and desire to secure by letters patent, is the combination of the apparatus for discharging the cooling fluid, centripetally against the outside surface of the hub, when constructed in the manner herein set forth, with the apparatus for letting the sand descend from around the hub and retaining it over and about the arms and rim, as described.

I likewise claim the combination of the bed plate, made with the curved conductor and slide, to confine and discharge the sand with the circular iron ring which forms and chills the tread of the wheel.

SAMUEL PRESCOTT.

No. 7516.—*Improved Steering Apparatus.*

What I claim as new in my invention, and desire to secure by letters patent, is operating or turning the rudder, by means of the socket C, so guided that it can be moved only in the direction of its length, and having helical threads or grooves fitting to corresponding grooves or threads on the head of the rudder post, and being moved in either direction, in the line of the axis of the rudder post, by means of a screw D, attached to and operated by the steering wheel, substantially in the manner herein described.

C. F. BROWN.

No. 7517.—*Improvement in Truss-Pads.*

What I claim as my invention, and desire to secure by letters patent, is the formation of the pads for trusses, braces, supporters, &c., as above described, to wit: made of shape in the boundary seen at figs. 5 and 6, (a rounded obtuse angle,) and the padding made somewhat hollow and fullest on the sides A, A, A, as seen in figs. 1, 3, and 4, adapted to bear under and outwards of the fulness of the abdomen, making a plano-concave pad, whether single or double, (the latter seen in figs. 7, 8, 9, 10.)

FRED'K M. BUTLER.

No. 7518.—*Improvement in fastening the Shoes of Hill-side Ploughs.*

What I claim therein as new, and desire to secure by letters patent, is the device for attaching and detaching the removable shoe, having the mould board hinged to it, and being fastened to the landside, substantially as herein set forth.

W. L. CHASE.

No. 7519.—*Improvements in the method of making Wrought Iron directly from the Ore.*

What I claim as my own invention, in the above process of making wrought iron direct from the ore, and desire to secure by letters patent, is deoxidising the ore, in a chamber which is so constructed and arranged, as to be heated by the waste heat, and at the same time prevent the product of combustion from coming directly in contact with the ore, (except during the time of charging,) and likewise permits the charge of deoxidised ore to descend upon the puddling floor or working bottom, without exposure to the atmospheric air, the whole substantially in the manner and by the use of apparatus, substantially such as herein described.

ALEXANDER DICKERSON.

No. 7520.—*Improvement in Machines for raking and binding Grain.*

What I claim therein as new, and desire to secure by lettters patent, is—

First. Gathering the grain and compressing it into a sheaf, substantially as herein set forth, by means of the rake and standards.

Second. Carrying the cord round the sheaf and holding the latter until the band is tied, by means of the curved lever h, and toothed arms g', substantially as herein described.

Third. The employment of the split thimble and sliding hook, to aid in tying the band.

Fourth. Alternating the rake to gather the grain and compress the sheaf, by means of the spring, strap, and drum, substantially as herein set forth.

Fifth. Bridging the space through which the bound sheaf drops, to support the grain while it is being gathered, substantially as herein set forth.

J. E. HEATH.

No. 7521.—*Improvement in the application of Electro-chemical Printing in colors for taking Ayes and Noes.*

What I claim as new therein, and for which I desire to secure letters patent, is—

First. The mode, substantially as herein described, of imprinting words, letters, figures, &c., upon paper or other fibrous substances, by placing the paper or other substance, either chemically prepared or not, as above set forth, between two surfaces of a metal which is not acted on by the substances employed, on one of which the letters or figures are raised by passing a current of galvanic electricity through the prepared material, substantially as above described.

Second. I claim passing the electric current between metallic surfaces, as above described, through damp paper, otherwise unprepared, and afterwards applying a chemical solution, by which the effect of the electricity becomes visible wherever it has passed through the paper, for the purposes above described, telegraphing, &c.

ALBERT N. HENDERSON.

No. 7522.—*Improvement in directing Water upon Water Wheels.*

I claim the adjustable vertical water mouths or openings, arranged in combination with the outer or longest edge of the buckets, as described, whereby the greatest effect is obtained.

MARCUS B. ASHLEY.

No. 7523.—*Improvement in Machinery for turning out Wooden Bowls.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the moveable frames B and C, with the reciprocating frame D, carrying the curved cutter arm M, connected, and operating as described; also the combination of the curved cutter arm M, with the reciprocating frame D, for the purpose described, and also the cutters N, the spurs O, and the guards P, constructed as described, and connected and fastened to the curved cutter arms M, in the manner and for the purpose, substantially as herein described.

ADDISON EVERETT.

No. 7524.—*Improvement in Stanchions for Cattle.*

What I claim as my improvement, and desire to secure by letters patent, is the arranging of the stanchions in a vibrating frame, to accommodate the position of the animal when lying down.

I also claim the stanchion, or fall piece g, in connection with the stay cords k, by which means it is brought to an upright position when closing the stanchion h, thereby preventing an animal taking the place which is occupied by the stanchion h, when open.

I further claim the catch and spring m, n, fig. 4, to hold the stanchions in an upright position, in combination with the rope o, for releasing the cattle from confinement, as herein specified.

G. W. HATCH.

No. 7525.—*Improvement in the Attachment of Prison Locks*

What I claim as my invention, is the combination of the shed e, and its recess or hole f, or their equivalents, with the side of the cell door opening, and the double hinged arm G, and lock, substantially in manner and for the purpose of preventing strain on the lock by pressure against the cell door by a prisoner or person within the cell, as above specified.

EDWARD KERSHAW.

No. 7526.—*Improvement in attaching Hooks and Eyes to Paper Cards.*

What I claim as my invention, is the indenting or impressing the cards or sheets of paper in such a manner as to retain the hooks and eyes in their proper places upon the card, until they can be fastened; in whatever manner they may be finally secured.

I claim nothing in regard to machinery for forming the indentations, nor for the spring, or whatever may be used in fastening, nor for the manner of applying it by gum or paste.

PETER KIRKHAM.

No. 7527.—*Improvement in Churn Dashers.*

What I claim as my invention, and desire to secure by letters patent, is the double concave, perforated, discoid churn dasher, as herein described and represented, and for the purposes set forth.

JOSEPH MARSH.

No. 7528.—*Improvement in Distilling Spirits of Turpentine.*

What I claim as my invention, and desire to secure by letters patent, is the process as described, for distilling turpentine, so that the spirits of turpentine are distilled, and the rosin saponified, ready for soap making at one operation.

CHARLES J. MEINICKE.

No. 7529.—*Improved Valve Gear for Steam Engines.*

What I claim as new, and desire to secure by letters patent, is the combination of the fixed cam E, with its frame and rods, and the adjustable cam I, with its frame and rods, to which latter are attached the traversing and oscillating bar n, having secured to one end of it the rod g, and at or near its centre, the rod H, which actuate respectively, the eduction and induction valves, substantially in the manner herein described, forming together a simple valve motion, and one which enables the engineer to regulate the degree of cut-off at will.

GEORGE B. MILNER.

No. 7530.—*Improvement in Rubbing and Polishing Stone.*

What I claim as my invention, and desire to secure by letters patent, is attaching the stone D, to be faced, to a chain *a*, one end of which is attached to a windlass *c*, by which it may be lengthened or shortened; the stone being left free, so as to be continually changing its position on the bed, during the operation of rubbing, by which an uniform and even wear is produced on the bed, and a true face given to the stone, in the manner substantially as described.

ADRIAN OLCOTT.

No. 7531.—*Improvement in Atmospheric Churns.*

What I claim as my invention, and desire to secure by letters patent, is the construction of the air tube *b, c, d, d*, in combination with the plungers and partition, as set forth, whereby the cream is thoroughly agitated, and intimately mixed with atmospheric air, by forcing it alternately to the opposite sides of the partition, through branches of the air tube, as herein set forth.

JOHN O. NEIL.

No. 7532.—*Jigger Windlass.*

I therefore claim as new, and desire to secure by letters patent of the United States—First. The application of the double acting pawls 3, 3, ratchet 4, disk *e*, socket *f*, and handspike *g*, with or without the winch-head D, whereby the power is applied to the horns *d, d*, to rotate them in either direction, as required, said application and arrangement being a combination of the double acting winch, as described in my patent of 29th May, 1849, and the cable lifting horns described in my patent of 21st March, 1848, heretofore referred to, whereby this combination of these two previously patented inventions effect new and useful purposes, not contemplated and not attainable by either of the inventions separately, substantially as described and shown.

CHARLES PERLEY.

No. 7533.—*Improvements in Apparatus for sizing and drying Cotton Batting.*

What I claim as my invention and improvement on all other modes of glazing cotton wadding, and desire to secure by letters patent, is—First. Doubling or turning the ragged and uneven edges of the bat of cotton, as it comes from the carding engine, and pressing them down to form a smooth selvage, as set forth, by means of the curved plates *a*, in combination with the cylinders *b, c*, as described, or other equivalent means.

Second. I claim heating and ironing the surface of the bat of cotton, previous to being glazed, for the purpose herein set forth, whether performed by the means herein described, or other equivalent means.

I likewise claim making the floating cylinder with check rings, or their equivalents, in the manner and for the purpose described.

I claim passing the bat through a space between the floating cylinder and compressive cylinder, and imparting the sizing to the bat of cotton without pressure, as described.

I claim making the drying chamber a double inclined plane, in combination with the chimney, constructed as aforesaid, for the purpose of increasing the circulation. I also claim the peculiar combination of the heating, selvaging, ironing, and glazing, and drying apparatus, by which the bat of cotton, as it comes from the carding engine, is selvaged, ironed, glazed, and steam dried by a continuous process, as herein fully set forth, the sizing vat being placed directly beneath the compressive cylinder, so that the sizing can be introduced fresh from the vat to the bat, as it comes from the ironing cylinder, as described.

E. P. RIDER.

No. 7534.—*Improvement in Purifying Coal Gas.*

What I claim as my invention, and desire to secure by letters patent, is the mixture with lime of coke dust or breeze, charcoal dust, or other carbonaceous substance, for the purpose of acting mechanically in the separation of the particles of lime, and at the same time acting chemically in removing various impurities from the gas, (which cannot be separated by the ordinary methods of purifying gas,) substantially as above set forth.

JOS. SABBATON.

No. 7535.—*Improvements in connecting Hubs with Axles.*

What I claim as new, and of my own invention, and desire to secure by letters patent of the United States, is the application of the half boxes *d*, and *d*, with the semicircular lip 5, and rib *e*, constructed to enter the grooves 4 and 8, near the end of the axle box *c*, said boxes being secured together and connected to the axle bar by any competent means, and said ribs, grooves, and boxes operating as a substitute for a collar on the axle, and to hold the axle box and wheel on the axle, and also to keep dust out of the parts, substantially as described and shown.

ELIPHALET S. SCRIPTURE.

No. 7536.—*Improvement in the Arrangement of Pressure and Feed Rollers in Planing Machines.*

What we claim as new therein, and desire to secure by letters patent, is connecting the moveable weighted pressure rollers with the stationary ones by oblique links, in combination with the additional rollers (f',) the whole arranged substantially in the manner and for the purposes set forth.

CHARLES A. SPRING.
PETER BOON.

No. 7537.—*Improvements in Machines for forming Tubes of Sheet Metal.*

What we claim as our invention, and desire to secure by letters patent, is supporting the forming roller (3,) upon the short ends of the bent levers (G, G,) in combination with the upper roller (2,) supported by springs, substantially in the manner and for the purposes herein described.

JOSEPH STOUT.
JAMES T. STANTON.

No. 7538.—*Improved Bolt and Rivet Machine.*

What I claim as my invention, and desire to secure by letters patent, is—

First. Gauging the length of the shank, after a head has been formed on the end, by pushing the head against a gauge beyond the header, which has a lateral motion to allow it to pass by, substantially as described, in combination with the operation of cutting off the shank at such distance from the griping dies, as by the same operation to determine or gauge the length of rod or wire, which shall be left projecting beyond the griping dies for forming the next head, substantially as described.

And lastly, cutting off the rod or wire, after the head has been formed, by the return lateral motion of the header, in combination with the rest, substantially as described, the edges of the rest and heading die, being formed to answer the purpose of shears, as herein described.

WM. E. WARD.

No. 7539.—*Improvement in Car Seat Backs.*

What I claim as my invention, and desire to secure by letters patent, is the forming of the backs of car seats, of double curved plates of metal attached by the ends to the arms of the seat, made to embrace both sides of the end pieces to which they are pivoted, and on which the car seats are reversed, formed, stayed, and braced, substantially in the manner and for the purpose herein specified.

THOS. E. WARREN.

No. 7540.—*Improvement in the Counter-twist Speeder.*

What I claim as new, and desire to have secured to me by letters patent, is making the shaft with a serrated groove *d*, in combination with the reduced portions *c*, *c*, of the shaft adjacent to said groove, wherein the roving runs from the twisting band to the bobbin in the manner and for the purpose herein fully set forth.

I also claim the combination of the spring *g*, and pendent tapered arm *f*, with the vibrating bobbin arm *i*, arranged and operated in the manner and for the purpose herein set forth, or in any other way which may be considered substantially the same, and by which analogous results shall be produced, that is to say, any arrangement wherein a rubbing pressure is imparted to the arms or their equivalents, containing the journals of the bobbin for producing the effect herein stated, said arrangement preventing the sudden rebounding of the bobbin on the shaft, when it becomes uneven from any cause, which the mere spring and weight applied to the bobbin axle or its arms, will not prevent, as I have fully tested by experiment; the spring when used alone being too elastic, and the weight too dead, whereas, the combination of the two, causes the bobbin to rise and fall gradually, as herein fully set forth.

JESSE WHITEHEAD.

No. 7541.—*Improvement in Fastenings for Bureau Draws.*

What I claim as of my own invention, and desire to secure by letters patent of the United States, is—

First. The metallic strip or its equivalent, constructed with the notch for receiving the fastening bolt, as set forth.

Second. The locking bolt operated by the opening or closing of any one of the drawers, for the purposes herein named, the whole being constructed, substantially in the manner herein set forth.

GEORGE WODE.

No. 7542.—*Improvement in the Manufacture of Raw-hide Whips.*

What I claim as my invention, is the above described improvement, in the manufacture of whips, or a whip having its external covering as well as its turk's heads or buttons, made in whole or in part of corrugated strips or bands of raw hide, laid or woven together, and on the handle or stock, substantially as herein before specified.

THOMAS J. BARNES.

No. 7543.—*Improvement in Scrapers used by Cabinet Makers.*

What I claim as my invention, and desire to secure by letters patent, is the scraper stock set in a frame for holding and guiding the scraper, so that the forward end only of the frame shall rest on the surface to be scraped, and thereby enabling the workman to manage the tool with the whole hand, apply a steady force instead of using the fingers only, as heretofore, for that purpose.

Second. I also claim reversing the position of the scraper stock and plate in the stock frame, whereby I am enabled to use both feather edges or corners of the plate successively, without taking the plate from the stock, as herein set forth.

HIRAM CARVER.

No. 7544.—*Improvement in Seed Planters.*

What I claim therein as new, and desire to secure by letters patent, is the combined operation of filling and discharging the revolving cups or cavities, in the planting rollers Z, Z, by a single blow of the arms F, F, on the said rollers, substantially as herein set forth.

EDSON HART.

No. 7545.—*Improvement in Ballot Boxes.*

What I claim therein as new, and desire to secure by letters patent, is the arrangement, substantially as herein described, of a moving band or tape, imprinted with numerals, and actuated by pedals, ratchet movement, and rollers or other equivalent device, in connection with spring detention latches, and a liberating brake or their equivalents, so that while the number polled for each respective candidate is exhibited by appropriate tape, each pedal as it is brought into play by the voter, is detained by its respective latch, until again liberated by the attending officer, thus effectually preventing the duplication of votes.

JOSEPH ADDISON HILL.

No. 7546.—*Improvement in Processes for Amalgamating Gold.*

What I claim as my discovery, and desire to have secured to me by letters patent, is saturating or dampening the sand or quartz, with which gold is found, with a solution in soft water of chloride of sodium and tartaric acid, mixed in about equal proportions, and applied to the sand, &c., prior to the introduction of quicksilver, to effect amalgamation with the gold.

CALVIN C. KNOWLES.

No. 7547.—*Improved method of making Barrels for Fire Arms.*

What I claim as my invention, and desire to secure by letters patent, is making barrels for fire arms, with a double seam or weld, from two bars of metal previously rolled into a semi-cylindrical form, the whole operation being conducted as herein described.

JESSE PANNABECKER.

No. 7548.—*Improvement in Hanging and Operating Gates.*

What I claim as my invention, and desire to secure by letters patent, is the manner of hanging and operating the gates, substantially as described.

THOMAS PARKINSON.

No. 7549.—*Improvement in Tenoning Machines.*

What I claim therein as new, and desire to secure by letters patent, are the planes for cutting the tenon, whose irons are made to turn alternately from and towards the faces of their respective stocks, so as alternately to cut and clear the lumber on which they are acting.

E. M. SHAW.

No. 7550.—*Improvement in Churn Dashers.*

All that I claim, and desire to secure by letters patent, is the combination of the funnel shaped tubes B, radial wings or plates D, inclining upward and outward, directly over the ends of the tubes B, with the circular cap plate or disk F, for the purpose as described.

R. S. SHERMAN.

No. 7551.—*Improvement in Harness Saddles.*

What I claim therein as my invention, and desire to secure by letters patent, is the combination of the separated elastic plates C, C, with the skirt portions B, B, of the casting A, B, B, and the pads F, F, substantially in the manner herein set forth, for the purpose of causing the pads to have a springy and equable bearing upon a horse, and to adapt themselves to horses of different sizes and conditions.

ROBERT SPENCER.

No. 7552.—*Improvement in Machines for Beating Gold.*

What we claim as our invention, and desire to secure by letters patent, is the combination of the adjustable differential cams (H,) with the pendulums, by means of which the packet is shifted under the hammer, so as to regulate the distribution of the blows upon it, as herein set forth.

WM. VINE.
JAS. H. ASHMEAD.

No. 7553.—*Improvements in Machinery for dressing Weavers' Harness.*

What I claim therein as my invention, and desire to secure by letters patent, is the within described combination of the size or glue receptacle K, *k*, and the rotating brushes *y*, *y'*, with each other, and with the shafts B, B', the screw shafts C, C', the sliding rod E, the lever *v*, the clutch X, the pulleys W, Y, and the drawing pulley Z, by which the brushes *y*, *y'*, are made, simultaneously to rotate on their axes, and to alternately traverse from one end of the harness A, to the other, (or any portion of it,) and deposite the size or glue evenly and smoothly upon the threads of the harness, substantially as herein set forth.

In combination with the size or glue receptacle K, *k*, and the rotating and reciprocating brushes *y*, *y'*, above set forth, I also claim the imparting a reciprocating movement to the frame G, G, in which the harnesses A, A, are placed simultaneously with the combined movements of the said brushes *y*, *y'*, substantially in the manner herein set forth.

I also claim the making the sliding frame G, G, of such shape and capacity as to receive two sets of harness A, A, when it is combined with the shaft D, the pulley Q, the crank or lever *q*, the elastic lever R, the pitman S, and the crank wrist *t'*, substantially as herein set forth; by which without stopping the machine, a dressed harness can be removed from the frame, and an undressed harness secured in its place, whilst another harness is being dressed with size or glue in the opposite receptacle of the said frame, substantially in the manner herein set forth.

KASIMIR VOGEL.

No. 7554.—*Improvement in Churn Dashers.*

What we claim as our invention, and desire to secure by letters patent, is the double curved, shaped dasher H, with the groove pieces J, J, and N, N, in combination as herein described, for the purposes herein set forth.

WILLIAM WALKER.
MATTHEW C. WALKER.

No. 7555.—*Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is:

1st. The manner of forming the front *d*, wing flues (*a*, *a*,) on either side of the stove, by recessing the centre of the front plate above and beneath the plate forming the hearth, and bottom of the fire chamber, and inserting plates (*e*, *e*,) to form the insides of the flues (*a*, *a*,) in the fire chamber, so that they can be re-placed when burnt out without disturbing the sections of said plates below the hearth, as described.

JAMES WHITE.

No. 7556.—*Improvements in Tenon Bits.*

What I claim as my invention, and desire to secure by letters patent, is the combination of converging slides with a pair of planes, the latter being combined with the former in such manner, that by pressure and turning, they are caused to approach each other and reduce the extremity of the spoke to which they are applied, substantially as herein set forth, the slides and planes being turned by a hand-brace or by machinery.

ELI K. WISELL.

No. 7557.—*Improvement in Friction Clutches.*

What I claim as new, and desire to secure by letters patent, is the sliding collar *k*, connected to and in combination with the nut *g*, substantially in the manner and for the purposes herein specified.

NELSON BARLOW.

No. 7558.—*Improvement in Cylinder Printing Presses.*

That which I claim, is constructing a printing machine, in which the form or forms of types, or blocks are placed on, or secured to the inner or concave surface of a cylinder or drum, which is made to revolve or carry the form or forms secured thereto, from the inking roller to the printing or impression cylinders, all of which parts are mounted inside the cylinder or drum.

Second. I claim the methods above shown, and described of the making the inking rollers or balls of printing presses or machines.

BARTHOLOMEW BENIOWSKI.

No. 7559.—*Improvement in the Manufacture of Candles.*

What I claim therein as new, and desire to secure by letters patent, is the arrangement and manner of operating the knives, by which the cylinder of fat, with its central wick, is cut into suitable lengths for candles, and the fat removed from the end of the wick.

I also claim the device for regulating the length, and delivering the candles, substantially as herein described.

JAS. G. DAVIS.

No. 7560.—*Improvement in Instruments for Vaccinating.*

What I claim as my invention, and desire to secure by letters patent, is the sliding cylinder D, in combination with the thumb key F, spring M, and piston O, for the purposes herein described and set forth.

JUNIUS F. FOZER.

No. 7561.—*Improvement in Splints for Fractures.*

What I claim as my invention, and desire to secure by letters patent, is the cutting out a portion of the splint, to afford an opportunity for dressing as often as may be necessary, the upper and lower portions of the splint being kept firmly united by means of the brace B, so as by extensions and counter extensions, to keep throughout the treatment, the proper relative position of the parts concerned, the slide being re-placed after each dressing, or any other device, substantially the same.

ADAM HAYS.

No. 7562.—*Improvement in Weighing Machines.*

What I claim as my invention, and seek to secure by letters patent, is the iron frame, together with the skids and regulating screw, used in connection with a weighing beam, as described in the foregoing specification, and represented in drawings accompanying this.

GEO. HOUSTON.

No. 7563.—*Improvement in Packing Boxes and Axles.*

What I claim as new, and desire to secure by letters patent, is the combination of the metallic packing ring E, having is outer periphery of conical form, the arched springs F, F, having their ends inclined to fit the said ring E, and the regulating screws *h*, *h*, with the journal box C, and axle A, in the manner and for the purposes, substantially as herein described.

WM. H. HOVEY.

No. 7564.—*Improvements in Pentagraphs.*

What I claim as new, and for which I desire to secure letters patent, is the instrument, constructed and arranged as above set forth, consisting of a pencil moving parallel with the eye tube, with which it is connected as herein described, and marking on a vertical plane, or a plane, parallel with their axes of horizontal motion, such objects as the sight through the eye tube passes over.

ALLEN JUDD.

No. 7565.—*Improvement in Bench Hooks.*

What I claim as new in my invention, and desire to secure by letters patent, is forming the head *c*, with any suitable number of edges of any required form, to suit various kinds of work, and having the spindle, of which the head forms part, grooved and fitted in a socket, set at an inclination to the bench, so that any edge of the head can be set to the work and secured by a spring catch, and whatever edge is turned to the work, will be higher than the back or opposite edge as herein set forth.

W. B. KEAN.

No. 7566.—*Improvement in Apparatus for Regulating the Setting of Boxes in Wagon Tops.*

I claim the combination and arrangement of the rules G, G, K, K, the rods

H, H, the pins *h*, *h*, the adjusting screws I, I, and the holdfast bolts J, J, arranged and adjusted upon a frame, in the manner and for the purposes, substantially as herein described.

And I also claim the adjustable rule M, sliding in the swinging bar L, and attached to the same frame with the before described combination, in the manner, and for the purpose herein set forth

A. McKINNEY.

No. 7567.—*Improvement in Ornamenting Textile Fabrics.*

What I claim as my improvement, is the new or improved ornamental fabric or manufacture, made substantially as specified, viz: having any ground suitable or unsuitable for receiving and exhibiting bright color or colors when imprinted thereon, and having figures, stripes, or other portions of surface floated over the said ground, in material and color, suitable for representing such bright color or colors, and having such bright color or colors printed on the said boated surfaces.

ROB'T MILLIGAN.

No. 7568.—*Improvement in Piano Fortes.*

What I claim as of my own invention, and desire to secure by letters patent of the United States, is combining two sets of strings operated by separate actions with one and the same sounding board, whereby I am enabled to produce greater effects, both in quality of tone and in power than heretofore, and also to maintain the unison of the notes, and the tune to a degree not possible before, the whole being constructed and operated, substantially in the manner described herein.

JAS. PIRSSON.

No. 7569.—*Improvement in Ship Ventilators.*

Firstly. I claim the ventilating chamber, constructed in the manner substantially as above described, having a tube or air passage, communicating with the cabin, or between decks of a ship or other vessel, entering it at *a*, *b*, figs. 2, 3 and 4, and provided with a register, represented by *a*, *b*, in fig. 1, either for the purpose of admitting pure air, by long tubes, to the lower parts of the cabins, or between decks, or for carrying off the ventilated air by short tubes from their upper parts.

Secondly. I do not claim the use of a float valve in the ventilating tube, irrespective of the manner of applying them, but I claim having the two float valves A and B, attached together, in the manner substantially as described, and each acting independently of the other, upon a separate seat in the ventilating chamber; so that any water passing one valve, may be shut off by the other.

WARREN ROBINSON.

No. 7570.—*Safety Apparatus for Steam Boilers.*

What we claim as our invention, and desire to secure by letters patent, is the application of a rope, made of any combustible material (using for this purpose, wool as prepared in the manner before noticed, or any other material which will answer the intended effect,) to the upper surfaces of one or more tubes or flues of a boiler, which, when said tubes or flues are uncovered of water, will burn off, or part in the manner as before described, for the action of the excessively heated metal and surcharged steam, which rope is connected with, and by its parting actuates the apparatus herein described, or any part thereof, for the purpose either of giving alarm, or putting in action means of safety, or both, substantially as herein described.

JOHN C. TENNENT.
JNO. WORKMAN.

No. 7571.—*Improved Serving Mallets.*

What I claim as new in my invention, and desire to secure by letters patent, is—First. Attaching friction rollers to the periphery of a serving mallet, substantially in the manner and for the purposes herein described.

Second. Making the groove or face (*c*,) deeper or larger at the part (*h*,) which fits the served part of the rope, in the manner and for the purposes substantially as herein described.

THOMAS BATTY.

No. 7572.—*Improvements in Gun Harpoons and Lances.*

What I claim as my invention, and desire to secure by letters patent, is attaching a tail of cords, (or their equivalent,) to gun lances, substantially in the manner and for the purpose herein set forth.

I also claim attaching the button to the shank of gun harpoons or lances, in such manner that when the lance or harpoon is discharged from the gun, the button will drop off, being thereby prevented from retarding the flight, and from deflecting the lance or harpoon from the line in which it is projected from the gun, substantially as described.

ROBERT BROWN.

No. 7573.—*Improvement in Obstetrical Supporters.*

What we claim as new and useful in our invention, and desire to secure by letters patent, is the combination, in the manner described, of the sliding plate C, with the back pad B, which is connected to the seat, for the purpose of enabling the bearing of the instrument to be moved higher up or lower down the back, without disturbing the patient.

F. H. CHASE.
ADAM WESTON.
LEANDER BABBIT.

No. 7574.—*Method of Propelling Boats in Shallow Water.*

What I claim therein as new, and desire to secure by letters patent, is—First. The combination and arrangement of the setting pole E′, sliding in the sheath E″, with the spring bolt *y*, and cords 3, 3, 3, and 6, for the purpose of shortening or lengthening the setting pole, substantially as herein fully described and shown.

Second. The manner herein described, of checking or snubbing the boat by means of a chain or cord attached to the foot of the setting pole, and passing over pulleys to a windlass placed in the stern of the boat near to the helm, as herein described.

JOHN DOUGHERTY.

No. 7575.—*Improvement in Compound Wagon Boxes.*

What I claim as my invention, and desire to secure by letters patent, is making the fastenings of a compound wagon body by combining with screw bolts, so jointed to the axles, frame or body of the carriage, as to be laid down or set up at pleasure, two cross pieces to each pair of bolts, with pres-

sure nuts above the upper, and sustaining nuts beneath the lower cross bar, whereby the whole load may readily and easily be secured, or the lower part may be released and withdrawn, without disturbing that which is above it, substantially as herein set forth.

IRNLA DRAKE.

No. 7576.—*Improved Steam Boiler.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of pendent water vessels (D,) in the fire box, in connection with water tubes (*e*,) which pass along the flue, and are connected at one extremity with a water space near the back of the boiler, and at the other with the water vessels at the fire box, substantially as herein set forth.

RICHARD E. DIBBLE.

No. 7577.—*Improvement in changing Rotary Motion into Reciprocating Motion.*

What I claim as my invention, and desire to secure by letters patent, is the mechanical arrangement and combination of parts, by which I convert the rotary motion of the wheel A, into a reciprocating movement of the churn dasher rod W, to wit: by means of the action of the lugs *a*, *a*, that project from the face of the said wheel A, upon the forked rocker K, *l*, *m*, and the vibrating beam G, when aided by the inclined planes *t* and *r*, substantially in the manner herein set forth.

ISAAC D. GARLICK.

No. 7578.—*Improvement in Machines for Cutting Hemp.*

What I claim as my invention, and desire to secure by letters patent, is the attaching a series of blades upon an arm, back to back, in a V form, their edges elevated in order to give a smooth glancing stroke upward, through the stalk of hemp, after manner of the cutting performed by the common scythe in hemp and grain.

I claim the introduction and use of a cleaning shear over the crotchet or junction of the blades (to remove such hemp as may be imperfectly cut or pulled up,) substantially in the manner as herein set forth.

I claim the method of separating and bunching the hemp after it has been cut, by means of a wedge or inclined plane, and a revolving cone.

I claim the invention and use of the revolving rack as a substitute for the over-head reel in supporting the hemp while being cut.

J. LOCKE HARDEMAN.

No. 7579.—*Improvement in Fulling Mills.*

What I claim as my invention, is so arranging a vertical fluted or ribbed cylinder, and fluted or ribbed concave, that the rotation of the former on its axis, shall cause the goods to be fulled to assume a cylindrical form, and to rotate on its own axis, by means of the friction of the two fluted or ribbed surfaces acting upon and sustaining in its position, the cloth or goods, as set forth.

JOHN C. MILLAR.

No. 7580.—*Improvement in Machines for Cutting Crackers.*

I claim the combination of the three following elements: First. The constant velocity of the breaking rollers.

Second. The number of strokes of the cutters adjustable thereto, by means substantially as described, so that within certain limits they may be varied in relation to the number of revolutions of the feed rollers.

Third. An adjustable feed to the apron, derived from the shaft carrying the cutters, so that it always makes the same number of strokes, but each stroke may be varied in length, by which, in the same machine, I am enabled to cut crackers of any given size.

WILLIAM R. NEVINS.

No. 7581.—*Improvement in preparing the face of Metallic Types, Engraved Plates, &c.*

What I claim as my invention and discovery, and desire to secure by letters patent, is the plating or coating of the surfaces of metallic printing types, stereotype plates or other printing plates, whether cast or engraved, with an additional coat of metal, by means of galvanic electricity, in the manner and for the purposes described.

L. VANDER VEER NEWTON.

No. 7582.—*Improvement in Hot Air Registers.*

What I claim as new therein, and which I desire to secure by letters patent, is the method of moving the dampers in registers or ventilators, by means of the slider (*d*,) and the oblique bars (*g*.) with their several forms and parts, substantially as described, in combination with the oblong dampers hung in the middle of their width, in the manner and for the purpose set forth.

G. POLLOCK.

No. 7583.—*Register for Steam Boilers.*

What I claim as of my invention, and desire to secure by letters patent, is connecting the gauge rods with the gauge cocks, in such manner as herein described, that the pressure of steam and height of water shall be registered each time the gauge cocks are tried, the register indicating at the same time, the period of time of trying of the gauge cocks by opening and closing them.

JAS. D. RICE.

No. 7584.—*Machine for cutting Sheet Metal, &c.*

What I claim as my invention, is the toothed rack, or its equivalent, (applied to the bar B,) and a system of one or more gears, or the mechanical equivalents thereof, (applied to the cutter wheel, and made to engage with the said rack, or equivalents therefor,) in combination with the said bar B, the cutter wheel and its sliding carriage; the same being substantially in the manner as above described, and for the purpose of causing the cutting periphery of the rotary knife to travel around faster than the knife moves horizontally, and to thereby make said knife cut with a drawing stroke.

I also claim the combination of the swinging frame and gauge contrivance, or equivalents therefor, with a sliding carriage, its cutter wheel and the slide bar and straight cutting edge, as substantially specified, the same being for the purpose of enabling me to cut either circular or curved work, as described, and of any diameter or dimensions capable of being produced by the machine of whatever size it may be made.

STEPHEN P. RUGGLES.

No. 7585.—*Improved opening and closing Bucket for Paddle Wheels.*

What I claim as of my own invention, and desire to secure by letters patent, is—First. The formation of each of the blades composing the bucket, so that their inner or closing ends shall be heavier than the outer ends thereof, when combined with a stop or stops, substantially as herein described, thus effecting the closing together of the same by the action of gravity before entering the water, as set forth.

And secondly. I claim curving the inner edges so as to ensure the closing of said edges together, by the action of the water while backing, and thus complete a sufficient bucket for that purpose, substantially in the manner described herein.

GEO. TINGLE.

No. 7586.—*Improvements in Machines for heading Bolts, Rivets, &c.*

I am aware that spikes and bolts have been headed in a box, I therefore do not claim the box with the moveable header therein, but what I do claim as my invention, and desire to secure by letters patent, is attaching to or forming in the lower part of the box or holder, a flaring or bell mouthed cavity, such as R, which embraces the tapered ends of the dies, when the box is down or in a vertical position, and clamps them firmly together, while at the same time the cavity acts as a guide to cause the heading box to assume its proper position, and prevents the metal from being forced out between the ends of the dies and bottom of the cavity in the box, during the operation of heading.

JOHN VAN BROCKLIN.

No. 7587.—*Improved method of carrying Vessels over Shoals.*

What I claim as new therein, and which I desire to secure by letters patent, is the mode or method of transporting a vessel across shoals or bars, by means of a camel, having an unyielding platform for the vessel to rest on, and likewise provided with a bow, as herein described, the vessel being partly water borne, and partly supported by the camel.

J. A. WINSLOW.

No. 7588.—*Improvement in Processes for making Stannates of Potash or Soda.*

I claim as of my said invention, the mode of producing a stannate of soda, by heating a mixture of tin ore and sulphuret of sodium, and a stannate of potash by heating a mixture of tin ore and sulphuret of potassium, and afterward separating the sulphur from these mixtures respectively, by means of a metallic oxide, in manner herein before described.

JAMES YOUNG.

No. 7589.—*Improvement in Expansible Bitts.*

What I claim as new, and desire to secure by letters patent, is the herein described expansible bitt, in combination with the single or double collar or tube, constructed and operating in the manner, substantially as herein set forth.

C. L. ADANCOURT.

No. 7590.—*Improvement in Obstetric Chairs and Supporters.*

What I claim in the foregoing as my invention, and desire to secure by letters patent, is an obstetric chair with its seat composed of sections, hinged together, substantially in the manner and for the purpose herein set forth.

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I also claim a chair back, hinged to the seat in such manner that it can turn both horizontally and vertically, substantially in the manner herein set forth.

I likewise claim the combination of the stirrups with the abdominal pad, substantially in the manner and for the purpose herein set forth.

ASA BLOOD.

No. 7591.—*Improvement in Turning up the Steps of Omnibuses.*

What I claim, is the turning up of the step, (it being properly prepared for the purpose,) by the action of the spiral or other spring, upon the stepping off of the passenger, and the withdrawing of the driver's foot, and its connection with the brake apparatus, thus preventing boys or others from riding on it, the whole being attached to the body of the carriage, and operating substantially as fully set forth in the accompanying drawings and model.

STEPHEN BURDETT.

No. 7592.—*Improvement in Machines for Cutting Straw.*

What I claim, and desire to secure by letters patent, is—First. The manner of hanging the knives to the wheel, as described.

Second. Forming the knives with a hook shaped end, in the manner and for the purpose set forth.

Third. The collar on the projecting end of the mouth-piece, forming a support for the detached end of the knife to rest against, as described.

HARRY CAMP.

No. 7593.—*Improvement in Revolving Coal Grates.*

What I claim as new, and desire to secure by letters patent, is the manner of arranging bars or flanges B, B, around the cylinder, at an angle of any desired degree from the axis of the cylinder, so as to move the coal alternately in opposite directions, the same forming a fire grate, in the manner and for the purpose, substantially the same as herein described and represented.

JOHN B. CHOLLAR.

No. 7594.—*Improvement in Self-generating Gas Lamps.*

What we claim as our invention, and desire to secure by letters patent, is the extension of the wick into a ball or cavity, where the gas may be generated by means of jets, as above set forth.

SHARPLESS CLAYTON
YARNALL BAILY.

No. 7595.—*Improvements in Coal Stoves for Roasting and Boiling.*

What we claim herein as new, and desire to secure by letters patent, is—

Firstly. The arrangement, after the manner and for the purposes herein described, of a grated or other more or less open fire back, whereby a roasting surface is presented to the interior of a stove.

Secondly. The provision, substantially as described, of dampers, whereby the roasting surface may be regulated or entirely closed up, or opened at pleasure.

Thirdly. The falling grate *g*, arranged and constructed, substantially as described, so as to enable extension horizontally, of the body of the fire, for a boiling surface.

Fourthly. The fire door having hopper sides, and forming, when extended, a canopy for the conduction of effluvia.

Fifthly. The hopper or funnel shaped door, as arranged and here applied for the insertion of fuel.

THOS. G. CLINTON.
GEORGE H. KNIGHT.
EDWARD H. KNIGHT.

No. 7596.—*Improved Lock for Fire Arms.*

What I claim as new, and desire to secure by letters patent, is the seer *j*, in combination with the pin and shoulder on the trigger, by which arrangement the hammer, after being brought back by the pressure of the finger upon the trigger, is held in its position by the seer, while the trigger passes forward, and the piece is discharged by a light touch of the finger upon the trigger, securing deliberation and certainty of aim, or may be discharged by one continuous pressure of the finger upon the trigger, at the pleasure of the person using the same. And in these claims I wish to be understood that I do not confine myself to the precise arrangement of the parts herein described, but shall vary the same at pleasure, while I attain the same ends, by means substantially the same.

NATHAN B. COOK.

No. 7597.—*Improvement in Shirt Studs and Buttons.*

What I claim in the foregoing as my invention, and desire to secure by letters patent, is constructing the shanks of shirt studs and buttons, in the manner and for the purpose herein set forth.

BENTON P. COSTON.

No. 7598.—*Improvement in Stoves with Circular Shaking Grates.*

What I claim as new, and desire to secure by letters patent, is casting the seat (G,) of the fire box separate from the top plate (C,) of the ash box, having the bar (D,) carrying the centre or pin (*d*,) for supporting the grate, cast with and forming part of the top plate (C,) of the ash box, substantially as described, and for the purposes set forth.

EDWARD B. FINCH.

No. 7599.—*Improvement in Cast Iron Car Wheels.*

What I claim as my invention, and desire to have secured to me by letters patent, is making the two plates which connect the hub and rim of a cast iron railroad wheel, in a series of lateral arching sectors connected by the curved partitions *c*, *c*, &c., in the manner and for the purpose herein above specified.

ALBERT FULLER.

No. 7600.—*Improvement in detaching Horses from Carriages.*

What I claim as my invention, and desire to secure by letters patent, is the application to buggies and other vehicles, drawn by horses and other draught animals, of a new and useful improvement on the swingle tree, which I entitle the safety swingle tree, together with its apparatus, consisting of a lever and ring bolt, a grooved headed screw bolt, a flat headed screw bolt, a force spring, and two stirrups combined, as above described, which, upon the ring bolts being raised as above described, will allow the horse to become unhitched and to pass off, freely from the same and every part thereof, without danger to the same, or to persons therein contained, using in the construction of the same, wrought iron or any other durable material that will ensure the desired object.

JOHN W. HARRISON.

No. 7601.—*Improvement in Grain Dryers.*

What I claim as my invention, and desire to secure by letters patent, is the arranging a series of drying plates, one above another, connected by passages as described, in connection with the vertical shaft and arms thereon, curving alternately in opposite directions, combined and arranged in the manner and for the purpose herein fully set forth.

JOHN R. HOOPES.

No. 7602.—*Improvement in the mode of Cleaning and Drying Gum Elastic or Cloth Bands in Calico Printing.*

I claim as my invention, the arrangement of the rollers and vat, above described, for washing the India rubber bands or other endless blankets, used in calico or other printing, said rollers being only partly immersed in water, and other parts arranged and operated, as set forth.

JAS. HUNTER.

No. 7603.—*Improvement in Saws.*

What I claim as my invention, and desire to secure by letters patent, is my improved saw teeth, constructed and operated, substantially as herein described and represented, viz: the cutting edges of the teeth inclining outwards from plane or curved surfaces *a*, *a*, a distance equal to the thickness of chip that each tooth is intended to remove from the wood, and being prevented from taking a deeper hold upon the wood, at the same time that they are strengthened by the said outer surfaces (*a*, *a*,) in consequence of these surfaces (*a*, *a*,) being in a line with each other, and parallel or nearly so, with an imaginary right line or circle, drawn over and touching the points of the saw teeth.

HAZARD KNOWLES.

No. 7604.—*Self-acting adjustable Feed-gear for Drilling Machines.*

What we claim as our invention, and desire to secure by letters patent, is the combination, substantially as described, of the splined screw *x*, the splined shaft *b*, the smooth wheel *r*, the toothed wheel *y*, carrying a nut, the arm *l*, the catch *n*, the small arm *o*, the spring *p*, and the segment *q*, so as to form a self-acting adjustable feed for boring or drilling machines.

ALDEN R. MORRILL.
HIRAM BALDWIN.

No. 7605.—*Method of Attaching Yards to Trusses.*

I claim suspending the yard to the truss, by means of linked and swivelled eye bolts, whereby the yard may either be allowed to hang freely below the eye which is swivelled, to the truss, or may be slung upward and inward toward the mast, so as to bring its centre above the bowed end of the truss, in the manner and for the purposes herein set forth.

TILGATH ODEON.

No. 7606.—*Improvement in Electric Telegraph Manipulators.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The two guides E, *h*, with their hook and detent spring, as described, in combination with the moveable connecting points, and D, D, the type forms for letters, substantially in the manner and for the purpose set forth, the guides being disconnected as soon as the moveable connecting point has passed them, thereby causing the finger key rods to resume their proper position to be again acted upon, and allowing the succeeding points to pass in their regular revolving course, without coming in contact with the type forms.

Secondly. I also claim the manner of disconnecting the two guides, viz: by the action of the moveable connecting point upon the detent spring, as above set forth.

Thirdly. I claim the employment of a clicking apparatus, to indicate the proper time of depressing the keys: the whole being constructed and arranged in the manner and for the purpose, substantially as herein set forth.

AUSTIN F. PARK.

No. 7607.—*Improved arrangement of Dampers in Cooking Stoves.*

What I claim therein as new, and which I desire to secure by letters patent, is the vertical dampers (*h*,) placed below the top of the oven in the division partitions (*g*,) substantially as herein before described.

HENRY L. SHEPERD.

No. 7608.—*Improvement in Blowers of Franklin Stoves.*

What I claim as new therein, and which I desire to secure by letters patent, is first, the inner doors or blowers (*f*,) made to slide in grooves within the front plates of the stove, serving when closed as a blower, and when not in use, being withdrawn out of the way and out of sight, substantially in the manner and for the purposes as above described.

DAVID STUART.

No. 7609.—*Improvements in Sub-marine Vessels.*

What I claim therein as my invention, and desire to secure by letters patent, is the method of effecting a circulation of the air, and of maintaining an atmosphere in the cabin of the requisite bulk, to prevent the encroachment of water during the descent of the vessel, and of preventing the waste of air by its expansion, and escape from the cabin during the ascent of the vessel, by pumping it either out of, or into the cabin, or air reservoir, as may be required, even when the density of the atmosphere in the compartment whence the air is drawn, is less than that of the atmosphere in the compartment into which it is forced, as herein set forth.

I also claim the device, consisting, substantially of the drop platforms, chains, and draw pin, for the purpose of carrying ballast on the exterior of a submarine vessel, and of discharging it at will, as herein set forth.

LAMBERT ALEXANDRE.

No. 7610.—*Improved method of Attaching lines to Harpoons.*

What I claim as new in my invention, and desire to secure by letters patent is the manner of attaching and securing the line to the harpoon, by means of the ring *H*, sliding on the shank, and the rounded end *d*, of the socket, or butt *C*, in the manner, substantially as herein described.

C. F. BROWN.

No. 7611.—*Improvement in Machines for dressing Staves.*

What I claim as my invention, and desire to secure by letters patent, in the before described machine, for shaving staves from rived bolts, is the employment of two concave knives for shaving the outer or convex surface of the staves, substantially as herein described, in combination with a single knife for shaving the inner or concave surface of the staves, when the said single knife is placed in a line midway between the other two, that is, opposite the space between the other two, substantially in the manner and for the purpose specified.

LEWIS S. CHICHESTER.

No. 7612.—*Improvement in Pressing Cotton and other Substances into Bales.*

What I claim as my invention, and desire to secure by letters patent, is the method of packing and compressing substances into bales or packages, in a series of successive layers or strata, by means of rolling pressure or its equivalent, substantially as herein specified.

I also claim, combining with the laying and compressing rollers or cylinders, or their equivalents, a bed which shall be gradually separated from the rollers or cylinders, as the layers or strata accumulate, and which shall also traverse from end to end, under the rollers, or cylinders, or vice versa, substantially as specified.

I also claim, in combination with the cylinders for packing and pressing substances in successive layers, a lapping apparatus for forming such substance or substances into a lap or laps, to be delivered to the rollers or cylinders, or their equivalents, to be laid and pressed into the bed, substantially as described.

I also claim, in combination with the laying and compressing cylinders, or their equivalents, the series of rollers or their equivalents, for retaining the layers or strata, as they are successively compressed, substantially as specified.

I also claim the bed, made without sides or ends, substantially as, and for the purpose specified, in combination with the carriage, provided with adjusting plates at the ends, for the purpose and in the manner, substantially as described.

And finally. I claim in combination with the adjusting plates at the ends of the carriage, the stationary plates at the ends of the frame, under which the adjusting plates pass, to remove any substance that may have accumulated on them, substantially as described.

S. A. CLEMENS.

No. 7613.—*Improvements in Repeating Fire-arms.*

What I claim as my invention, and desire to secure by letters patent, is making the central bore of the many chambered rotating breech, which fits and turns on a central pin or arbor, to extend from the rear part thereof, to within some distance from the front end, and thus leave the front end closed, substantially as described, to prevent the access of smoke, when this is combined with the connecting of the barrel with the shield piece and lock plate, substantially as described.

SAM'L COLT.

No. 7614.—*Improvement in Hand Spinners.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the clamp lever V, with the cords and drum, for the purpose and substantially as described.

DAVID CURRENT.

No. 7615.—*Machine for Beveling the Surfaces of Washers, &c.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of drawing out, and giving a bevel

form to metal clinch rings, washers, &c. by the action thereon of the surfaces of a series of travelling rollers turning on bearings, arranged about a common centre of rotation, and combined with a spindle or mandrel, adapted to the reception of the clinch rings or washers, to be formed and provided with the means, as substantially herein described, for turning it to present in succession, every part of the periphery to the action of the rollers, substantially as described.

I also claim, in combination with the spindle or mandrel, for presenting the clinch rings or washers, to the action of the travelling rollers, a gripe, substantially as described, for griping and holding the said rings or washers on to the spindle or mandrel, whilst passing under the action of the travelling rollers as described.

WILLIAM FIELD.

No. 7616.—*Improvement in Draining Sugars.*

I claim of my invention, the mode of applying steam or liquids, to machines used for separating syrups or fluids from sugar, by means of centrifugal force, for the purpose of clearing and keeping clear, the meshes or apertures in the periphery of the revolving cylinders of such machines, in manner herein described.

CONRAD WM. FINZEL.

No. 7617.—*Improvement in Clamps for Holding Paper in Writing and Drawing.*

What I claim as my invention, and desire to secure by letters patent, is the clamping slides A, made to slide freely on the parallel rods B, operated by the lever C, and the springs D, substantially in the manner, and for the purpose as herein set forth.

ELIAKIM B. FORBUSH.

No. 7618.—*Improvement in Fastenings of Hay Rakes.*

What I claim, and desire to secure by letters patent, is:

First. The manner of holding the teeth *d*, firmly in their required positions against the sliding bar *i*, during the operation of the machine, by means of the aforesaid combination of the ratchet wheel *f*, pawl (*g*,) sliding bar (*i*,) and stem (*e*,) helical spring *n*, fixed bar *m*, and slide *k*, attached thereto, with the parallel guiding arms *c*, and revolving finger shaft *a*, arranged and operating in the manner and for the purpose above set forth.

Second. I likewise claim, the combination of the slide *k*, helical spring *q*, strap (*o*,) and roller *p*, with the parallel arms *c*, and fixed bar *m*, for disengaging the sliding stop bar *i*, from the rake teeth *d*, without moving the hand from its usual position on the hand roller *h*, to allow the teeth to revolve to deposite the hay in windrows, as herein fully set forth.

ORANGE W. HOGLE.

No. 7619.—*Improvement in Stoves.*

What we claim as our invention, and desire to secure by letters patent, is the jambs of stove or grate fronts or ends, constructed with recesses closed by doors, within which, the doors of the fire-place are folded up and concealed from view; the fire-place doors being constructed and arranged to turn back into the recesses, substantially as herein described.

SHERMAN S. JEWETT.
FRANCIS H. ROOT.

No. 7620.—*Improvement in Car Couplings.*

What I claim therein as my invention, and desire to secure by letters patent, is the bearing roller (or rollers) *m*, placed within the body of the coupling, and the bearing roller *n*, located in one end of the connecting link *c*, for the purpose of enabling the connecting bolt A, to be easily detached from the link C, when the cars are in motion; when this arrangement of the said rollers and connecting bolt, is combined with the loop *h*, the catch head *f*, and cord, for uncoupling, in such a manner, that the loop will be disengaged when force is applied to withdraw the bolt; but will prevent the connecting bolt from being accidently thrown out of place, when the cars are in motion.

DAVID S. NEAL.

No. 7621.—*Improvement in Planing Machines.*

First. I claim the use and employment of the cutter I, made and fashioned in form and manner, or any analogous form and manner, whereby the peculiar cutting, bevelled scalloped edge is attained, for planing or dressing plank or other material, substantially as herein set forth.

Second. I also claim the use and employment of the cutter I, in combination with the compressing spring J, feed rollers and straight edge, or any one or more of them, in form and manner for the purposes, substantially as herein set forth.

J. F. OSTRANDER.

No. 7622.—*Improvements in Sewing Machines.*

What I claim, is the hook *z*, the surface *a*, the tube or holder *s*, and thread carrier *e*, working, substantially as above described.

BARTHELEMY THIMONNIER, Sr.

No. 7623.—*Improvements in the Direct Action Steam Hammer.*

What I claim as my invention, and desire to secure by letters patent, is attaching the hammer to the sliding steam cylinder, substantially as herein described, the steam being admitted and discharged to and from the sliding steam cylinder, substantially as herein described.

J. H. TOWNE

No. 7624.—*Improvements in Manufacture of Lead Pipe.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of setting or cooling the inside of the mass of metal within and throughout the length of the cylinder, and before or preparatory to pressing out the pipe, by passing a cooling fluid into or through a long core or core holder, extending through the length of the cylinder, as herein described, the said method having the effect at the same time to keep the said core or core holder cool and stiff, as described.

WM. P. TATHAM.

No. 7625.—*Improvement in Apparatus for Breaking Horses.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of breaking horses by means of the shafts, which are connected together by a bow passing around in front of the horses' breast, substantially as herein described, in combination with the two straps, one passing over the crest and the other under the breast, by which the horse is harnessed to the said shafts, substantially as described.

SEYMOUR TOMLINSON.

No. 7626.—*Improvement in Surgeons' Splints.*

What I claim as my invention, and desire to secure by letters patent, is my improved surgeons' splints, composed of thin strata of wood, combined with some elastic adhesive substance interposed between them, substantially as herein set forth.

BENJAMIN WELCH.

No. 7627.—*Improvement in Ladies' Stays.*

What I claim as my invention, and desire to secure by letters patent, is the peculiar arrangement (in the body of the stay) of the whale bones *a*, *a*, *a*, *a*, *b*, *b*, in combination with the gores *g*, *g*, and *f*, *f*, of the particular form, and in the particular position represented, whereby the usual irritating effects of ladies' garments upon the muscles, &c. about the loins are avoided, at the same time that effectual support is given to the whole waist, by means of the peculiar position and shape of the gores, and thence the easy curves given to the whale bones, as set forth.

LOUISA BALIS.

No. 7628.—*Improved mode of representing Musical Scales.*

I claim the manner herein described, of representing each and all of the scales used in music, by the combination of the board B, the side bars *c*, *c*, the centre piece D, and the bars *d*, *d*, *d*, and *d'*, *d'*, *d'*, having letters attached to them to indicate the name of the notes or sounds they represent, or any other combination of parts, substantially the same.

W. B. BILLINGS.

No. 7629.—*Improvement in Revolving Chambered Fire Arms.*

What I claim as my invention, and desire to secure by letters patent, is an improvement for fire arms, having a rotating breech with a series of parallel chambers, in combination with the locking holes of rotating chambered breech fire arms, substantially such as herein specified, making grooves leading to each locking hole, substantially in the manner and for the purpose specified, when this is combined with a bolt, independent of the mechanism which rotates the breech, and which bolt enters the lock by a spring, and is withdrawn by its connection with the lock, substantially as described.

And I also claim holding the rotating breech midway, or nearly so, between any two of the chambers, to prevent accidental discharges, by means of a recess or hole in the hammer or cock, fitting on to a projection of the rotating oreech between any two of the chambers, or vice versa, substantially as herein specified.

SAM'L COLT.

No. 7630.—*Improvement in Paint Mills.*

What I claim as my invention, and desire to secure by letters patent, is the broad depressions *b*, *b*, in the face of the muller *a*, when combined with the discharging grooves *c*, *c*, in the same, and with the plane surface of the bed *a'*, substantially in the manner and for the purpose as herein set forth.

W. W. DRAPER.

No. 7631.—*Improvement in picking Cotton from the Bolls in the Field.*

What we claim as our invention, and desire to secure by letters patent, is

First. The combination of the whipping cylinder M, with the picking disks A, A, and the strippers B, B, and also the combination of the whipping cylinder M, with the picking cylinders C, C, and the strippers D, D, substantially in the manner and for the purpose as herein set forth.

Second. We claim the combination of the picking disks A, A, and the strippers B, B, with the gathering planes L, L, and the cotton receptacle J, substantially in the manner and for the purpose as herein set forth.

Third. We claim the combination of the picking cylinders C, C, and the strippers D, D, with the gathering planes L, L, and the cotton receptacles K, K, substantially in the manner and for the purpose herein set forth.

SAM'L S. REMBERT.
JEDEDIAH PRESCOTT.

No. 7632.—*Improvement in Smiths' Strikers.*

What I claim as my invention, and desire to secure by letters patent, is attaching the raising and rebound springs, and the hammer, to the same adjustable frame, substantially as herein described, when this is combined with the adjustable attachment, between the hammer and the treadle, whereby the hammer can readily be adjusted to strike a flat blow on iron of different thicknesses.

MELCHI SCOTT.

No. 7633.—*Improvement in Camp Bedsteads.*

What we claim as new and of our own invention, and desire to secure by letters patent, is—First. So arranging the parts of a camp chest, that when it is unfolded in a direction parallel with its length, it will constitute a bedstead, which may be of the width of the inside of the chest, and when unfolded in a direction at right angles with its length, it will constitute a bedstead, which may be of the width of the inside of the length of the chest.

And Second. The arrangement by which a part of the front of the chest (B,) fig. 2, can be used as a table leaf, and the slides C, as seats at the table, substantially in the manner and for the purpose set forth.

WM. C. SHAW.
JAS. STALCUP.

No. 7634.—*Improved Exhaust Passages for Steam Cylinders.*

What I claim herein as new, and for which I desire to secure letters patent, is the two-fold outlet or steam passage from the cylinder into the exhaust valve chamber, which admits the steam above and below, and discharges it between the disks of the exhaust balance valve, and thus facilitates the insertion, withdrawal and adaptation to the exhaust side in the line of its stem or spindle of a balance valve, whose disks are cast in one piece, and are held down to their seats by the stress of steam.

GEORGE SHIELD.

No. 7635.—*Improvement in Mortising Machines.*

What I claim as new in the herein described mortising machine, and desire to secure by letters patent, is in combination with a device for giving the chisel a reciprocating motion, the device for giving it at the same time an oscillating motion, substantially as herein set forth.

SMITH SPENCER.

No. 7636.—*Improvement in Machines for Scribing Lumber.*

I claim the manner of operating the horizontal sliding carriage E, E, carrying the cutter blocks F, F, and cutters or scribers f, f, and the vertical sliding carriage I, I, carrying the cutter blocks F2, F2, and cutters or scribers $f2, f2$, in such a manner that they perform the duties in concert, without

interfering with each other, by means of the levers G, G, the rods h, h, the levers a, a, the straps e, e, the levers $i\,j, i\,j$, and weights k, k, in combination with the pulleys C, C, the straps J, J, the rods l, l, the levers K, K2, and the weights L, L1, the levers G, G, and the pulleys C, C, being hung upon the same shaft B, and operated by the same treadle D, substantially in the manner and for the purposes herein described.

JOHN SHELLENBERGER.

No. 7637.—*Improvement in Clover Hullers.*

What I claim as new and of my own invention, is the continuous wave form of the rubbers of the concave: and I further claim the continuous wave form of the rubbers, if it should be applied to the cylinder, instead of the concave.

ROBERT STADDEN.

No. 7638.—*Improvement in Plough Clevises.*

What I claim as new, and desire to secure by letters patent, is forming a plough clevis by means of two arcs of metal, of corresponding outward curvatures, having the point of attachment of the draught link to the martingale, for their common centre of curvature, in the manner and for the purposes herein set forth.

Second. I also claim, in combination with a fixed horizontal arc, having a slot between bearing edges, the vertical arc having notches on its inner curve, adapted to the bearing edges of the fixed arc, whereby the direction of draught may be varied horizontally or vertically, as required.

JOHN B. STONER.

No. 7639.—*Improvement in Friction Rollers.*

What I claim therein as my invention, and desire to secure by letters patent, is the friction rollers, each composed of a series of separate sections, held together by nuts, or otherwise, on a common spindle, in such manner that the spindle and roller sections usually turn together, but when any obstruction intervenes to stop the movement of any one section, and thus cause it to grind and flatten the adjacent sections with the spindle, continue to roll on, and by rubbing against the obstructed one, tend to move it past the obstruction, thereby preventing continued excessive wear on any one portion of its periphery: hence the irregular wear of any one of the sections will not affect the general roundness of the whole to such a degree as will materially impair the efficiency of this device as an anti-friction roller.

JOSEPH M. TOTTEN.

No. 7640.—*Improvement in Plough Cleaners.*

What I claim as my invention, and desire to have secured to me by letters patent, is the combination of the vibrating finger clearer, with the beam and sheath of the plough, said finger clearer being arranged in such a manner in relation to the sheath or throat of the plough, that by the use of the hand of the ploughman, to elevate and depress a lever, a series of curved or straight fingers will be made to vibrate back and forth, adjacent to the sheath, and clear away straw, stubble, and other obstructions therefrom, as described and set forth.

DAVID WARREN.

No. 7641.—*Improvement in Tailors' Measures.*

What I claim as my invention, and desire to secure by letters patent, is the use of the slides for laying off the division of the several measures for a coat, in combination with the fashion slides, for the purpose and in the manner herein set forth.

WILLIAM W. ALLEN.

No. 7642.—*Improvement in the Seeding Roller of a Seed Planter.*

What I claim as my invention, and desire to secure by letters patent, is the constructing a seeding wheel for a planting machine, by the combination of two parts *a* and *d*, of the form herein described, in such a manner that by turning one of the said parts within or upon the other, in one direction, the planting receptacles will be reduced in depth and size, and by turning the said part of the seeding wheel in an opposite direction, the planting receptacles will be enlarged in depth and size, substantially as herein set forth.

AARON PALMER.

No. 7643.—*Improvement in the Process of Working Gutta Percha.*

What we claim as our invention, and desire to secure by letters patent, under the first part of our invention, consists in the use of lime or other alkaline substance, with heat in the manner substantially as herein described, in the cleaning of gutta percha, to neutralize the acid or acids contained in that substance in its crude or native state, and thus preserve and render more permanent its useful properties, as specified.

And in the second part of our invention, we claim compounding lime with gutta percha, substantially as herein described, for the purpose of improving its qualities, preserving it wholly or partly from deterioration, and protecting it against the injurious effects of the atmosphere and heat, substantially as described.

S. T. ARMSTRONG.
CHAS. J. GILBERT.

No. 7404.—*Improvement in the Process of Preparing Cream.*

What I claim as my invention, and desire to secure by letters patent, is the process described herein of distilling milk, and condensing the same in sugar for the purpose of preserving the flavor, as set forth.

CHARLES DENNISON BIRDSEYE.

No. 7645.—*Improvement in Spike Machines.*

I claim the heading and carrying nippers *l*, *m*, in combination with the shears, the headed and the griping mechanism, the same being made to operate in connection therewith, substantially as above specified.

And in combination with the lower nipper, I claim the spring catches, latching and unlatching apparatus, applied to it for the purpose above specified.

WM. BLAKE.

No. 7646.—*Improvement in Machinery for Ginning or Picking Cotton.*

What I claim, is the combination of such parts as I have shown, forming a picking machine, and their mode of action, as hereinbefore described.

FRS. A. CALVERT.

No. 7647.—*Improvement in Processes for Preparing Wheat for Grinding.*

I claim the application of an acidulous composition to wheat or other grain, the said composition being principally vinegar; but I do not limit my claim to the exact composition of acids as herein described, while the same effects can be produced by the vinegar alone, or when combined with one or more of the other acids, especially with the sulphuric acid, for the purposes set forth.

JOSEPH W. CARPENTER.

No. 7648.—*Improvement in Paper Filers.*

What I claim therein as new, and desire to secure by letters patent, of the United States, are:—First. The arrangement and construction after the manner, substantially as described, of a box or receptacle for documents and papers, having a lid fitting loosely within it, which is made to press down upon the papers by a spiral or other suitable spring.

Second. The rod (*c*,) or its equivalent attached to the lid, and moving in the guide slits or apertures (*d*,) in the sides of the box, the said slits terminating in a notch or shoulder (*g*,) at their upper extremities, for the reception and retention of the rod during the manipulation and examination of the file.

W. A. COLLORD.

No. 7649.—*Improvement in Grain Harvesters.*

What I claim as my invention, and desire to secure by letters patent, is the application to a reaping and mowing machine, of two sickles working together in opposite directions, as set forth in the above specification and accompanying drawings, so as to throw the weight of the moving parts upon opposite sides of the centre of the crank or bit, for the purposes set forth.

EBENEZER DANFORD.

No. 7650.—*Improvement in India Rubber Hose.*

What we claim as our invention, and desire to secure by letters patent, is the making of flexible hose or pipe, by combining India rubber leather with a tube of rubber, substantially as herein described, the whole being united, forming one solid tube, making a strong, durable, and flexible hose, adapted as a substitute for leather, and other similar pipes for the conveying of fluids.

HORACE H. DAY.
RICHARD McMULLEN.

No. 7651.—*Improvement in the Plough Clevis.*

What I claim as new, and desire to secure by letters patent, is so making a clevis with teeth or prominences, and cavities on the front surface of a socket, matching with corresponding depressions or cavities, and elevations on the surface of a moveable bar, that the bar and socket when set together by a screw or other equivalent fastening in the required position, may have numerous bearings, and be wholly prevented from either sliding or revolving in any direction, without breaking the continuity of materials of which the parts are composed.

I also claim, in combination with a series of radial ridges, or a circle of cavities on the end of a clevis socket fixed at the extremity of the plough beam, a series of teeth, or of conical points on a moveable clevis bar, so adjusted to each other, that the guide hole of the clevis bar, may be held in any required position, and at any necessary distance from the axis of the beam, without relying on friction of the surfaces to prevent slipping, in the manner and for the purpose herein set forth.

GERRETT ERKSON.

No. 7652.—*Improvement in Printing Machines.*

What I claim as my invention, and desire to secure by letters patent, is the mode of representing letters, and the sounds of letters, by means of characters made by changes wrought upon a less number of moveable type, than the number of letters or sounds of letters represented. The type being made upon, or attached to the bottom of wires or rods, which are worked by keys at or near the top, substantially as herein set forth.

JOHN B. FAIRBANK.

No. 7653.—*Improvement in Corn Shellers.*

What I claim as my invention, and desire to secure by letters patent, is the device herein described, for twisting and forcing the ears of corn, between spring shelling plates, substantially as herein set forth.

SAM'L L. GRAVES.

No. 7654.—*Improved Tool for Forming Plaster Cornices and Mouldings.*

What I claim as my invention, and desire to secure by letters patent, is arranging a former, for making mouldings upon the walls and ceilings of a room, upon the diagonal of a square frame, and making an angle of forty-five degrees with each side of said square, for the purpose and in the manner described.

SYLVESTER GROESBEECK.

No. 7655.—*Improvement in Daguerreotype Plate Holder.*

What I claim as my invention, and desire to secure by letters patent, is the daguerreotype plate holder, constructed substantially as herein described, of a block with a spring edge, by which the plate is secured to it.

GEORGE MALLORY.

No. 7656.—*Improvement in Spring Beams to Ploughs.*

What I claim as my invention, and desire to secure by letters patent, is the adjustable spring bar, interposed between the point of draft and the frame of the plough, in the manner and for the purpose herein set forth.

WILLIAM MORRISON

No. 7657.—*Improved Roadway for Rail Cars and ordinary Vehicles.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of making rails for the roadways of streets, &c., by combining with the rails on which flanched car wheels run, outer faces of sufficient breadth for the wheels of common carriages to run, made curved or inclined from the top of the rail, substantially as described.

And in combination therewith, I also claim, making wide faces on the inside of the rails, substantially as described, for the wheels of common carriages to run on, as described.

JORDON L. MOTT.

No. 7658.—*Improvement in Cast Iron Car Wheels.*

What I claim as my invention, and desire to secure by letters patent, is a cast iron wheel in one piece, having the rim connected to the hub by two plates joined together at intervals, at points as small as may be, and nearly equidistant from the rim and hub, said plates being of such form, that each section by the plane of the axes, passing through the points of union,

shall present two pointed arches, uniting at the apex, the one springing from the ends of the solid hub, and the other from the edges of the rim; and a similar section between the points of union, shall bestow flat curved lines bending towards each other, and joining the ends of the solid hub with the edges of the rim; and a circular section passing through the points of union of the two plates, shall produce a double series of flat arches united to each other at their ends. The whole being constructed, substantially in the manner and for the objects herein set forth.

BENJAMIN SEVERSON.

No. 7659.—*Improvement in Sewing Machines.*

What I claim as my invention, and desire to secure by letters patent, is the machinery herein described, for making the stitch, viz: the combinations of the hook *v*, the plyer *w*, and needle *l*, as constructed and made to operate together, substantially as described.

JOHN BATCHELDER.

No. 7660.—*Improvement in Looms for Weaving Tapestry and Brussels Carpets.*

What I claim therefore, as my invention, and desire to secure by letters patent, is closing and opening the supports or guides, as they are raised, and depressed, to receive and support or guide the wires, and to liberate them in manner, substantially as herein described.

And I also claim, the employment of a stop motion in looms, for weaving looped or piled fabrics, in which the pile is formed on wires, for the purpose of stopping the loom whenever a wire fails to be introduced, substantially in the manner described.

E. B. BIGELOW.

No. 7661.—*Improvement in Processes for Refining Gold.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The process of dissolving alloyed gold, for refining it by developing nitric acid, or both nitric and muriatic acids gradually, from their salts, in the manner and for the purpose set forth in the specification.

Second. I claim the process of precipitating gold from its solution, and removing therefrom the insoluble chlorides, as set forth.

Third. I claim the process of refining alloyed gold, without the use of silver, so as to form a solution of gold and other metals, and a residue of chloride of silver and of other insoluble chlorides, and then precipitating metallic gold upon those insoluble chlorides in the same vessel without transfer, after the solution is effected; and afterwards dissolving out the insoluble chlorides from the gold, or reducing the insoluble chlorides to the metallic state in the wet way, and dissolving out the metals from the gold, all in the manner hereinbefore described. But I do not claim dispensing with the use of silver, except as a part of the main process herein described.

Fourth. I claim the process as described, of dissolving alloyed gold in wooden vessels, which may be made of any dimensions, corresponding to the extent of the operation.

Fifth. I claim the process as described, of dissolving alloyed gold, by blowing steam directly into the solvent liquids, all in the manner as herein before described.

JAS. C. BOOTH.

No. 7662.—*Improvement in Grain cleaning Machines.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the revolving slotted hollow barrel (B,) with the toothed wheels (F, F',) the same being arranged and operated, substantially in the manner and for the purpose herein set forth.

GEO. W. BOWERS.

No. 7663.—*Improvement in Machines for Fumigating Plants.*

I claim the combination in apparatus or instruments, for fumigating purposes, of a destroying magazine containing the fumigating or obnoxious substance, with a cylinder and exhausting fan or wheel, whereby the smoke is drawn in at one part of the cylinder, and driven out at another, and whereby, also the atmospheric air, necessary for the combustion of the substance, is drawn into it by the said fan or wheel, both as before described.

D. S. BROWN.

No. 7664.—*Improvement in Machines for making Ropes.*

What therefore I claim as my improvement, is to support the frame E, of the gears and strand spindles, on the main laying shaft alone, and combining with the said frame E, and the main frame of the machine, the lever U, or suitable machinery, whereby the said frame E, of the gears and strand spindles may be either clamped to the main frame, or so fastened, as to be prevented from revolving, while the main laying shaft and strand spindles are in revolution on their respective axes, or be unclamped, or unfastened therefrom, as occasion may require, and for the purpose of enabling the strands to be laid or twisted together, without previous removal from their spindles, as heretofore practised, and above described.

HENRY EVANS.

No. 7665.—*Improvement in Stop motion of Looms.*

What I claim as new, and desire to secure by letters patent, is the manner herein described, of securing the moveable reed bar and reed, while the filling is being put in, and releasing them after the filling is completed, by the combination of the levers G, G, having arms *d*, *f*, and snecks *e*, *e*, and the springs *h*, *h*, and H, the whole being arranged and operated in the manner, substantially as herein set forth.

ELIJAH HALL.

No. 7666.—*Improvement in the construction of Thrashing Machines.*

What I claim as my invention, and desire to secure by letters patent, is the thrashing cylinders, constructed of fast and loose sections, the fast sections of one cylinder being opposite the loose sections of another, substantially as herein set forth.

D. W. HARRIS.

No. 7667.—*Improvement in Burning Fluids.*

What I claim as my invention, and desire to secure by letters patent, is the compounding rosin and the essential oil of vegetables or grain, (when the same is produced by distillation of whiskey or alcoholic liquors, and thereby become a refuse article,) for the purpose of making a material from which to make gas; also for a burning fluid, as set forth herein, whether compounded in the precise proportionate quantities set forth or other quantities, which will produce, substantially the same result, all of which is fully set forth herein.

EPHRAIM HOWE.

No. 7668.—*Improvement in Machinery for drawing Hemp and parting its Fibres.*

What I claim as my invention, and desire to secure by letters patent, is the employment of two sets of holding and drawing rollers, substantially as herein specified, in combination with a rotating cam, (or cams,) or the equivalent thereof, for each sliver, in the manner and for the purpose, substantially as described.

O. S. LEAVITT.

No. 7669.—*Improvement in Casting Stereotype Plates.*

What I claim as my invention, and desire to secure by letters patent, is the employment of the dipper, constructed substantially as described, in the vertical casting of stereotype plates, in the manner herein set forth.

JASON M. MAHAN.

No. 7670.—*Process of reducing Gold Bullion.*

What I particularly claim as my invention and discovery, and desire to secure by letters patent, as a new and useful improvement in the art of refining gold bullion, is—

First. The reduction of argentiferous and other gold bullion, as a preparatory process in the art of refining thereof, into a pulverulent or spongy state, or a disintegrated molecular condition, by the means particularly of fusion therewith, and the subsequent removal by acids therefrom, of zinc or other metal, baser than silver, which will produce the desired effect, for the purpose of then separating by acids from such gold bullion, the silver and other impurities which it may contain, without quartation with silver, or any intermediate process, in order to fit the gold for coinage and other uses.

Secondly. I also claim, in addition to the above processes, the pulverizing by grinding, crushing, or percussion, of gold bullion, rendered brittle by union with lead, solder, or other like base metal, for the purpose set forth in the specification.

RICHARD S. McCULLOH.

No. 7671.—*Improvement in removing Electricity from Wool in the process of Manufacture.*

I claim as my improvement, in the manufacture of wool, the removal of electricity from its fibres, substantially in the manner and for the purpose herein set forth, but irrespective of the form, arrangement, or construction of the apparatus by which such removal of electricity is effected.

JOSEPH METCALF.

No. 7672.—*Improvement in Heating Elevated Ovens.*

What I claim as new, and desire to secure by letters patent, is the arrangement and combination of revertible flues in elevated ovens of cook stoves, in the manner and for the purpose herein described and represented.

P. A. PALMER.

No. 7673.—*Improvements in Machinery for Fulling Cloth.*

What we claim as our invention, and desire to have secured to the said Charles A. Read by letters patent, is the above described mode of fulling fabrics by means of toothed cylinders, by power machinery, the fabric being fed between the fulling toothed cylinders by means of feeding rollers, through guides with sufficient rapidity to prevent all strain upon the fabric, and at the same time to supply the fulling cylinders which receive the fabric, full it, and then pass it out between two cleaning rollers, which receive it from the fulling cylinders, prepared for other processes. The movements of the several parts of the machine being produced by a combination and adjustment of mechanism, similar to that herein described and represented, or any other which may be substantially the same, and by which analogous results may be produced.

CHARLES A. READ.
THOMAS COTTER.

No. 7674.—*Improvement in Water Wheels.*

What I claim therefore as my invention, and desire to secure by letters patent, is making the discharge aperture of the shutes moveable, relatively to the axis of the wheel, or the axis of the wheel moveable, relatively to the aperture of the shute, substantially as described, for the purpose of varying the effective diameter of the wheel, and thereby increasing or decreasing the velocity thereof, substantially as described.

TIMOTHY ROSE.

No. 7675.—*Improved Machine for Forming and Charging Percussion Caps.*

What I claim as new therein, and which I desire to secure by letters patent, is—

First. The combination of the several motions given to the sheet of metal, by which it is presented to the cutting punch by an intermittent motion from right to left, and vice versa, and when the edges are reached, reversing the direction, and at the same time advancing the sheet so that the blanks are punched in successive rows across the sheet, substantially as set forth.

Second. I claim the chisel (3,) moving with the punch stock (*c*,) by which the perforated sheet is cut into strips, for removing it piecemeal from the machine, substantially as described.

Third. I claim giving such a form to the slots of the carrying plate that the cups when lifted from the shaping die, are caught by them and taken on, substantially as described.

Fourth. I claim in combination with the slots of the carrying plate, the conducting groove, by which the caps are guided transversely in the slots, and made to present themselves accurately under the charger and polisher, and to drop out when completed, through the holes (16,) at the end of the slots, substantially as described.

Fifth. I claim operating the cap holder (33,) and the revolving polisher or pressing punch (31,) by a single cam in connection with the strong and weak springs (36 and 37,) substantially in the manner and for the purposes set forth.

Lastly. I claim the combination in one automatic machine of the several processes, by which the percussion caps are cut out of a sheet, shaped, charged, and the charge polished down, substantially in the manner described.

GEORGE WRIGHT.

No. 7676.—*Improvement in Wrought Iron Car Wheels.*

What I claim, is the combination of a rim E, with arms D, at the ends of the spokes C, by means of the inner flange F, and bevel E′, between the flange and opposite side of the rim.

HERRICK AIKEN.

No. 7677.—*Improvement in Cotton Stalk Harvesters.*

What I claim as my invention, and desire to secure by letters patent, is the combination of two saw-teeth wheels, with the frame, and supported thereby, and the triangular pieces of iron for disengaging the stalks, in the manner herein set forth.

STEPHEN BOWERMAN.

No. 7678.—*Improved Double Acting Rocker for washing Gold.*

What we claim as our invention, and desire to secure by letters patent, is the combination of the moveable pan with the gold washing rocker, so arranged and operated, as to give to the pan inside of the rocker, a double rocking or vibrating motion, sidewise and endwise, substantially as described in this specification.

ARNOLD BUFFUM.
PHILIP THORP.

No. 7679.—*Improvement in Mills for Grinding.*

What I claim as my invention, and desire to secure by letters patent, is the elastic cushion, inserted in the bottom of the socket of the cock head, substantially in the manner and for the purpose herein set forth.

W. P. COLEMAN.

No. 7680.—*Improvement in Slides for Seed Planters.*

What I claim as new therein, and which I desire to secure by letters patent, is the combination of the reversing slides (*k* and *l*,) with each other, and the hopper, by which the machine can be readily adapted to different varieties of planting, in the manner and for the purposes set forth.

ROBERT J. COLVIN.

No. 7681.—*Improvement in Vegetable Cutters.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the double edged reciprocating blade, with the hopper and removable bars, for slicing vegetables, substantially as herein set forth.

REUBEN DANIELS.

No. 7682.—*Improvements in Looms.*

I claim the combination of the stationary circular plate *d*, the gears *f*, *g*, *h*, and *i*, the circular box *a*, with the tubular shaft H, and the main shaft, the same being for the purpose of effecting the rotations of the cam shaft H, without any such exposure of gears as is customary in most other looms, and which are not only often productive of accidents to attendants or workmen, but often destroy or injure the shuttles when thrown out of the lay, by the action of the pickers.

I also claim the combination of mechanism, for operating the harnesses, when they are constructed substantially as specified, the said combination consisting of the supporting or radial bars *r*, *s*, *y*, *z*, of the harness frames M, N, the rocker shaft *q*, and tubular shaft *t*, the arm *v*, and its pin or stud, which enters the groove of the cam *w*, and the endless chain a^s, and fixed pulleys *a′*, *b′*, the whole being applied together and made to operate, essentially as above described.

I also claim the mode of constructing each of the harness frames, viz: of a combination of a bar and thread carriers as applied together, and made to operate, in the manner as above described.

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I also claim the combination of an endless belt c', or d', and its projection or picker f'', with each shuttle box and its picker staff, so as to constitute the floor or bottom of the shuttle box, and operate, and be operated in manner as described. This mode of constructing the shuttle box, in consequence of the belt moving with the shuttle, reduces the friction of the shuttle in its passage out of the box.

I also claim the combination of mechanism, for operating each picker staff, the same consisting of the cord and pulley attached to it, and the main frame, the spring of the foot of the picker staff, the spring latch on the lay, and the discharging cam or plane affixed to one of the harness frames, the whole being as above described.

I also claim the above described mode of making the race beam, viz: with elevations of plates x', x', x', to extend above it, and between and above the lower warp threads, and so as to constitute a support for the shuttle, in its passage over the race beam, the same enabling me to protect the yarns from injury from the shuttle, and to run the loom at a greater velocity than it would be safe to operate it with a race beam, constructed in the ordinary manner.

HALVOR HALVORSON.

No. 7683.—*Improvement in Rice Harvesters.*

What I claim as my invention, and for which I desire to secure letters patent, is the application of the vertical blade F, and wing attached to either, or both sides of a beam A, and their combination with each other, and the other parts of this machine running by hand or horse power. J. J. HERNDON.

No. 7684.—*Improvement in Saw Gates.*

What I claim as my invention, and desire to secure by letters patent, is raising and lowering the saw, for the purpose of using the whole cutting part of the same. OLIVER B. JUDD.

No. 7685.—*Improvement in Dash Boards for Carriages.*

I claim the arrangement of the winch shaped hand and foot lever (h, h,) in combination with, and the attaching the same to a jointed moving dash frame n, n, n, n, together also with the attaching of said jointed moving dash frame to the running gear part of the vehicle, instead of to the body part of the vehicle, as is usual. LEWIS LUPTON.

No. 7686.—*Use of Rosin Oil in Printers' Ink.*

What I claim as my invention, and desire to secure by letters patent, is the employment of rosin oil in the manufacture of printing ink, substantially as herein set forth. MOSES M. MATHEWS.

No. 7687.—*Improvements in Weavers' Shuttles.*

What we claim, and wish to secure by letters patent, is—

First. The combination and arrangement of friction levers in weavers' shuttles, in such a manner that the lever shall be allowed to vibrate towards, and from the bobbin, for the purpose of producing a more even tension, substantially as herein described.

Second. The combination and arrangement of a spring and cam surface, upon the friction lever, in order that as the friction lever is raised from its seat, the compression may be made more or less as desired, substantially as herein described.

JOSEPH MILNES.
WILLIAM MERKLAND.

No. 7688.—*Improved Auger Handle.*

What I claim herein as new, and of my invention, and desire to secure by letters patent, is securing augers and other tools, in their handles, by means of a tube attached to the inner half of one part, and an eccentric attached to the inner half of the other part of the handle, the eccentric part passing into the tube, and the eccentric fitting into the dovetailed grooved slot of the shank, substantially as herein described. GELSTON SANDFORD.

No. 7689.—*Improvement in Spring Callipers.*

What I claim as my improvement, and wish to secure by letters patent, is the circular spring enclosed within the hollow head, resting on the pivot on which the two parts turn, and acting on the two parts (or shanks,) throwing them outward against the nut on the cross bar.

WM. M. SMITH.

No. 7690.—*Improvement in Grain Driers.*

What I claim as new in my invention, and desire to secure by letters patent, is the revolving barrel, consisting of the wheels H, H, and the bars I, I, provided with arms h, h, carrying scrapers i, i, in combination with the troughs D, D, arranged one above another, in the manner substantially as herein set forth, for the purpose of drying meal, grain, &c.

CHAS. S. SNEAD.

No. 7691.—*Improvement in Construction of Endless Aprons in Thrashing Machines and Grain Cleaners.*

What I claim as my invention, and desire to secure by letters patent, is the method of constructing the closed metallic apron C, for separating grain, in the manner described. ASHLEY TOWNSEND.

No. 7692.—*Improved Door Spring.*

What I claim as my invention, and desire to secure by letters patent, is the door spring, consisting essentially of a spring, jointed lever, strap, and curved track, the latter being of the form herein described, to control the action of the spring, and the several parts, together with the door and the door frame, being arranged with respect to each other, substantially as herein described. AMOS WESCOTT.

No. 7693.—*Improvement in Straw Cutters.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the moving cleansing bar (j,) with the stationary blade (C,) substantially in the manner and for the purposes herein set forth.

I also claim the treadles (E, E,) constructed and arranged substantially as herein set forth, in combination with the cutter gate.

ISAAC WOODWARD.

No. 7694.—*Improvements in Shanks of Hay Forks.*

What I claim as my invention, and desire to secure by letters patent, is the constructing the hay, straw and manure forks with two or more tines, in a separate manner, and confined in a socket, as set forth in the above specification and drawings, or otherwise, substantially the same, in a way and manner so that either of the tines can be taken out of the socket, and another put in its place, if necessary.

DAVID ANTHONY, Sen.

No. 7695.—*Compound for Imparting a Gloss to Clothes.*

What I claim as my invention, and desire to secure by letters patent, is the within described compound of stearic acid, white wax, spermaceti, and quick lime, prepared as fully set forth.

WM. D. BEAUMONT.

No. 7696.—*Improvement in Presses for Copying Letters.*

What I claim therein as new, and desire to secure by letters patent, is the manner in which I have arranged and combined the two plates, or platens A and B, with the two levers E, E, and with the steel spring C, C, as set forth, the two plates being made to approach each other by the drawing apart of the levers E, E; the two bolts D, D, that are operated on by said levers, passing through the outer ends of the spring C, which is curved, and operates on the curved bottom of the plate B″, in the manner and for the purpose set forth.

GEO. BURNHAM.

No. 7697.—*Improvement in Hay Forks.*

What I claim as new in my invention, and desire to secure by letters patent, is the manner, substantially as herein described, of forming the tines *c*, *c*, and fitting them in the stock or handle, so that they can be secured in the stock or handle, either by the wedge shank *d*, of the centre tine D, or by a detached wedge *d*, of similar form, and the pin *b*, so as to make either a two tined or a three tined fork.

ALINZOR CLARK.

No. 7698.—*Improvement in Seed Planters.*

What I claim, and desire to secure by letters patent, is—First. The sliding link (*x*,) in combination with the lever (R,) the catch (S,) for working the seeding apparatus by the draught of the team, as set forth.

Second. I claim stopping the feeding, by slackening the bands, and the simultaneous elevation of the shovels, by the draught of the team, substantially as set forth.

DAVID EBERLY.

No. 7699.—*Improved Seeding Apparatus for a Seed Planter.*

What I claim as my invention, and desire to secure by letters patent, is the ratchet shaped vertically revolving feeding wheels, arranged and operated in the manner and for the purposes herein set forth.

G. S. GARDNER.

No. 7700.—*Improvement in Mounting the Cutters of a Mowing Machine.*

What I claim therein as new, and desire to secure by letters patent, is the method of constructing a revolving grass or grain cutter, so as to adapt itself to the varying surface of the ground, by means of hanging it by a universal joint on the end of a shaft, adjustable vertically, substantially as herein described.

GEORGE HART.

No. 7701.—*Improvement in Machinery for Doubling and Twisting Yarn.*

What I claim therein as new, and desire to secure by letters patent, is the stop wires, so constructed and connected with the head of the spindle, and with the strands of the yarn, that whenever any of the latter are broken or run out, the stop wires shall move and effect the disconnection of the machinery from the moving power, thereby stopping it, substantially as herein set forth.

MOSES HEY.

No. 7702.—*Improved Kettle for Manufacturing Comfits.*

What I claim as my invention, and desire to secure by letters patent, is the improvement in manufacture of comfits, by apparatus constructed upon the principle herein set forth, and consisting essentially of a pan moved by machinery, as herein described.

WM. H. HOLT.

No. 7703.—*Improvement in Gasometers.*

I claim the introduction of the secondary shaft, connecting by means of a wheel and pinion, with the drum shaft in the interior of the metre case.

Secondly. The arrangement, substantially as shown, by which the gas is passed at once into the interior of the drum, and removing the pressure from the chamber in which is the valve float, or by whatever means this effect is produced

T. W. LANE.

No. 7704.—*Improved Eaves Trough and Gutter Machine.*

What I claim as my invention, and which I desire to secure by letters patent, is the grooved moveable rib (*d*,) locking down to the mandrel, for the purpose of holding the beaded edges of the sheets while bending and soldering, and rising, to allow of inserting and removing the work, substantially as described.

I also claim, in combination with the revolving mandrel, the piece (*c*;) suspended on the journals of the mandrel, and resting when required, on the ledge (*a*″,) substantially in the manner and for the purposes described.

JOHN LEE.

No. 7705.—*Grain and Maize Harvester.*

What I claim as my invention, and desire to secure by letters patent, is the use of the revolving shaft D, in combination with a system of fingers, teeth, or knives, arranged on the shaft, as described, and for the purpose herein set forth, not confining myself to any particular size, shape, or curvature.

EDMUND QUINCY.

No. 7706.—*Improved Vulcanized India Rubber Spring.*

What I claim as my invention, and desire to secure by letters patent, is the employment of a ring or rings, or disks, made of any of the preparations of caoutchouc, known under the various appellations of metallic or vulcanized rubber, as a substitute for metal or other kinds of springs, heretofore known and used, when such ring or rings, or disk or disks, or the equivalents thereof, are applied, in manner substantially as herein described, in combination with a series of solid disks or plates, or their equivalents, substantially as herein described, whether made of metal or other solid or non-elastic substances.

I also claim making the surfaces of all or either of the plates above and below, and interposed between the elastic rings, or their equivalents, or the surfaces of the elastic rings, or either of them convex, substantially in the manner and for the purpose specified.

F. M. RAY.

No. 7707.—*Improvement in Sofa Bedsteads.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the frames D, D, which are of the same form as the sofa ends F, F, with the said sofa ends, substantially in the manner and for the purpose as herein set forth, to wit: when the back A, is elevated to convert the sofa bed into a sofa, the frames D, D, must be swung inwards against the sofa back, to retain it in an elevated position, and to throw the said frames out of the way and out of sight; and when it is desired to change the sofa bed from a sofa to a bed, the said frames D, D, can only be swung outwards, into a line with the sofa ends F, F, so that the ledges *l*, *l*, on the inner sides of the same will unerringly catch and retain the back A, when it reaches a horizontal position, as it is thrown rearwards, in which position the sofa ends F, F, and the swinging frames D, D, will form an ornamental and uniform head and foot to the bed form of my improved sofa bed.

RUSSELL SCARRITT.

No. 7708.—*Improved Grummet Strap.*

What I claim as new in this invention, is the mode of applying the above described strap, by encircling the rope therewith, and stitching or pegging the strap to the canvass, and so applying it as to insert the grummet through the strap and canvass, and this is what I desire to secure by letters patent.

ELI F. SOUTHWARD.

No. 7709.—*Improved Spring Grapple.*

What we claim, therefore, is not a set joint, but the arrangement of the tongs shaped spring talons and set joint, constructed and acting as herein described.

ORRA WARNER.
CHARLES S. GAYLORD.

No. 7710.—*Improvement in Cast Iron Car Wheels.*

What I claim therein as my invention, and for which I desire to secure letters patent, is the combination of the arch at the centre with the curved plate, and arms or brackets, connecting the hub and rim, in the manner and purpose set forth.

NATHAN WASHBURN.

No. 7711.—*Improvement in the Adjustment of Knives in Straw Cutters.*

What I claim as my invention, and desire to secure by letters patent, is the mode of attaching the knives to the permanent arms, by means of the pendulous or moveable arms rotating on the shaft, and secured to the permanent arms, by means of screw bolts passing through elongated holes in the moveable arms, thereby allowing the cutting edge of the knives to be placed at any required angle necessary for adjusting them to the bed cutter or shear, in combination with the moveable box, for regulating the mash of the cog of the pinion into those of the wheel, substantially as described.

JOSEPH W. WEBB.

No. 7712.—*Improvement in Portable Bedsteads and Sacking Bottoms.*

What I claim as my invention, and desire to secure by letters patent, in the making of a sacking bed of canvass, or other cloth, to be suspended from the edges, is the insertion of gores to fit the same to the swell of the body at the shoulders and hips, substantially as described.

And I also claim, making the frame of a portable bedstead, substantially as herein described, of a series of posts connected and combined together longitudinally and laterally by braces on the principle of the lazy tongs, the said braces being connected with the posts by means of joints and slides, substantially as herein described.

SAMUEL WHITEMARSH.

No. 7713.—*Improvement in Warm Air Registers.*

What I claim as my invention, and desire to secure by letters patent, is the manner in which I have combined the screw, racks, and segments of pinions, and the application of this combination to the purpose herein described, viz: that of opening and closing the valves of warm air registers.

PETER G. WOODSIDE.

No. 7714.—*Improvement in Looms for Weaving Figured Goods.*

What I claim to have invented, and desire to secure by letters patent, is as follows:

First. The arrangement of machinery for throwing the shuttles as herein described, in connection with the arrangement of the machinery for raising and lowering the shuttle boxes; the devices thus arranged, occupying the under part of the loom frame and being more simple, compact, and convenient than other arrangements heretofore in use, for the same purpose.

Second. The winding of the cloth round the beam with uniform tension by increasing the leverage of the weight M^3, in proportion as the diameter of the roll of cloth is increased, substantially as herein described.

Third. In combination with a positive let-off, I claim the use of a conditional let-off, constructed substantially as herein described, whereby, when there is an excess of strain on the warp threads an increased quantity of yarn is delivered from the yarn-beam; such conditional increased delivery of the yarn ceasing whenever the proper strain on the warp thread is restored.

Fourth. The preventing the opening and closing of the shed from producing an increased or diminished strain upon the warp threads, by means of the regular and positive advance of the let-off rolls toward the harness through an invariably equal distance at every opening of the shed, and by their return through the same distance at every closing of the shed, substantially as described.

Fifth. The causing the loom to throw itself out of gear, whenever a shuttle fails to go into its proper box at the proper time, and whenever the connection formed by any weft thread between its shuttle, and the cloth is not maintained during the whole of the passage of that shuttle through the warp thread, by the operation of the hooks combined with each other, and attached to the bed of the lay, substantially as described, the hooks being in the latter case combined with wires or prongs for the reception of the weft thread, substantially as described, and operated by the passage of the shuttle into the shuttle box, substantially as described.

Sixth. Forming and breaking in any required order, the connection between the draught boards respectively and the machinery that works them, by means substantially such as are herein described; this method of working the draught boards admitting of a more simple, compact, and convenient arrangement of the machinery than others before used to attain the same end.

Seventh. The combination of a rising and falling jacquard frame, with the draught boards, substantially as herein set forth; whereby the depression of the frame will be simultaneous with the elevation of a part of the draught boards, and the elevation of the frame with the depression of a part; the one in this manner aiding in working and equipoising the other.

Eighth. Elevating and depressing the harness and draught board, by the simultaneous elevation or depression of all the knot boards for the purpose of opening the sheds in looms for weaving figured fabrics when these knot boards are arranged above the draught boards, as herein described.

Ninth. In connection with the movement of the part of the jacquard, to which the harness is attached, substantially as described, I claim the arrangement of the harness and of the movement parts of the jacquard, and of their connections with the lower part of the loom, substantially as described, in such manner, that at the time when the loom is to be thrown out of gear, the weight of the harness and of those parts and connections, shall oppose the greatest possible resistance to the momentum of the loom.

Tenth. I claim the use as a part of the jacquard machine, of the combination of the machinery herein before described, as shown in fig. 4, of the accompanying drawings, such combination consisting of the two slides Y^{10}, the two springs Z^{10}, and the two needles Q^{10}, constructed substantially as described, and operating so as to permit the draught board to come down without crowding out the cylinder or prism, substantially as described.

AVERY BABBETT.

No. 7715.—*Improvement in Braces for Carriage Tops.*

What I claim as my invention, and wish to secure by letters patent, is the construction and arrangement of braces for carriage tops, so that when one limb or part of the brace is turned upon a prop, fulcrum or pivot, all the joints of such brace are simultaneously moved or operated, substantially as shown in the drawings. I also claim the adaptation of a graduating strap, loop or similar device, so as to secure the top at any desired elevation, as herein set forth.

JNO. L. ALLEN.

No. 7716.—*Improvement in Filtering Cocks.*

What I claim as my invention or improvement, is the combination of parts arranged, constructed, and made to operate together, substantially in the manner herein before set forth, the said combination consisting of the box or case A, the tubular passage way B, having three discharging orifices G, H, I, the turning or hollow plug C, made with a discharging orifice E, the central and two lateral chambers K, *i*, *k*, the passages connecting the openings G, H, with the chamber *k*, *i*, the self-operating valves, and their stem, and seats and valve openings; the passages leading out of the bottom of the two lateral chambers, the central discharge pipe leading out of the chamber K, the partitions *s*, *t*, and the filtering medium, having wire gauze chambers, as above specified, or being used without them, as occasion may require.

DANIEL BARTLETT, Jr.

No. 7717.—*Improvement in Looms.*

What I claim as my invention, is the combination of the vibrating posts and springs applied to them, as arranged and adapted to the loom frame, and the operative parts with which they are connected, substantially in the manner and for the purpose of easing the web, without varying its horizontal position, as herein before specified. A. H. BOYD.

No. 7718.—*Improvement in Machines for Pulverizing Sugar.*

I claim as my invention, the combination of a rotative series of cells, a rotative series of stampers, suitable machinery for actuating the stampers, and a cylindrical mortar, when arranged and made to operate together, and to receive, pulverize, and expel sugar or other material, substantially in the manner as herein before specified. O. R. CHASE.

No. 7719.—*Improvement in Hemp Harvesters.*

What I claim as my invention, and desire to secure by letters patent, is

First. The box on the right marked Q, which is a constant oil retainer.

Second. The combined sides X, X, and spring bottom R, R, for catching and laying the hemp, &c.

Third. I claim casting (or securing in any firm manner,) choppers on a rock shaft N, with the edges chisel shaped, and set so as to strike obliquely against the top and right edges of the teeth P, where the part N, moves by a lateral and semi-rotary motion in procuring this combined motion. I employ a male and female screw thread, as already fully described in the preceding part of these papers. I do not desire to be understood as confining myself to the screw in getting this motion in N, but will employ any other method most suitable to produce the desired result, and which shall be substantially the same. WILLIAM BAILY COATES.

No. 7720.—*Improvement in Grain Cradles.*

What we claim as our invention, and desire to secure by letters patent, is the particular construction and arrangement of the brace rods *c*, so as to fold down upon the fingers, as shown in fig. 2, each being bent in the proportionate angle, fitting their respective localities, the ends thus bent pass through the fingers perpendicularly at *d*, and are secured by rivetting the same upon the upper side of the fingers, which shape and form given to the wire braces, forms and constructs a hinge joint, and each may be turned or swayed in the direction desired, and when separated from the sneath, each wire brace is placed in the position as represented by fig. 2 aforesaid, permitting large numbers to be packed in a condensed form, in packages or boxes convenient and proper for removal, storage, or transportation, substantially the same as herein before set forth and described. ISAAC T. GRANT.
DAN'L H. VIALL.

No. 7721.—*Improvement in Pegging Jacks.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the two jaw blocks and the double spring connecting rod, as constructed and made to operate together, and in connection with the other parts of the apparatus, substantially as herein above specified.

JACOB JENKINS.

No. 7722.—*Improvement in Machines for Folding Paper.*

My improvement or combination, as invented and claimed by me, consists of the following elements:—First. A slotted plate B, table or contrivance for receiving and supporting the sheet.

Second. Two parallel planes or plates (L, M,) extending at right angles from such support, and so arranged that there shall be one of the said plates on each side of the slot *b*, of the first element or support of the sheet.

Third. A striking and folding frame or plate (D,) so arranged and operated as to press the paper against the middle or other proper part of it, force it downwards through the slot, and between the two parallel plates: the said parallel plates operating to complete the fold, and to hold the sheet of paper during the return or retrograde movement of the striking frame or plate: and in combination therewith, I claim a second striking and folding plate N, arranged at right angles to the said two parallel plates, and made so to pass or operate through them or their slots, and directly after the said retrograde movement of the first one, as to press against the sheet of paper, and force it through one of the said slots, and thereby once more, or a second time fold it.

And I claim, in combination with such second combination of mechanism, a third striking and folding plate (R,) and slotted parallel folding plate S, and friction rollers (*p, q*,) or equivalent contrivances, the same being for supporting the thrice folded sheet of paper, folding it a third time, and subsequently discharging it, such discharge taking place in consequence of the return or retrograde movement of the striking or doubling plate, as above described.

And I also claim the combination of mechanism which is applied to the striking plate, and its rollers or folding contrivances, and used for packing the sheets; the said mechanism consisting of the stationary plate T, and the spring plate U, or plate and its springs, or other proper equivalents, which permit the recession of the plate in proportion as the pack of sheets increases in size; the whole being arranged and made to operate together, substantially in the manner as herein before specified.

GEORGE K. SNOW.

No. 7723.—*Improved Machine for Excavating and Conveying Earth.*

What I claim, and for which I wish to obtain letters patent, is the combination of the series of elevators, with the scoop, and a rising and falling earth bed, furnished with an apparatus for emptying the same, the whole arranged and acting substantially as herein described.

I also claim a regulator to the scoop, attached in the manner and for the purposes herein specified.

JOHN A. SPRAGUE.

No. 7724.—*Improvement in Molasses Gates.*

What I claim, is the arrangement of the spring, the turning shaft, and their bearings at one end of the gate, and on the side of the screw or seat tube, substantially in the manner above specified, the same giving to my improved molasses faucet, several important advantages over that described in the said patent numbered 3002.

ERASTUS STEBBINS.

No. 7725.—*Maize Harvester.*

I wish it to be understood, that I do not limit myself merely to the various parts herein described, when combined together in a single machine, as some

of these parts may be used without the others; neither do I limit myself to the precise combination of parts described in this specification, as portions of one machine may be used in connection with portions of the others, thus constituting new machines, operating upon a common principle; but what I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of separating the ears of Indian corn from the standing stalks on which they grow.

I also claim, in combination with the gathering forks, apparatus for husking and shelling the corn, substantially as herein set forth, whereby the gathering, husking and shelling of corn, are performed at a single operation.

WILLIAM WATSON.

No. 7726.—*Improvement in Suspender Buckles.*

What I claim as my invention, and desire to secure by letters patent, is the connecting of the wire forming the tongue of the buckle, to the outside plate, by means of an eye or hinge formed by bending a portion of the plate, thus making the whole buckle of but two pieces of metal, also bending or forming the wire which forms the tongue of the buckle, in such a manner as to make a lateral spring for securing itself in its proper place, and also the method of securing the points of the tongue by the lateral hooks or guards, curved from the sides of the plate in such a manner as to receive and partially or entirely cover the points of the tongue, and the whole of these contrivances arranged, connected, and combined, substantially as herein described.

CHARLES BENEDICT.

No. 7727.—*Improvement in Feeding Apparatus for Straw Cutters.*

What I claim, therefore, is the use and employment of the adjustable and compressing lid C, in combination with the feed roller and a cutting-box, having an adjustable block piece to contract the mouth of it, and so arranged as to present the straw or stalk obliquely at different angles to the action of the knife, and compress it while under its edge, substantially in form and manner as herein set forth.

HENRY H. BERTHOLF.

No. 7728.—*Improvement in Cheese Presses.*

What I claim therein as new, and desire to secure by letters patent, is the elastic strap for raising the platen rod, arranged and operating substantially as herein set forth.

J. CARD.

No. 7729.—*Improvements in Machines for Making and Holding Cores for Casting.*

What I claim as new, and desire to secure by letters patent, is the combination of the two moving jaws O, O, with the stationary piece A, said moving jaws being shaped and actuated, substantially in the manner and the mechanical devices herein specified.

I also claim keeping the cores straight and stiff in the flasks, without the use of anchors, by means of contrivances substantially such as are herein described.

LUTHER H. CROCKER.

No. 7730.—*Apparatus for Reversing or Stopping Locomotive Engines.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement and connection of the system of devices, consisting substantially of a rock shaft (M,) with its hand lever (O,) and arms (H,) link rods (*c*, *q*,) helical segment (G,) drum (F,) sliding key (D,) and oscillating arms (*k*,) together with the eccentrics and valves, with their respective rods, by means of which the movement of the steam valves of a locomotive engine can be arrested or reversed, with proper lead, to reverse the motion of the locomotive by a single movement of the hand.

JAMES CUNNINGHAM.

No. 7731.—*Improvement in Cotton Presses.*

What I claim as my invention, and desire to secure by letters patent, is the employment of the press herein described, so arranged that it may be conveniently charged in an upper story of the building in which it is placed, and actuated and uncharged in a lower story of the same, substantially as herein set forth.

J. T. ELLIOTT.

No. 7732.—*Improvement in Subsoil Ploughs.*

What I claim as my invention, and desire to secure by letters patent, is the scoop instrument A, A, with the combination of the cutters in the rear, as a subsoil plough.

WM. C. PAGETT.

No. 7733.—*Improvement in Apparatus for Releasing Horses from Carriages.*

What I claim as my invention and improvement, is combining two tapered trace bars F, F, with the flexible lever or disengaging strap I^2, attached to the upper end of the curved confining box plate J, projecting outward from the swingle tree A, in which the flexible lever I^2, and ends of the tapered trace bars F, F, fit, and are properly secured with the traces, by the curve of the box plate J, and a guard or holder L, attached to the flexible lever I^2, and fitting into the cavity of the box plate J, directly over the ends of the trace bars F, the disengagement being effected by drawing a cord K, attached to the flexible lever I^2, which will cause it to approximate to a straight line, and with it elevate the ends of the trace bars F, and liberate the same from the curved box plate J, as fully set forth.

TAPLEY B. PYRON.

No. 7734.—*Improved Wrought Iron Railroad Chair.*

What I claim as my invention, and desire to secure by letters patent, is a wrought iron railroad chair, with lips formed from that portion of the plate on which the rail is usually supported, substantially as herein set forth.

EDWARD S. RENWICK.

No. 7735.—*Improvement in Preparing Beefsteak for Cooking.*

What I claim as my invention, and desire to secure by letters patent, is preparing beef and other steaks for cooking, by running them through toothed rollers, substantially as set forth and described in the specification and drawings.

THOMAS G. STAGG.

No. 7736.—*Improvement in Fastenings of Coulters to Ploughs.*

What we claim as our invention, and desire to secure by letters patent, is the construction of the double plates, held in parallel position by the combined action of the coulter and the bolts K, K, substantially as described, and for purposes as above set forth.

AUSTIN WHITTLESY.
AUSTIN K. WHITTLESY.

No. 7737.—*Improvement in Processes for Manufacturing Alum.*

What I claim as my invention, and desire to secure by letters patent, is the obtaining of alum by the action of sulphuric acid, or its equivalent, upon the substance called green sand marl, or simply marl.

JACOB HENRY WURTZ.

No. 7738.—*Improvement in Printing.*

First. I claim marking on the shank and foot of types, by any convenient means, such as writing, engraving, casting, or electrotyping, the same letter or character, which is formed on its upper surface, and also the method herein shown and described, of casting the intaglio letters on the shank and foot of the types at the same time that the type itself is cast.

Second. Making types, having the combination with the usual letters in relief on the face of the type, intaglio letters on the foot thereof, for the purpose of serving as matrices, from which to obtain a polytype plate, while the types themselves will serve for printing.

Third. I claim casting spaces on the sides of the ordinary type for the purposes above mentioned, as above described.

Fourth. I claim the peculiar mode herein shown and described, of polycomposing, either from the ordinary cases, or from what I call the authoriton.

Fifth. I claim the process and apparatus herein shown and described, for facilitating the sorting and distributing of types and spaces, and making part of them of wood and iron, so that the wooden portion may be separated by means of water, the iron ones by a permanent or temporary magnet, and the others into their several receptacles by hand, the workman being considerably assisted in this operation by the type being marked on their sides.

Sixth. I claim the apparatus shown in figs. 8, 9, and 10, which I denominate the authoriton, and also of the use of copying sticks, shown in figs. 13, 14, and 15, for the purpose of facilitating composition, by which the above described types are brought into a convenient space for composing from, as herein before described.

BARTHOLOMEW BENIOWSKI.

No. 7739.—*Improvement in Electro Magnetic Enunciators for Signals in Hotels, &c.*

What I claim as my invention, and desire to secure by letters patent, in my improved electro magnetic enunciator for hotels, &c., is the manner in which the signal bell and any one of the signal plates can be simultaneously acted upon, at a distance from the enunciator, through the medium of the galvanic battery O, the series of electro-magnets A, and *g*, *g*, and the wires *k*, *l*, *n*, *n*, connected with each other, with the insulated point and the shank of the knob P, located within the walls of the different rooms, and with the bell S, and signal plates B, B, of the insulator, substantially in the manner herein set forth.

CHAS. S. BULKLEY.

No. 7740.—*Improvement in Winnowing Machines.*

What I claim therein as new, and desire to secure by letters patent, is the combination of the additional bottom board M, with the elevated fan O′, and fan case O, for the purpose of diminishing the space between the discharging board E, and screens, for concentrating the blast beneath, and in contact with the screens, for the purpose described.

J. G. GOSHON.

No. 7741.—*Improvement in Car Couplings.*

What therefore, I claim as my invention, is the improvement whereby the cars are connected or disengaged, under the above named circumstances, or in other words, I claim the combination of the suspended extension pin I, with its weighted pin or arm *h*, or any mechanical equivalent therefor, the hinge H, and the buffer socket to which they are applied, the same being constructed and made to operate, substantially as set forth.

NATHAN HASKINS.

No. 7742.—*Improvement in Corrugated Boilers.*

What I claim therein as new, and which I desire to secure by letters patent, is the employment of corrugated plates of metal, for forming the curved arches of fire chambers, and shells of steam boilers, the corrugations running in the direction of the curves, substantially as described.

RICHARD MONTGOMERY.

No. 7743.—*Improvement in Bedstead Fastenings.*

What I claim as my invention, and desire to secure by letters patent, is the construction and application of a triangular or forked plate of iron, made in such a manner, as that it can be secured to its place and draw the post and rail firmly together, by means of an eccentric or cam, substantially as above described.

JOHN MORRISON.

No. 7744.—*Improvement in Rotary Grain Screens.*

I claim the construction of a rolling screen consisting of a large and fine, and small, and coarse part, in combination with conductors D, to carry the grain from the large to the small part, for the above mentioned purpose, and substantially as above described

DAN. PEASE, Jr.

No. 7745.—*Improvement in Machinery for Pressing Hats.*

I do not claim merely so arranging the smoothing irons that they can all by a single movement be simultaneously brought over the block, I only claim this, when the irons are also at the same time and by the same movement brought into the requisite contact with the top and sides of the crown, and with the brim of the hat, to smooth and compress the same, substantially as herein specified.

I likewise claim the devices herein described, or their equivalent, for rendering the crown iron self-adjusting, with respect to the brim iron, so that the pressure of the crown iron, will be co-etaneous with that of the brim irons, without affecting the relative degree of pressure with which they respectively bear upon the surfaces, to be smoothed by them, substantially as herein set forth.

BENNETT POTTER, Jr.

No. 7746.—*Improvements in Machines for making Wrought Iron Car Wheels.*

What I claim as my invention, and desire to secure by letters patent, is the forging of solid wrought iron wheels, when made by drop and die, the use of a lower die or anvil, made to revolve during the process of forging, horizontally on a central vertical axis, either by hand, or by the machinery, which operates to drop the ram or hammer, substantially as set forth in the above specification.

NATHAN STARKS.

No. 7747.—*Improvement in Reed Musical Instruments.*

What I claim as my invention, is the improvement of the vibration string, or strings, wire or wires *e*, *e*, *e*, *e*, in their combination with the wind chest, the same being made to be vibrated by the air, in its passage into or through the wind chest, substantially as specified.

I also claim the above described extension or elongation of the passage *l*, in combination with the improved arrangement of the reed and valve opening, the said arrangement, consisting in placing the reed not directly over the valve opening, but at a distance therefrom, and in said passage, substantially as specified.

JAMES P. SLEEPER.

No. 7748.—*Improvements in Machines for Nicking the Heads of Wood Screws.*

What I claim as my invention, and desire to secure by letters patent, is interposing a spring between the griping jaw, and the lever or cam by which it is operated, in the manner substantially as herein described, and for the purpose specified.

I also claim making the spring, which is interposed between the griping jaw and the mechanism which operates it, so that its tension can be varied and regulated, in the manner and for the purpose specified.

And I also claim, causing the griping jaw to open slightly, after it has seized the blank, to permit the blank to assume its proper position, between the jaws, before it is finally griped, in the manner, substantially as herein specified.

THOS. J. SLOAN.

No. 7749.—*Improvement in Spike Machines.*

What I claim therein as new, and which I desire to secure by letters patent, is—

First. The adjustable cutter (5,) when in such position, with regard to the dies for holding the spike, that the rod forming the spike is both cut off, and the proper bend given to it, to form the head at one and the same operation, during which, the spike is held stationary, substantially in the manner described.

Second. I claim the jaw (3,) of the swage, kept open by a spring, in combination with the moving swage (2,) and the stationary swage (6,) the swage (2,) having an inclined face, which acting on a similar face on the back of the jaw (3,) closes it for forming the point for the spike, whether placed in front of the revolver, to point the rod, or behind it to point the spike, constructed substantially as described.

H. N. SWIFT.

No. 7750.—*Improvement in Machines for Dressing Irregular Forms.*

What I claim as new, and desire to secure by letters patent, is the toothed wheel *i*, upon the shaft S, arranged so that it is capable of being thrown in gear with either of the racks *d*, *d*, in combination with the dog S, on the slide D, and the notched projection on the table B, by which the slide is locked to, or unlocked from the table, for the purpose of enabling the wheel *i*, to give either a rectilinear motion to the said slide D, or a circular motion to the table B, as may be required, in the manner and for the purposes, substantially as herein set forth.

ALANSON CARY.

No. 7751.—*Improvement in Rotary Pumps.*

What I claim as new, and desire to secure by letters patent, is the two pistons, acting alternately with each other as rotary pistons, and as stationary partitions, in connection with the arms and apparatus, by which they are worked, substantially as above set forth.

WILLIAM H. DAVIS.

No. 7752.—*Improvement in Furnaces for Steam Boilers.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as described, of the making the box lining of furnaces, with a partition or division plate or plates, between the inner lining and outer shell, to direct the current or currents of air before entering the fire, substantially for the purpose and in the manner specified.

I also claim the manner of arranging the furnace door with its interior plate or lining, in combination with the tube or apertures for blowing or forcing in air, steam, or other cooling medium, between the door and said plate, all as herein described, irrespective of form, and also of the manner of producing the forced current of the cooling medium. F. P. DIMPFEL.

No. 7753.—*Improvement in Washing Machines.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of three vertical presses or washers, in combination with the fan, arranged and operated in the manner, and for the purpose above set forth.

R. A. FISHER.

No. 7754. [Sam'l W. Hawes,—cancelled.]

No. 7755.—*Improved Valves for Governors.*

What we claim as our invention, and desire to secure by letters patent, is making the valve openings of governor valves, to widen from the closed towards the fully open end, and also in such a manner, that when the governor acts upon the valve under low speed, it shall cause the opening or closing of that part of the steam passage, where the rate of widening or narrowing of the passage, is more rapid than at the parts at which the valve acts at high speeds.

Second. We also claim forming valve openings, substantially as described, in fig. 4, whatever may be the number of openings in to which the space or valve seat is divided, and whether the said openings are made in plane or curved surfaces.

Third. We also claim the spring set screw, re-acting against the pressure of steam in the valve, not only for relieving the valve from friction, but also for causing it to recede slightly from its seat when the valve approaches its open position, whereby an increased flow of steam is permitted, and the rate of flow augmented the more the valve opens, or the tension of steam diminishes, as herein set forth.

Fourth. We also claim, in combination with a valve lever, adjustable to the stem of the valve, an indicator not adjustable, for the purpose of setting the valve in any required position without opening the valve box.

JUNIUS JUDSON.
ALFRED JUDSON.

No. 7756.—*Improvement in Straw Cutter.*

What I claim as new in my invention, and desire to secure by letters patent, is the application and use of rotary spiral cutters D, D, which are self-

feeding, in combination with a stationary knife, or cutting edge, in the manner and for the purpose, substantially as described.

A. S. MACOMBER.

No. 7757.—*Improvement in Lime Kilns.*

What I claim therein as new, and desire to secure by letters patent, is:

First. The construction of an upper tier, or tiers of arches, in the manner and for the purpose herein fully set forth.

Second. I claim the recesses or openings F, F, in combination with an upper tier or tiers of arches, for the purpose of creating a draught through the structure, after the lower arches have become stopped up.

WILLIAM McCOY.

No. 7758.—*Improvement in the Running Gear of Carriages.*

What I claim, is the axles of the wheels having racks on their inner ends, meshing into central cog wheels, the front one of which meshes into a segmental rack on the inner end of the pole of the carriage, the whole being constructed, arranged, and operating in the manner, substantially as described.

JOSEPH PINE.

No. 7759.—*Improvements in Operating the Copping Rail of Cop-Spinners.*

What I claim as new in my invention, and desire to secure by letters patent, is changing the direction in which the ring rail is moved, and the speed at which it is operated, for the purpose of governing the winding of the thread on the cop, and forming a bind thread, by means of the combination of the shaft M, having a toothed wheel N, and smaller wheel O, fast upon its axis, with the shaft R, having on it a fast toothed wheel S, and a loose smaller wheel or pinion V, operated by shifting belts and pulleys, or other similar changing or reversing gear. WANTON ROUSE.

No. 7760.—*Improvement in Hardening Fats and Oils.*

What I claim as my invention, and desire to secure by letters patent, is the hardening of fatty or oily substances, without separating the stearine from the oleine to such a degree, that they can withstand a heat of at least 135 degrees Fah. without melting; using for that purpose, the ingredients of cera japonica and gum elemi, in the manner and proportions above described, which will produce the intended effect.

CARL WILHELM SCHINDLER.

No. 7761.—*Improvement in Clamps for Girding Emery Wheels.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the screws F, and G, and toggle joints C, C, with the jaws B, B, substantially as herein described and set forth, for the purpose of producing, first tension of the girding substance, and then the compound motion of the jaws in closing together, and settling down to the object on which the machine rests. HENRY S. VROOMAN.

No. 7762.—*Improved mode of Fastening Hooks and Eyes upon Cards.*

What I claim as my invention, is the putting on of the hooks and eyes, in such a manner upon paper perforated as herein described, that the points of the hooks are upon one side of the sheet, and the eyes upon the other side, thereby securing the eyes against dropping off from the hooks. I claim nothing in regard to the manner of perforating or folding the paper, nor for any other method of putting hooks and eyes upon perforated paper, than the method herein described.

E. J. WARNER.

No. 7763.—*Improvement in Fly Brushes.*

What I claim as new, is so constructing and adapting the revolving fan or brush, that it may be placed like a lamp upon a table, or may be fixed to the walls or ceiling of a room, or that it may be suspended by a cord over a bed, sofa, or cradle, by the means herein fully described.

SAMUEL R. WILMOT.

No. 7764.—*Improvements in Apparatus for Stretching and Smoothing Cloth.*

What I claim as my invention, is the combination of the revolving platform, or table W, and the guide roller or apparatus X, with the series of stretching rollers; the whole being substantially in the manner and for the purpose as herein before specified.

JOHN BUTCHER.

No. 7765.—*Improvement in Portable Furnaces.*

What I claim as my invention, and desire to have secured to me by letters patent, is a summer furnace in which the draft is derived to the fire chamber from the exterior of the furnace and at the bottom of the same, and passes first up through a flue chamber, (formed between the partition *i*, *i*, and the periphery of the furnace as above set forth,) and then down through the fuel, all as herein above set forth, and for the purpose specified.

JOHN P. HAYES.

No. 7766.—*Improvement in Processes for Curing Meat.*

What I claim as my invention, and desire to secure by letters patent, is the method of curing meat, by placing it with brine within a vessel, and then subjecting it to the combined action of agitation, and an alternate increase and diminution of atmospheric pressure, substantially as herein set forth.

GEORGE STARKWEATHER.

No. 7767.—*Improved Filter for Oils.*

What I claim as my invention, and desire to secure by letters patent, is the use of a filter formed as described, carried downwards by pressure, under the force of which the oleic acid is filtered upwards, and which, applied in connection with the arrangement described for applying cold, allows oils and fats to be purified in warm weather.

THOMAS ANTISELL.

No. 7768.—*Machine for making Jack Chains.*

What we claim as our invention, and desire to have secured to us by letters patent, is the combination of the parts, movements, and operations, in one machine, which are required to make jack chains by one process, from the straight wire, after it is cut off in suitable lengths, to finished chain, substantially as described.

We also claim, particularly, the stud pin with a recess in it, substantially as herein described—that is, the use of it as a mandrel, around which the bow of a link is bent, while the bow of another link is held in the recess, thereby forming a continuous chain, and irrespective of the mechanical devices by which it is moved or used.

We also further claim, the partly revolving mandrel with its stud and nipper, and other appendages, for bending the last bow of each link, substantially as combined and used in our machine, and constituting part of it.

CHARLES ATWOOD.
GEORGE KELLOGG.

No. 7769.—*Improvement in Repeaters for Electro Magnetic Telegraphs.*

What I claim therein as my invention, and desire to secure by letters patent, is the manner of connecting two galvanic circuits with the two electro-magnets (*a*, *a*, and *d*, *d*,) in the said repeater, substantially as herein represented and described, to wit: each of the said galvanic circuits, as it passes through my said telegraphic repeater, embracing in its course the armature of the opposite electro-magnet, in the said instrument, previous to its passing through the helices in the electro-magnet, embraced in its own respective circuit.

In combination with the above, I also claim the connecting the points *b*, *j*, with the galvanic battery O, (or batteries,) when the said points are placed in such positions, in relation to the armatures (*s*, *t*,) of the electro-magnets in my said telegraphic repeater, that when either one of the said electro-magnets is charged, it will, by attracting its armature against one of the points *b*, or *j*, close the poles of the galvanic circuit in which the opposite electro-magnet, (in the instrument,) is in connection, and thereby throw the battery O, into the said circuit, substantially as herein set forth.

CHARLES S. BULKLEY.

No. 7770.—*Improvement in Seed Planters.*

What I claim as my invention, and desire to secure by letters patent, is the attachment of my vertical cylinders J, J, to the rear of my ploughs or cultivator, (without regard to any particular plough,) in combination with its machinery, arranged substantially in the manner and for the purposes herein set forth.

SAMUEL CANNON.

No. 7771.—*Improvement in Printing Machines.*

What I claim as new, and desire to secure by letters patent, is—

First. I claim the type form, constructed substantially as described and represented, viz: with the types arranged in rows, longitudinally and laterally, in such manner as to permit each type to be brought to a given position, at the will of the operator, to be pushed upon the paper by the plunger C, No. 1, or its equivalent.

Second. I claim the combination of the two motions, which I have called lateral, and longitudinal, for the purpose of bringing the type or character required in position to make its impression.

Third. I claim the wedge shape movement, in combination with a type form, substantially as described and represented, for the purpose of giving motion to the latter.

Fourth. I claim the manner of adjusting with precision the required position of the type form, by the use of gauges, substantially as described and represented, in combination with the two motions already described, as giving motion to the type form, or in any combinations, substantially the same.

Fifth. I claim the inking of the types by the inker, interposed during the action of the machine between the face of the types and the paper.

Sixth. I claim the use of the bob (V,) substantially as described and represented, to furnish the power to cause the pressure on the types, or the inking of the same.

Seventh. I claim the combination of the bob, whose fall produces the pressure on the types, with a contrivance by which, after the blow is given, a second blow or vibration, is prevented.

Eighth. I claim the use of the slats, substantially as described and represented, or other analogous device, controlling the motions of the machine, combined with the rods answering to the letters or characters wanted, by means of the catches on which the slats may be moved separately or together, in any combinations of time, or extent of motion that may be required for the action necessary to produce the given characters.

Ninth. I claim the draft rod and lever, (see *r*, *i*, and *q*, *i*, No. 3,) in combination with the slat *p*, *i*, or its equivalent, to produce the various movements required to control the types.

OLIVER T. EDDY.

No. 7772.—*Improvement in Horse Shoe Machinery.*

What I claim, and want secured to me by letters patent, is the combination of the two flanged rotating dies, arranged with respect to each other, and operating substantially as herein described, said dies being so shaped as to give the requisite form to the metallic shoes of animals.

SAMUEL S. GREENE.

No. 7773.—*Improvement in Drying Paints.*

What I claim as my invention, is a method of giving a drying quality to oils, by the use of a mineral, commonly known by the name of the red oxyde of zinc, in a partially deoxydised state, and either in combination with those substances naturally associated with it, or by the use of any of its component parts, separated by mechanical means. AQUILLA JONES.

No. 7774.—*Improvements in Iron Railings.*

What we claim as our invention, and desire to secure by letters patent, is the combination of the rods, tubes, and palings, with the manner of operating the same, as herein set forth and described.

JOHN KRAUSER.
SOMMERS CROWELL.
CYRUS KRAUSER.

No. 7775.—*Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the method of heating the front end of the extended part of the oven, in combination with and receiving the heated air from the hot air chamber, behind the fire back, and causing it to pass through the oven, and out into the fire flues, in the manner substantially as described, and for the double purpose of heating the front end of the oven, and passing a current of heated air through the oven, substantially as specified. SAMUEL PIERCE.

No. 7776.—*Improvements in Sewing Machines.*

What I claim as my invention, and desire to secure by letters patent, is forming a stitch by each throw of the shuttle and corresponding motion of the needle; that is to say, making one stitch at each forward, and another at each backward motion of the shuttle, this being effected by the needle, in combination with the shuttle, both constructed, arranged, and operating as herein described, or in any other mode substantially the same.

Second. I claim the combination of the sliding bar Q, the plate *r*, the feeding plate V, the spring W, the screw *t*, the lever R, and the clamping plate T, for holding and feeding the cloth to the needle and regulating the length of the stitch, in the manner herein described, or in any way substantially the same. ALLEN B. WILSON.

No. 7777.—*Hinged Gun Harpoons.*

What I claim as new in my invention, and desire to secure by letters patent, is making the shank of harpoons, and other whale irons, to fold by a hinge or joint at any convenient point in their length, in the manner and for the purposes, substantially as herein described.

WILLIAM ALBERTSON.

No. 7778.—*Improvement in Bake Ovens.*

What I claim therein as new and of my invention, and desire to secure by letters patent, is the combination and arrangement of an endless chain platform N, with the oven, by which arrangement, the unbaked bread or other articles being put in at one end, are discharged at the opposite end completely baked; and in combination therewith, I claim the self-opening and closing door F′, arranged substantially as herein set forth.

HOSEA BALL.

No. 7779.—*Improvement in Working the Doors of a Bee-Hive.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the bee boxes and moth chambers, in combination with the sliding screen doors, pulleys and levers, as described, so that the doors may be worked by a sinlge movement of the lever, in the manner and for the purpose set forth. JARVIS CASE.

No. 7780.—*Improvement in Air-Heating Furnaces.*

What I claim therein as new, and desire to secure by letters patent, is:

First. The annular chamber, constructed and arranged, substantially in the manner and for the purposes set forth, with or without the cross pipe.

I also claim the mode of conducting off the products of combustion from the fire through ascending pipes *h*, into an annular chamber, and thence into a central descending pipe to their exit, and the surfaces being all so constructed of a curved figure, as to allow a diverging influence, and free circulation to the exterior air in the air chamber, to be warmed without over-heating it; while it is, by the arrangement of parts, forced to impinge directly against the heated surfaces.

I also claim the method of setting the furnace, consisting of a double walled chamber, the inner wall of which encloses a cold air trench, supplied from without that surrounds the ash pit, with openings at its top for the proper admission of air into the air chamber around the furnace, and with lateral openings into the space between the walls, to cause an upward current, which is connected with the warm air-pipes leading to the apartments, by means of which a constant and pure supply of air is insured, and the heat greatly economized.

GARDINER CHILSON.

No. 7781.—*Improvement in Corn Shellers.*

What I claim as new and my improvement, and desire to secure by letters patent, is the combination of the wheels C, D, E, for shelling corn, as herein described.

DAVID ELDRIDGE.

No. 7782.—*Improvement in Mills for Grinding and Crushing.*

What I claim as my inprovement, and desire to secure by letters patent, is the use of the cylinder D, grooved or notched, or smooth, being made to rotate, and having within it, any number of crushers formed as described, for the purpose of pounding, grinding, or mixing any substance, the crushers either running singly, or, for the purpose of working different substances simultaneously one within another, the jumping bar or pin at N, in combination with the arrangement shown, or any other arrangement substantially the same.

WILLIAM FROST.

No. 7783.—*Improved Annunciator or Bell Telegraph.*

What I claim as new and of my own invention, and desire to secure by letters patent, is the combination and arrangement of the spring levers I, suspender bar or striker F, with the pendulums K, and bells D, for simultaneously indicating the number of the room, and calling the attention thereto, by giving the alarm, there being a secondary or intermediate fulcrum bar L, against which the spring lever I, impinges on its descent, increased by the spring N, by which the rear end is made to descend, and with it the suspended striker F, upon the bells D, and at the same time suddenly elevating the front end of the lever I, and imparting a vibratory movement to its pendulum, said spring levers I, being provided with oblong openings or slots M, through which the fulcrum bar J, passes, for producing the aforesaid action of the spring levers, on its descent upon the intermediate fulcrum bar.

JOHN GARVEY.

No. 7784.—*Improvement in Photographic Pictures on Glass, &c.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the ground or frosted glass, or other semi-transparent substance interposed in connection with the picture, between the source of light and the spectator, substantially as described in the foregoing specification.

FREDERICK LANGENHEIM.

No. 7785.—*Method of Attaching Augers to their Handles.*

What I claim as new in my invention, and desire to secure by letters patent, is the handle made in two parts, one of which D, fits in a socket B, on the other A, and carries a bolt *b*, secured at its end, the said bolt passing through a hole in the auger shank, and screwing into a female screw or nut *a*, in the part A, for the purpose of clasping or firmly holding the auger shank between the ends of the parts A and D, of the handle or stock, in the manner herein described.

JOHN E. LARKIN

No. 7786.—*Improvement in Copper and Steel Plate Printing Presses.*

What we claim as of our invention, and which we desire to secure by letters patent, are—

Firstly. The arrangement of a tooth or catch, projecting from the roller, and operating upon a tooth or projection upon the platen, for the purpose of starting the platen, and causing the commencement of the convexity of the roller to impinge upon any required point of the length of the platen, for the purpose described.

Secondly. The combination of the racks (8 and 9,) with the cog wheel (*w*,) attached to the connecting rod of a gang of rollers, together with the beads (*p*,) and the grooves (*m'*,) in the rollers, for security, uniformity of action, and a proper relative position between the platen and the supporting rollers, upon which it traverses, thus preventing lateral and longitudinal aberation.

Thirdly. The method of heating and retaining at a suitable temperature, the plate from which the impressions are to be taken, by means of lamps or vessels containing inflammable material, placed under the upper plate of the platen, or traversing bed, within the recess formed between that and the plate resting immediately upon the gang of rollers.

Fourthly. The arrangement of a stationary and sliding clamp, adjustable longitudinally of the platen, for securing the plate in position, substantially in the manner described.

Fifthly. We claim, in combination with the D, roller, the method of retracing the platen by the weighted cord, assisted by making an inclined plane of the bed in which the rollers traverse.

E. C. MIDDLETON.
EDWARD NEVERS.
ROBERT NEAL.

No. 7787.—*Improvement in Excavating Machines.*

What I claim as my invention, and desire to secure by letters patent, is—

First. Operating the bucket O, by giving motion to the band or chain Q, and to the drum I, in one direction, to fill the bucket, and then reversing its motion, so as to draw back the bucket, to be emptied, in the manner substantially as herein described.

Secondly. I claim the manner, substantially as herein described, of closing the bottom or trap P, of the bucket, by means of the spring or incline 17, over which it passes in its forward passage.

MARTIN NEWMAN, 2d.

No. 7788.—*Improvement in Pessaries.*

What I claim, is the solid connector *m*, with its connecting contrivance, (or its equivalent,) and joint, in combination with the supporting stem, the whole being substantially in the manner and for the purpose as herein before specified.

JONATHAN HOVEY ROBINSON.

No. 7789.—*Improvement in Extension Tables.*

What I claim as my invention, is the construction of extension tables in such a manner as that the sliding parts, when extended, shall constitute a table complete, without any replacing of panels to form the leaf, substantially in the manner herein before set forth.

EDWIN F. SHOENBERGER.

No. 7790.—*Improvement in Spark Arresters.*

What I claim as my invention, and desire to secure by letters patent, is combining, in manner substantially as described, with the chimney, the surrounding jacket and the cap, a valve for governing an aperture in the top plate of the cap, so balanced or weighted, that it shall open by gravity when the furnace is working under a draft due to the ramification of the column, and be closed by the force of the current when increased by the exhaust steam in the chimney, for the purpose and in the manner substantially as described.

I also claim, in combination with the valve and the wire gauze, or the equivalents thereof, and the deflector over the chimney, all arranged substantially as herein specified, the central tube of the deflector, and the conical ring within the wire gauze, substantially as herein specified, and for the purposes set forth.

SAMUEL SWETT

No. 7791.—*Improvement in Bedsteads.*

What I claim therein as new, and desire to secure by letters patent, is the combination of the slats $(c,)$ clasps $(d,)$ and hooks $(g,)$ athwart the length of the outside slats, in combination with the rails $(e,)$ and latches $(f,)$ on the posts $(a, b,)$ the whole combining to form a strong and portable bedstead.

WILHELM ZAISER.

No. 7792.—*Improvements in Machines for Feeding Nail Plate.*

What I claim, is the combination of such raising mechanism, with the machinery for imparting to the strip of metal, its progressive forward movements as specified, the mechanism so combined with the said machinery, being the valve a', the rod b', the lever or arm c', the crank f', shaft g', drum h', belts i', k', and the arms b', m', of the lever beam R, the whole being arranged and made to operate together, substantially as specified. And I further claim, in combination with the mechanism, which produces the progressive advancing movements of the strip of metal towards and between the cutters, the mechanism for producing the retrograde movement of the pincers, after the strip of metal has been entirely operated upon by the cutters; such mechanism being the pullies i^2, and t^1, the endless belt r^2, the moveable frame u^1, and clutch or their equivalent, the vertical rock shaft w^2, and its arms s^2, t^2, the cams g^3, h^3, the lifting bar y^2, and its spring catch, together with the slide d^3, and its projections, the whole being constructed and made to operate together, essentially as specified. And I claim the combination of the arms z^2, with the shaft w^2, and the mechanism for moving the clutch, the said arm being for the purpose of creating a retrograde movement of the clutch, so as to unclutch the pulley t^2, from the shaft e, and this when the entire retrogradation of the nippers has been effected, the same being accomplished as hereinbefore specified.

And in combination with the mechanism which produces the reciprocating rotary movements of the nippers, or strip of metal held thereby, I claim the combination of mechanism for arresting or stopping such rotary motions, immediately on the final retrogradation of the pincers taking place, such mechanism being the levers z^4, and n^3, connecting rod p^3, arm q^3, shaft v^3, arm fig. 3^3, spring catch y, as applied together, and to the lever beam R, and lifting bar y^2, as described.

And I claim the combination of mechanism, by which the progressive advancing and intermittent secondary retrograde movements of the strip of metal are produced, the same consisting of the long bar l^2, and its connecting frame

p^2, the feed and pressure rollers f^2, and m^2, the shaft g^2, and pulley f^2, the strap or belt e^2, and its rods c^2, d^2, the levers z', and v', connected together as described, and the cams r', s', on the shaft e.

And in combination therewith, and the lifting bar y^2, I claim the bent lever i^3, the same being applied to the same, and used for the purpose substantially as herein before specified.

FREDERICK J. AYERS.

No. 7793.—*Improvement in Cutters for Planing Machines.*

What we claim as our invention, and desire to secure by letters patent, is arranging a series of shaving knives, in continuous succession, upon the periphery of a conoidal wheel, whereby a continuous serrated shaving instrument is produced, whose uninterrupted action, by preventing jarring, produces a smoother surface.

ENOS G. ALLEN.
CHAS. BRIGGS.

No. 7794.—*Improvement in Ship Ventilators.*

What I claim as my invention, and desire to secure by letters patent, is the combination of floatable valves, with ventilators, for ventilating vessels and steamers, and the combination of floatable valve ventilators, with vessels and steamers. The valves to be acted upon by the raising and the falling of the water, when in contact with the ventilator, the rising water to cause the valve to close the air orifice, and prevent the entrance of water, and the falling water to permit the valve to recede by its own gravitation, and thereby open the air surface.

RALPH BULKLEY.

No. 7795.—*Improvement in Gang Ploughs.*

I claim the inclined coulters, so arranged as to throw out the ploughs without breaking, when they meet with an obstruction, in the manner and for the purpose set forth. I claim the apparatus shown at n, m, fig. 5, for setting the frames for hilling, in the manner above specified.

HENRY COWING.

No. 7796.—*Improvement in Hanging Carriage Bodies.*

What I claim as new therein, and which I desire to secure by letters patent, is the combination of elastic cross reaches, with a non elastic centre support, the reaches being so connected with the centre support, that they shall be free to bend throughout their length, substantially in the manner and for the purposes described.

M. G. HUBBARD.

No. 7797.—*Improvement in Processes for rendering Cordage Uninflammable.*

What I claim as my invention, and desire to secure by letters patent, is my improved process of rendering vegetable fibrous substances uninflammable, and preserving them in that condition, substantially as herein set forth.

JAMES H. JOHNSON.

No. 7798.—*Improvement in Fountain Pens.*

What I claim as my invention, and desire to secure by letters patent, is the pen nib, made to project through the conical termination of the fountain, substantially in the manner and for the purpose set forth, and in connection therewith, I claim making the pen nib adjustable, substantially as described.

CHARLES W. KREBS.

No. 7799.—*Improved method of securing Rails of Rail Roads.*

What I claim as new, and desire to secure by letters patent, is the diagonal position of the horses, by which, with the aid of the arms and clamps, the rails are secured in their proper position. H. H. MAY.

No. 7800.—*Improvement in Sausage Stuffers.*

What I claim as my invention, and desire to secure by letters patent, is the introduction of a tube or case D, into the case or cage B, of a press, and adapting it thereto, in such a manner as to form a sausage stuffer, in combination therewith, which is operated by the same power and under the same piston and rod, that acts upon the press, as herein substantially set forth.

SIMON McNAIR.

No. 7801.—*Improvement in Screw Threading Machines.*

What I claim as my invention, and desire to secure by letters patent, is the before described method of operating the jaws for griping and liberating the blank, by means of the toggle joint, and rod connected therewith, when this is combined with the method, substantially as described, of latching and unlatching the rod, by means of the sliding collar acting on the inclined or bevelled stem of the rod to draw it back, and force in the latch, and then holding it in place, by passing on to it, so as to avoid an endwise strain on the mandrel against its boxes, substantially as described, and for the purpose specified.

I also claim so connecting the mould, which governs the line of motion of the chaser, with the sliding frames, so that it shall be free to vibrate thereon, in manner substantially as described and for the purpose specified.

THOMAS J. SLOAN.

No. 7802.—*Improvement in the Locking Apparatus of Repeating Fire Arms.*

What I claim as my invention, consists in hinging the dog or catch, to the bolt, in combination with so making and applying the recess *i*, and the spring *g*, together, and to the dog or catch, as to cause said spring to perform two functions, or to not only operate the dog or catch, but to operate the bolt, substantially in the manner as above described.

JOSHUA STEVENS.

No. 7803.—*Improvement in Shuttle Motions in Looms.*

I claim the boxes P, P′, oscillating upon fixed points *p*, *p′*, and having the flat bar springs Q, Q′, attached to them, in combination with the chains *c*, *c′*, and the regulating screw *d*, and nut *e*, for giving a more free and easy motion to the picker staves, and for the more effectually controlling and graduating the amount of pick. THOMAS T. WILLCOX.

No. 7804.—*Combined Boiler, Cupola, and Grate.*

What I claim therein as new, and desire to secure by letters patent, is the boiler, descending from the top to the bottom of the cupola, in combination with the removable grate, the water contained in the boiler surrounding the heated iron, and coals, substantially as described. I do not claim the use of the subsidiary grate, but I do claim it, as making a part of the combination necessary to the proper and perfect action of my combined steam boiler and cupola smelting furnace. LOFTIS WOOD.

No. 7805.—*Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is placing one or more ovens between one or more fires on each side in connection with a vertical flue or flues passing between the ovens, separating them, substantially as described. LOFTIS WOOD.

No. 7806.—*Improvement in Machines for Turning Irregular Forms.*

What I claim as original, and desire to secure by letters patent, is the mode herein described, of changing the position of the ratchet R, by means of the arrangement of the sliding rod, knee, lever, lifting plate and pawl.

SMITH BEERS.

No. 7807.—*Improvement in Machines for Boring Dovetailed Mortises.*

What I claim therein as new, and desire to secure by letters patent, is—

Firstly. The rotating cutters (*g*, *h*, *i*, *k*, *l*,) formed and arranged substantially as described, with conical heads and cylindrical necks, in combination with a rest or moveable table, for the reception and attachment of the bed-post, the said table while being advanced towards the cutters, being conducted by suitable guides (*p*, *p′*, *p″*,) as described, either upon the moving table or the stationary bench, in a course which is at first at right angles to the face of the post, and thence, as soon as the cylindrical cutter (*l*,) has begun to act in a longitudinal course, receding sufficiently from the face of the post to form a mortise which shall bind the dovetailed tenons of the rail, as they are pressed down in their sockets.

Secondly. I claim, in combination with the aforesaid guides, the stops (*r*,) substantially as here arranged and applied, or their equivalents, whereby the table is limited in its course, to the particular range of cutting action required for the time being. HENRY I. BETJEMANN.

No. 7808.—*Improvements in the Alarm and Indicator for Steam Boilers.*

What I claim as my invention, and wish to secure by letters patent, is the peculiar method of moving the indicator, by its attachment to the slide valve of the whistle, by which the connection is continued through the head of the boiler, as herein described, dispensing with the stuffing box and packing.

his
JOSEPH + DILKS.
mark.

No. 7809.—*Improved Arrangement of the Bending Roller in Tin Cutting and Bending Machines.*

I claim to so combine and arrange the roller Y, with respect to the jaws E, F, (as specified,) so as to enable the said roller to be operated in the manner substantially as set forth; that is to say, to be moved in a plane parallel to the common axes of the shafts C, D, the said roller being arranged in a turning frame Z, and supported by a moveable and adjusting frame A′: and the object of my improvement being to enable a person to move the roller against the tin, in manner and for the purpose of binding it down, substantially as herein before explained. WM. H. HORTON.

No. 7810.—*Improvements in the Metallic Flask for Casting Large Kettles.*

What I claim as new, and of my invention, is the elastic iron core supporter, or inner part of the flask, constructed of wings attached to the crown, and provided with covering strips, substantially as described.

WILLIAM KELLY.

No. 7811.—*Improvements in Machines for Dressing Spokes.*

What I claim therein as new, and desire to secure by letters patent, is—

First. Constructing a cylindrically rotating cutter head, with a separating joint athwart its middle, and in the plane of its rotation, so arranged as that by the mutual advance or recession (in the direction of their axes of rotation) of the respective sections of the cutter heads, as they traverse the length of the stuff, the cutting edges are adapted to impart the varying outline and form required for the work.

Second. The shafts (9,) and weighted levers (b', b',) in combination with the levers (v'', v'',) and the links (w, w,) or their equivalents, for sustaining in position the tongues (11,) upon the spoke, and the rollers (r, s,) upon the guides, and rendering them self-adjustable, under all the circumstances which can affect them.

ORVILLE MATHER.

No. 7812.—*Improved Nail Plate Feeder and Turner.*

What I claim as my invention, and for which I ask letters patent, is—

First. Giving the alternating motion to the nipper rod, by means of a pair of jaws actuated by the opposite ends of a vibrating beam, one of the jaws being provided with a spring and toggle, which causes it to grasp and release the nipper rod, the whole operating substantially as described.

Second. I claim giving to the said rod its progressive, advancing and slightly retrograde motions, by means of a pair of jaws actuated by a cam and an eccentric, and two springs, substantially as specified.

Third. I claim operating the follower, so that it is raised from the nail plate, and the nail plate from the lower cutting jaw of the machine, by means of a cam, a rock shaft, and a radius bar connected to one end of the follower, substantially as described.

Lastly. I claim transmitting the motion from the nail machine to the feeding machine, by means of a lever beam and connecting rods, when the lever beam is hung upon a cranked centre, and the actuating connecting rod is provided with knob acting upon a flat crank pin, substantially as described in the annexed specification and drawing, whereby I am enabled, with facility, to throw my feeding machinery in and out of gear.

But I do not intend, hereby to confine myself to the particular forms and proportions herein described, provided I construct a machine substantially the same.

MELVILLE OTIS.

No. 7813.—*Improvement in Horse Rakes.*

What I claim as my invention, and desire to secure by letters patent, in my improved horse rake, is the device for raising the teeth simultaneously, to clear them of the hay, and dropping them again, by means of the apparatus, substantially as described, being worked by the draught of the team, when thrown into gear, at the will of the operator.

HENRY W. SABIN.

No. 7814.—*Improvement in Suspender Buckles.*

What I claim as my invention, and desire to secure by letters patent, is

the construction of the buckle frame, and attaching the tongue or points thereto, so that the tongue or points slide out and into the buckle, instead of acting upon a hinge or roller, as above described.

ELISHA STEELE.

No. 7815.—*Improved Auger Handle.*

I claim the construction of auger handles, substantially as set forth in the above specification; that is, by making the principal part of the same, from end to end, of one piece of wood, or material, securing the central portion, through which the auger shank passes, with a metal band, and arranging a detent, for holding the shank, with machinery to operate it, as exhibited in the drawings forming part of this specification, the said handles being for use with augers or any other tools to which it may be adapted.

AUGUSTUS THAYER.

No. 7816.—*Improvement in Vulcanizing India Rubber.*

What I claim, therefore, is the use and employment of zinc, prepared by the process above described, whereby a hyposulphite, or similar preparation of zinc is obtained, in combination with India rubber, for the purpose of curing or vulcanizing it, substantially as herein before set forth, without the use of free sulphur in any way, in combination with the rubber.

JONATHAN T. TROTTER.

No. 7817.—*Improved Balance Boiler Feeder.*

What I claim therein as new, and desire to secure by letters patent, is having the piston B, with compartments and apertures, as described, passing completely through the boiler, and working in double packing boxes in short cylinders c, c, placed on opposite sides of the boiler, substantially as herein set forth.

W. D. ALLEN.

No. 7818.—*Improvement in Buckles for Harness.*

I claim the construction of a trace clasp, as a substitute for a buckle, for fastening together two straps of leather, by the use of a metal tongue fastened to one of the straps, having projecting from it pins or studs fitted to enter into holes to be made therefor in the other strap, the tongue and strap lying one against and upon, or near the other, the tongue and strap to be kept in this juxtaposition, by a slide or box enclosing them, the whole substantially as set forth in this specification.

SOLON BINGHAM, Jr.

No. 7819.—*Improvement in Bearings for Axles and Shafts.*

I claim the combination of the sliding plate E, having a conical seat a, and the conical packing ring F, applied and secured to the journal box of a car or other axle, or of a machine shaft, in the manner substantially as herein described, for the purposes set forth.

WM. H. HOVEY.

No. 7820.—*Improvement in Lever Jacks.*

I claim the hanging of the lever by links which permit the lever teeth to disengage themselves from those of the rack bar, with which they are engaged, by simply raising the lever, and allow them to re-engage with a new set of teeth, when the lever is depressed, substantially as herein set forth. I also claim the method of connecting the pawl with the lever, in such manner, that, by simply working the latter, the rack bar with the weight resting thereon, may be lowered tooth by tooth, substantially as herein set forth.

JAMES LEFFEL.

No. 7821.—*Improvement in Electrotyping.*

I claim to form a heterogeneous substance on the surface of the metallic plate, by exposing it to the action of iodine, bromine, chlorine, or other chemical, capable of forming an insoluble compound with the metal, for the purpose herein set forth.

I also claim to expose the metallic plate to the action of the light, after being acted on by a halogen element, substantially for the purpose of preventing the adhesion of the deposite as specified.

I claim the use of iodine in the electrotype process, in the manner herein substantially set forth, and for the purpose specified.

GEORGE MATHIOT.

No. 7822.—*Improvement in Seed Planters.*

What we claim as new, and desire to secure by letters patent, is the combination with the depositing tube, and the bar which connects said tube with the body of the machine, the joint *m*, *n*, as above described, said joint being of such peculiar construction as to be complete and effective in itself, without any moveable device whatever, and which admits of attaching or detaching said tube at pleasure, without the use of any kind of implement or tool, or separate connecting bolt or fastening, as before described.

SAMUEL PENNOCK.
MORTON PENNOCK.

No. 7823.—*Improvement in Seed Planters.*

What I claim therein as new, and desire to secure by letters patent, is the upper and lower sliding bottoms *n*, *n*, *l*, *l*, in combination with the adjustable side of the hoppers *r*, *r*, operating in the manner and for the purpose, substantially as herein described.

DEXTER B. RHODES.

No. 7824.—*Improvements in Sewing Machines.*

What I claim as my invention, is the combination of two needles, two thread guides and a cloth holder, made to operate together substantially, in the manner and for the purpose as herein before set forth.

And I also claim the improvement of making the needles with springs, and applying mouth pieces or pressers to them, and on each side of the flanch of the base plate, the whole being substantially as above described.

FREDERICK R. ROBINSON.

No. 7825.—*Improvement in the Manufacture of two and three Ply Carpets.*

What I claim therefore, as my invention, and desire to secure by letters patent, in the weaving of two or three ply ingrain carpets, is the employment of parti-colored warp and weft, operated by jacquard or other mechanical means, to form the figure when the same colors in the warp and in the weft, are caused to combine together, to form the same colored figure in the fabric, substantially as described.

ALEXANDER SMITH.

No. 7826.—*Apparatus attached to Vessels for Indicating the depth of Water.*

What I claim as my invention, and desire to secure by letters patent, is the combination of a sounding chain or jointed rod, with an indicator on the deck of a vessel, operated by means of a cord pulley, or other equivalents, so as to indicate the depth of water, whilst the boat is making headway, as herein described and represented.

H. B. SOMMERS.

No. 7827.—*Improvement in Planing Machines.*

I claim, first—the attachment, either whole or in segments, of a narrow circular saw blade to the front of the periphery of an iron or other metallic planing wheel, (properly counter sunk for the purpose,) in combination with the clearing and planing cutters, so that the saw shall be stiffened, and rendered free from trembling, shaking, or running in, and made to cut in advance of the planing cutters to cleanse and level the surface of the plank or timber, that the planing cutters may with facility, produce an extra smooth surface, and be cleared of timber or slab, by the clearing cutters as set forth, the attachment of the saw blade to the wheel being such, by screws or otherwise, that the saw blade may be easily removed or taken off, for the purpose of turning the reverse face to the plank or timber whenever the teeth on one side have become dulled, or out of set from long usage against the timber.

Second. The clearing cutters *n*, *n*, *n*, in combination with the saw and planing wheel, arranged in the manner and for the purposes herein set forth, the whole being arranged in the manner and for the purposes herein set forth and described.

DANIEL H. SOUTHWORTH.

No. 7828.—*Improvement in Elevating, Cooling and Conveying Flour.*

What we claim as our invention, and desire to secure by letters patent, is the method of elevating, conveying, and cooling flour or meal, by passing it by means of a blast through an air-trunk and head, constructed substantially as herein set forth.

JESSE WHITE.
JONATHAN BUNDY.

No. 7829.—*Improvement in Machines for making Pill Boxes.*

What I claim as my invention, is the contrivance for supporting the stick, and feeding each stick forwards towards the cutters, the same consisting of the saddle and orifice, (applied to the rotary block holder,) the endless screw D, the shaft E, the spring G, the bearing plate *g*, fixed to the shaft B, the pinion H, and the stationary gear wheel I, the whole being applied and made to operate together, substantially in the manner as above set forth.

What I claim also as my invention or improvement, is the combination of said saw, with the rotating series of sticks, or their rotating holding frame, substantially in the manner, and so that they shall be successively operated upon by it as specified.

NELSON D. WHITE.

No. 7830.—*Improved Cut-off Motion for Puppet Valves.*

What I claim therein as new, and desire to secure by letters patent, is:

Firstly. Raising and dropping at any desired point, the puppet valves that admit steam to the cylinder by means of a lifter, that vibrates with and upon the usual rock shaft, the said lifter being operated by a gravitating and counterbalancing toggle as described, so that the lifter in the manner described, or its equivalent, is fixed for raising the valve, and is depressed and allowed

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gradually and easily, to drop the valve when the counterbalance of the toggle is operated by the adjustable stop, substantially as herein described.

SAMUEL H. GILMAN.

No. 7831.—*Improvement in Seed Planters.*

What we claim as new and of our invention, and desire to secure by letters patent, is dividing the drill teeth or depositing tubes into two separate sections G, H, and hinging or connecting the two sections at their upper ends, in such a manner as to permit the longest or rear section H, to recede, or turn on its connecting pin *a*, while the upper or short section retains its proper position in relation to the drag bar and flexible conducting tube, and providing the upper or short section G, with two arms J, J, having notches therein, which, when the two sections of the drill tooth are closed, become co-incident with a notch formed in an arm K, projecting from the rear or longest section H, into which is inserted a wooden pin, which it is intended shall break when the rear or longest section of the drill teeth, shall strike against a rock or other obstruction, and thus separate the sections, and permit the longest section H, to recede and clear itself from the obstruction, whilst the flexible conducting tube is held in its proper position by an oval loop on the inside of the section G, herein fully set forth and represented.

Second. We also claim, providing the clutch plate R, with an additional row of teeth (*l*,) adjacent to the side beam of the frame, for engaging with a tooth T, projecting therefrom, for arresting the motion of the seeding rollers simultaneously with unlocking the axle from the propelling wheel, and thus stop the operation of the machine, as fully set forth.

JOHN SIGNER.
T. N. SHEPTON.

No. 7832.—*Improvements in Mills for Sawing with Circular Saws.*

What I claim as new and of my invention, and desire to secure by letters patent, is—

First. The springs G, and G′, carrying the journal boxes *g*, and *g′*, attached and arranged in the manner substantially as herein described, for the purpose of guiding the saw, but at the same time allowing a sufficient degree of end play to the spindle, to admit of its accommodating itself to the lateral springing of the log.

Secondly. Arranging the saw N, and its spindle M, on the swinging frame H, H, which is adjustable, so as to bring the saw N, in any required position in a line forming part of a circle round the axis of the saw D, and adjusting the said saw N, either in a line with, or to the right or left of the saw D, by means of the slot in the spring G′, through which the bolt *b*, passes, in the manner herein described, or in any manner substantially the same.

ORLANDO CHILD.

No. 7833.—*Improvement in Machinery for Doubling and Twisting Silk, &c.*

What we claim as new, and desire to secure by letters patent, is so constructing the catch bar, that all the threads or silk, either before or after being twisted, may be secured by the catches simultaneously, by simply bringing the bar with its catches down upon the threads, and whilst in that position causing all the helical springs to act on the catches at the same time, by suddenly disengaging the slide lock plate from the end of the bar, the mortises in the said

plate, being so formed as to allow each catch to be opened separately, without the aid of the lock plate, or all to be opened simultaneously by moving said lock plate longitudinally, in the manner herein fully set forth.

JOSEPH CONANT.
LUCIUS DIMOCK.

No. 7834.—*Improvement in Apparatus for emptying Privies.*

What I claim as new therein, and which I desire to secure by letters patent, is the gasometer, connected with the receiver, as described, for the purpose of keeping the gases separated from the fecal matter, and preventing their mixture as set forth, and serving also as a reservoir for the compressed gases, from which the power for expelling the contents of the reservoir is obtained.

FLORIMOND DATICHIY.

No. 7835.—*Improvement in Carriages.*

What we claim as new therein, and desire to secure by letters patent, is the joint on which the fore carriage turns when placed in rear of the fore axle, in combination with the segment on which the end of the perch rests, substantially as described, for the purpose of allowing the carriage to be turned in a small space, without having the fore wheels to run under the body, or interfere with the hind wheels.

EDWARD EVERETT.
CHARLES EVERETT, Jr.

No. 7836.—*Improvements in Machinery for Cutting and Bending Sheet Metal.*

I claim the improvement in the bending mechanism, the same consisting in the combination of the conic or approximately conic roller or projection *n*, with the cylindric part or roller *m*, and with the circular discs or holders, in the manner as above described, and so as when pressed against the tin to gradually bend it over and down upon the disc or holder C, so as to enable the roller *m*, to pass over and upon the tin, and complete the bending of it down upon the periphery of the holder.

I also claim the improvement in the construction of the gauge B, whereby it is adapted to operate when the tin plate is rotated in a vertical plane, such improvement consisting in arranging its supporting journal at an inclination to the horizontal plane, and applying a weighted arm or its mechanical equivalent, to the gauge, as seen in the drawings, or so that the gravitating power of the weighted arm shall restore the gauge to its original and proper position under the holders, after it has been freed from the pressure of the surplus tin, or part removed by the cutters.

JOSEPH F. FLANDERS.

No. 7837.—*Improvement in Seed Planters.*

What I claim as my invention, and desire to secure by letters patent, is the peculiar construction of the adjustable shovels N, to clear the mouth of any obstructions. I also claim the mode and manner of sowing the grain through the slots, as herein described.

JOSEPH W. FAWKES

No. 7838.—*Improved Expansion Gear for Horizontal Engines.*

What I claim therein as new, and desire to secure by letters patent, is withdrawing the sliding tongue of the lifter of the supply valves of steam cylinders, so as to trip the valves at any desired point, by an adjustable prong, which is made to slide upon the arm holding the usual fixed prong, by the action of a tappet on the rock shaft, when this adjustment is effected by means of the shackle and links within the steam chest, the shackle and links being elevated or depressed by an index arm without side of the steam chest, and the whole being arranged and operating, substantially as herein described.

SAMUEL H. GILMAN.

No. 7839.—*Machine for making Eyelets.*

What I claim as my invention, and desire to secure by letters patent, is the sliding bolster, constructed with its two dies *c*, and *e*, and aperture *n*, in combination with the feeding tube, punches, and clearers, the whole being constructed, arranged and operated, substantially in the manner and for the purpose herein set forth.

L. E. HICKS.

No. 7840.—*Improvement in Grain Cradle Fingers.*

What I claim as my invention, and desire to secure by letters patent, is the insertion of a metallic plate into the edge of a cradle finger, by means of rivets and other fastenings, so as to keep the plate and finger permanently attached together, and in their place, and thereby effectually prevent the finger from straightening or springing back, when used in damp grain, prevent the grain from wearing it away, and prevent the grain from sliding endwise off the cradle, before the cradler gets it round into its own swath.

JOEL HOUGHTON.

No. 7841.—*Improved Sash Fastener.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the cam with the plate, when these are combined with the shaft C, and lips B, for turning back the cam when necessary, and locking it to fasten down the lower sash, when the whole is constructed, arranged, and combined, substantially as herein described.

WILLIAM H. LAZELLE.

No. 7842.—*Improved arrangement of Steam Engine.*

What we claim as our invention, and desire to secure by letters patent, is the arrangement herein set forth, of the beams, connecting rods, and cranks, of the two cylinders of a double cylinder engine.

RICHARD F. LOPER.
JOHN W. NYSTROM.

No. 7843.—*Improved Composition for making Cores for Casting.*

What I claim therein as new, and desire to secure by letters patent, is the use of white of egg, as a component in the preparation of loam, for cores and other similar things, intended for contact with molten metal, in the manner herein described, limiting myself to that use of white of egg, but not limiting myself to the precise proportions mentioned, while the same result is obtained by the said addition to the ingredients ordinarily used in loam for cores.

EDWARD REES.

No. 7844.—*Improvement in Mills for Grinding.*

What I claim, is hanging the bed stone, (when the shaft or spindle to which the runner is attached, passes through the same,) by means of the before described universal joint, in combination with the lever and screw, as aforesaid.

JOHN ROGERS, Jr.

No. 7845.—*Improvement in Oscillating Seeding Cylinders.*

What I claim as new, and of my invention, and desire to secure by letters patent, is oscillating the seeding cylinder H, upon its axis, for the supply and discharge of the seed as described, by means of the combination of the lever L, spring N, and pins M, with the propelling wheel B, as described.

DAVID E. ROHR.

No. 7846.—*Improved Instrument for laying down Curves of Ships' Timbers.*

What I claim as my invention, and desire to secure by letters patent, is the adjustable mould, constructed substantially as herein set forth, so that it can be set to the outside and inside curves of the timbers of a vessel, and can then be used to mark them upon the wood, of which they are to be formed.

CHARLES SCALES.

No. 7847.—*Improvement in Artificial Legs.*

What I claim as my invention, and desire to secure by letters patent, is the application of the whole action from the heel up to the knee joint in the artificial leg, which action prevents the knee joint from turning, slipping, or revolving out in the act of stepping, as herein described, using for that purpose the aforesaid springs, rod, lever, and pins, or any other substantially the same, and which will produce the intended effect.

W. C. STONE.

No. 7848.—*Improvement in Lamps for lighting Gas Burners.*

What I claim as my invention, is the protector, as made and applied to the lamp, and so as not only to be capable of exploding or inflaming the gas brought into contact with it, substantially as specified, but of protecting fibrous matters which may come in contact with the protector, from direct exposure to the flame.

ROBERT THOMPSON.

No. 7849.—*Improvement in Fanning Mills.*

What I claim therein as my invention, and desire to secure by letters patent, is the supporting and regulating the motion of the sieves *g*, *f*, by means of the rollers *c*, *c*, or their equivalents, and the spiral springs F, F, so arranged as to press the shoe, or sieve frame A, down upon the rollers, steadying its motion, and to a certain extent preventing any jar at the end of each vibration, substantially in the manner and for the purpose as herein set forth.

E. BLISS.

No. 7850.—*Improvement in the Manufacture of Starch from Maize.*

What I claim therein as new, and desire to secure by letters patent, is the method, substantially as described, of extracting from maize, and other grain or seeds subject to rapid putrescent decomposition, that portion of the starch which is inextricable, either by mechanical means, or by fermentation of the meal, by the subjection of the unbroken grain to an incipient germination, which is arrested at that stage of the vegetative action at which the starch that exists in the insoluble combination, being liberated, is capacitated for precipitation along with the free starch, by any of the usual processes of maceration and elutriation.

THOMAS BRAGG.

No. 7851.—*Improvement in Dampening Paper for Copying Presses.*

I do not confine myself to the employment of sheet metal as a material for my dampening tablets, as many other impermeable materials are well suited to the purpose, but what I claim as my invention, and desire to secure by letters patent, is a dampening tablet, constructed substantially as herein described, of some impermeable material.

GEO. BURNHAM.

No. 7852.—*Improved means for preventing back-lash in the Feed Motion of Planing Machines.*

What I claim as my invention, and desire to secure by letters patent, is the combination in the travelling table motion of planing machines, of two racks L^1, L^2, sheets 1 and 2, operated on by two separate pinions M, N, one of which is made adjustable, shown by set screws *m*, *m*, *m*, *m*, with accompanying parts, and so arranged that the pinions M, N, may be set as to alternately operate, the one to drive the table forwards, and the other to drive it backwards, for the purposes herein set forth, and operating as shown and described, or in any manner substantially the same.

THOMAS H. BURRIDGE.

No. 7853.—*Improvements in Hydraulic Blowers.*

What I claim as new therein, and which I desire to secure by letters patent, is—First. The apparatus, substantially as above described, consisting of a revolving drum, partly filled with water, and provided with chambers, valves, &c., which cause the air to enter at one hollow journal, and escape in a compressed state at the other, for the purpose of producing blast, as set forth.

Second. I claim the manner of separating the water accidentally mixed with the blast, by means of the partitions and cells in the chambers (*l* and *n*.)

Third. I claim the pipe (*u*,) for conducting the water accumulated in the chamber (*n*,) to the hollow journal (*c*,) and returning it to the drum, substantially as described.

JEREMIAH DARLING.

No. 7854.—*Improvements in Vats for Tanning Hides.*

What I claim as of my own invention, and which I desire to secure by letters patent, is the slats, as described, in combination with the vat and the handler, substantially in the manner and for the purposes as herein set forth.

LEWIS C. ENGLAND.

No. 7855.—*Improvements in Printing Presses.*

What I claim as my invention, and desire to secure by letters patent, is—

Firstly. The combination of the rocker shaft C, and rocker arm D, and the fork lever A, with the swing platen, substantially in the manner and for the purpose herein set forth.

Secondly. I claim for feeding cards, the slide *k*, and rods *m*, in combination with the swing platen, substantially in the manner and for the purpose herein set forth.

Thirdly. I claim the combination and arrangement of the gauge *s*, the spring *u*, the lever *v*, the trip *w*, the catch *x*, and the wire *y*, with the swing platen, in the manner and for the purpose herein described.

Fourthly. I claim the knees *c*, to support the inking rollers, in combination with the spiral springs *h*, the rods *f*, the plate *l*, and the set screws *k*, substantially in the manner and for the purpose herein set forth.

CHARLES W. HAWKES.

No. 7856.—*Apparatus for Operating Window Blinds and their Slats.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the shaft P, having two levers J, G, thereto attached, with the connecting rod L, attached to the blind or shutter, the whole arranged substantially as herein described, and constituting a blind or shutter opener.

I also claim, in combination, the hollow shaft I, having a lever D, at one end of the same, and two arms B, H, at its other extremity, the bolt A, with its bracket N, and slot Q, and the two pins C, C, attached to the blind rod E, the whole forming an apparatus for working the slats and fastening the blind, when closed, substantially as herein described.

JOHN JONES.

No. 7857.—*Improvement in Attachments to Pumps for agitating the surface of the Water in the Well.*

What I claim therein as new, and desire to secure by letters patent, is the application of a series of floating blades to the rod that operates the plungers of pumps for cisterns or wells, for the purpose of agitating the surface of the water, and this I claim, whether the blades and rod are reciprocally prepared, in the manner described, or in any other equivalent way to effect the same purpose.

W. D. MAYFIELD.

No. 7858.—*Improvement in Instruments for Vaccinating.*

What I claim as my invention, is the sliding lancet B, when in combination with a cylinder A, charger E, piston H, and springs J, K, in the manner and for the purpose above set forth.

HENRY MELLISH.

No. 7859.—*Improved method of loosening Metallic Cores from Hollow Castings.*

What I claim as my invention in the above described mode of casting, is the application of cold water to the core or inner metallic flask of a hollow casting, when the metal begins to cool, so as to loosen the core (by the contraction caused by the action of the water,) sufficiently to remove it without injury to the casting.

JOHN C. PARRY.

No. 7860.—*Improvement in Portfolios.*

What I claim as my invention, and desire to secure by letters patent, is the roller back, in combination with the strings stretched thereon, the device, or its equivalent, at the ends, for securing and for tightening or loosening the strings, and the binders, to secure the sheets in their proper places.

JAMES SHAW.

No. 7861.—*Improvements in Looms for weaving Figured Fabrics.*

What we claim, and desire to secure by letters patent, is the improvement on the jacquard loom, as herein described, to wit: the horizontal harness, shafts or bars, of such length as may be desired, (according to the width of the cloth) upon which the several mail cords or heddles, which constitute the harness or entire mounting, are distributed, at any required distance from each other, together with their hooks, pins, loops or holes, upon or in which the several mail cords or heddles, which are caused to be raised or operated upon by one needle or distinct movement, are separately fastened or attached.

We also claim the improvement for producing the rotation of the pattern prism; the same consisting in combining with the machinery which advances the pattern prism, other mechanism, which at the same time, shall produce a movement of the draw pawl in an opposite direction, as described.

S. T. THOMAS.
EDWARD EVERETT.

No. 7862.—*Improvement in Mills for Grinding.*

What I claim therein as new, and desire to secure by letters patent, is the combination of the hollow spindle A, feeding tube E, and adjustable screw *a*, with the gimbal *i*, when said gimbal is placed above the openings through which the grain, or other material to be ground, passes to the surfaces of the stones, as herein fully set forth and represented, for the purpose of having an uninterrupted feed through and past the gimbal.

JOSEPH N. WALKER.

No. 7863.—*Improvement in Hot Air Furnaces.*

What I claim as my invention, and desire to secure by letters patent, is the annular flue between the cylinder of tubes, and the external casing of the furnace for the purpose of distributing the heat, equally over the external casing, substantially as described.

I also claim the distributor or annular distributing chamber, provided with arched passages, for the purposes of carrying the heat and products of combustion to the exit chamber, and which also admit of the free circulation of the external air in and around the fire-pot, substantially in the manner and for the purpose described.

GEO. E. WARING.

No. 7864.—*Improvement in Machines for Weighing Grain.*

What I claim as new, and desire to secure by letters patent, is the employment of the gate rod (*f*,) connecting to the sliding gate (*e*,) and weighing beam (*d*,) in combination with the said sliding gate and weighing beam, constructed and operating as aforesaid, for opening and closing the gate, to admit the grain to the dish or scale, or exclude it therefrom at the required periods, by the ascent and descent of the dish or scale, during the operation of weighing and discharging the grain, as herein fully set forth.

I also claim the manner of attaching the vibrating weighing scale *l*, to the weighing beam *d*, so that the said weighing scale, as soon as the required quantity of grain shall have entered it, shall descend and close the gate, and bring the hammer end *j*, of the gate rod against the lip of the dish or scale, and cause the scale to turn on its centre *m*, and discharge its load of grain, and immediately ascend and strike the gate rod and re-open the gate, and assume its former position for another weight of grain; every operation of the weighing apparatus being indicated by an index of the ordinary construction affixed to the end of the scales, the said scale being arranged below a hopper of the ordinary construction.

I likewise claim turning the short end of the weighing beam upwards, in the manner represented in figure 1, and placing the arms to which the bale of the scale are suspended, on a line drawn through the fulcrum of the weighing beam, forming an angle of about fifty degrees, with a horizontal line passing through said fulcrum, for the purpose of increasing the leverage of the short arm of the beam simultaneously with diminishing the leverage of the long arm as the scale or weighing dish descends, by which the gate is acted upon with increased speed and force, enclosing the same.

S. R. WILMOT.

PATENTS RE-ISSUED DURING THE YEAR 1850.

No. 158.—*Improvement on the Carding and Spinning Machines denominated the Card Spinner for Manufacturing Yarn from two or more different Materials at the same time.*

What I claim as new, and desire to secure by letters patent, is the combination by which the said composition, thread, or yarn is produced as above described, consisting of the delivering rollers *b*, and *c*, between which the covering material and the thread to be covered, come in contact as described, combined with the said doffer cylinder *a*, the spindle *d*, for twisting the thread while it is in contact with the covering material and the spool *g*, supplying the thread to be covered, all as described and represented in this specification, and the accompanying drawings or their mechanical equivalents in like combination, and for the purpose set forth.

R. S. STEUART,
Ex'r of Geo. Law.

No. 159.—*Improvement in Churns.*

What I claim as my invention, and desire to secure by letters patent, is the series of parallel floats or beaters (*a*, *a*,) formed and arranged within the agitator, substantially as above described, so that when their motion is reversed, their thick inclined rear edges, will gather the butter into a roll in the centre of the agitator, substantially as herein set forth.

Z. C. ROBBINS.

No. 160.—*Improvement in Cooking Stoves.*

Having thus fully described my improvements, what I claim as my invention, and desire to secure by letters patent, is the moveable back plate (*h*,) for contracting the fire, and protecting the oven plates, as herein set forth: and I wish it to be understood, that I do not claim the employment of double plates at the back of the fire, when such plates are stationary, but only when made moveable; so that the front and top plates of the oven are always protected back as far as the flanch on the moveable plate extends.

I also claim, in combination with the elevated fire chamber, and projecting oven under a part of said fire-chamber, the ash-pit, formed by projecting the bottom and sides of the stove under the sunk hearth, which is level with the bottom of said fire chamber.

JAMES ROOT.

No. 161.—*Improvement in Curry Combs.*

Having thus fully described my invention, what I claim as new, and desire to secure by letters patent, is combining the trough shaped bars (*a*,) which have the comb teeth on their edges, with the folded strips of metal (*b*,) and with the wires (*c*,) running through them, in the manner substantially as herein set forth, so as to form a curry comb with open or hollow back. I do not claim, separately, either trough shaped comb bars, or combs with open backs, but only in the combination herein set forth.

I also claim the shank, constructed with the fastening hole therein, made without drilling or welding, and combined with the comb as herein above described, so as to act as guards to the ends thereof.

WILLIAM BEACH.

No. 162.—*Improvement in Distilling Apparatus.*

I do not claim the use of charcoal as an absorbent of the essential oil, nor of the process of passing the vapors from the boiling liquid, through successive masses of a rectifying substance, neither do I claim the condensation of the aqueous vapor, by passing the ascending vapors through chambers cooled below the boiling point of water, nor the flavoring of a spirit by passing its vapor through any particular flavoring substance, as I am aware that all these things have been long since done.

But what I do claim as my invention, and desire to secure by letters patent, is the particular construction and arrangement of the rectifier, as herein set forth; that is to say, first—constructing the rectifying chambers and water cases with charging holes, substantially as herein set forth, by which means the various substances employed to rectify, or to flavor the spirit, can be easily charged into or discharged from any one chamber without dismounting the apparatus, or removing the substances in the other chambers.

Second. The particular form of the rectifying chambers, which are made of the frusta of two cones united at their bases, the upper forming the condensing surface of the aqueous vapor.

CHARLES A. KRECHLER.

No. 163.—*Method of Attaching a Ball to a Cartridge.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of attaching or joining to a ball, a cartridge, made of wood or other equivalent material, in manner substantially as herein described.

WALTER HUNT.

No. 164.—*Loaded Ball.*

What I claim as my invention, and desire to secure by letters patent, is making metallic balls for fire arms, with the rear part thereof cylindrical, and a cavity in the said cylindrical part of sufficient capacity to receive the entire charge of gunpowder, substantially as herein described, when the said charge is retained in the ball by a cap or the equivalent thereof, having a central hole through which the charge can be inflamed, substantially as described.

WALTER HUNT.

No. 165.—*Machine for cutting the Threads of Wood Screws.*

What is claimed as new, and desired to be secured by letters patent, is—

First. In combination with the shaft or mandrel, which gives the rotary motion to the screw blank, the employment of the rotating wedge formed cam, or the equivalent thereof, for determining the pitch of the thread, and for permitting the return motion to repeat the operation, substantially as described.

Second. Causing the chaser or cutter at each successive cut to approach nearer to the axis of the screw blank, by means of a revolving conical cam, which at each successive operation acts by a greater radius, substantially as described.

Third. Governing the motions of the chaser or cutter, to make the core or body of the screw, of a conical or tapered form along the whole or any part of its length, by combining therewith a cam of gradually enlarged diameter, substantially as described, the form of such cam depending on the form intended to be given to the core or body of the screw.

Fourth. Combining the cam which determines the form of the core or body of the screw, to make it tapering or conical in whole or in part, with the chaser or cutter, by means of a rock shaft and adjusting lever, substantially as herein described, the said adjusting lever being interposed between one of the arms of the rock shaft, and the face of the cam, so that by the use of a set screw or other analogous device, the cutter or chaser may be readily set, as described.

Fifth. Shifting the cam which determines each successive cut of the chaser or cutter, by combining therewith a ratchet movement, operated by an eccentric or cam, the wheel of the ratchet being provided with pins which operate a lever connected with the cam to shift, substantially as described.

Sixth. Disconnecting the shaft or mandrel from the driving power, at the end of each complete operation of the machine, by combining the clutch or the equivalent thereof, with the ratchet by means of an index wheel or perforated rim, which, at the required periods liberates or acts upon the connections of the clutch to disengage it, substantially as described.

Seventh. Making the chaser or cutter for chasing or cutting the threads of wood screws by machinery, with a groove of the form of the thread in its cutting face, and in the direction of its length, substantially as described, whereby the said chaser can be sharpened, by simply grinding off at the end, and without changing the form of the groove, and whereby also, the said chaser cuts on both sides of the thread, and finally on the edge thereof, as described.

CULLEN WHIPPLE.

No. 166.—*Improvement in Cooking Stoves*

What I claim as my invention, and desire to secure by letters patent, is—

First. Making the back of the oven, of a series of vertical flue tubes, in combination with the flue tubes in the bottom, substantially as herein described, to equalize the heat of the oven.

Second. I claim lining the inside surface of the bottom plate of the stove, with some refractory earthy cement or polished substance as described, in combination with the series of flue tubes constituting the back and bottom of the oven, for the purpose and in the manner substantially as described.

Third. I claim making the front part of the top plate separate from, and attached to the top plate by bolts or otherwise, substantially as described, when combined with the sunken connecting piece (*h*,) whereby the cracking consequent upon overheating and unequal expansion and contraction of that part which is exposed to a high temperature is prevented.

Fourth. I claim the combination of a fire box, made with a grate or openings for draught in the bottom thereof, substantially as described, with the coal feeder having an aperture or apertures for draught, between it and the upper edge of the fire pot, substantially in the manner and for the purpose above described. I am aware that a series of hook formed wipers playing between the grate bars, and arranged on a shaft, have been heretofore patented, for clearing the grates of an iron furnace, but these can only be turned in one direction, by reason of their hook form, and on this account, are not practically useful. I do not therefore, claim broadly the use of cam formed wipers, unless they are so formed that they can be operated in opposite directions, but

I do finally claim, in combination with a grate, a series of eccentric plates or cam formed plates, of equivalent form, arranged on a shaft, so located relatively to the grate bars, as by the vibration of the shaft in either direction, the said plates shall play between the grate bars, and separate and clear out cinder, slag, and other hard substances, substantially as herein described.

JORDAN L. MOTT.

No. 167.—*Improvement in the method of Rendering Lard.*

What I claim as my invention, and desire to secure by letters patent, in the above described apparatus for extracting or rendering lard, &c., by the action of high pressure steam, is combining with a steam tight tank, substantially such as herein described, and provided with one or more discharge holes, for the discharge of the residuum, and with a perforated steam pipe at bottom, for the introduction of high pressure steam, a perforated false bottom above the steam pipe, to sustain the charge under the weight and pressure, substantially as described, to admit of and insure the free passage of the steam thro' the charge, and also the free descent of the water of condensation, as described.

I also claim, in combination with the tank, substantially such as herein described, the employment of one or more try cocks near the top thereof, and a regulating discharge cock at or near the bottom, substantially as herein described, for the purpose of ascertaining when too much water of condensation has accumulated, and to discharge the same, to retain a sufficient space above for steam, to insure the passage of steam through the charge, as described.

And finally, I claim, in combination with a tank, substantially such as herein described, and for the purpose specified, the employment of a series of discharge cocks, arranged at different levels, substantially as described, for the purpose of drawing off the rendered lard, &c., as it floats on the water of condensation, and thus insure the separation of the pure lard, &c., from all foreign substances, when this is combined with the relief or discharge cock, substantially as described.

EBENEZER WILSON.

No. 168.—*Improvement in Pumps.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the nozzle with the pump barrel, in such a manner that the nozzle can be readily changed from side to side, and secured in any desired position, substantially as herein represented and described.

I also claim the manner of connecting the induction pipe J, the valve *n*, and its seat E, with the base D, of the pump, without the aid of rivets or solder,

and in such a manner that when the base of the pump has been securely fastened to a platform, the respective parts of the pump, as also the induction pipe, can be combined with the base, or detached therefrom, without disturbing its fastenings, to wit: by means of the cup rising from the centre of the base D, which has a screw cut in its inner periphery, and a hole in the centre of its bottom, through which hole the induction pipe J, is inserted, and enlarged by a mandrel; the metallic disk E, placed within the said cup, with the tube S, descending therefrom, inserted into the upper end of the induction pipe; the leather disk *t*, from the centre of which the valve *n*, is cut, placed on the disk E, and the whole securely combined with each other, by inserting the screw formed in the outer periphery of the lower end of the pump barrel, within the screw thread formed in the inner periphery of the base cup, and turning the pump barrel until the lower end thereof forces the above enumerated parts into the position represented in fig. 2.

BIRDSILL HOLLY.

No. 169.—*Improvement in Feeders for Screw Machines.*

What I claim as my invention, and desire to secure by letters patent, is

First. The method, substantially as described, of arranging screw blanks, &c., by the motion of oppositely inclined beveled or curved surfaces, with sufficient space between them to receive freely the shanks of the blanks, whilst they hang suspended by their heads, the said motion of such surfaces being in the direction of the space between them, substantially as described.

Second. Making one of the said inclined beveled or curved surfaces in two parts, one above the other, substantially in the manner and for the purpose specified.

Third. Combining with the said oppositely inclined beveled or curved surfaces, a fence or guard plate, placed across, from the one towards the other, and over the space in which the blanks are suspended, substantially in the manner and for the purpose specified.

Fourth. In combining with oppositely inclined beveled or curved surfaces, revolving arms, wings or beaters, substantially in the manner and for the purpose specified.

And lastly. In combining with the said oppositely inclined beveled or curved surfaces, a checking and delivering apparatus, substantially in the manner and for the purpose specified.

SOLYMAN MERRICK.

No. 170.—*Improvement in Planing Machines.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the lever frame B, B, B, B, cam wheel J, and plane stock G, substantially in the manner described, by means of which combination, and the configuration of the cam wheels, substantially as specified, and the plane stock, which is made to move in a different and lower line, during its forward stroke, than during its backward stroke, in the manner and for the purposes described.

Second. The combination and arrangement of the tonguing and grooving planes W and X, running with the slides *y*, *y'*, and the mode of adjusting the same, in combination with the surface plane G, the cam wheels J, and levers B, B, B, B, substantially in the manner specified, for planing, tonguing and grooving boards and plank, at one operation.

And finally. The mode of contracting and expanding the grated bed, in the manner specified, in combination with the tonguing and grooving planes.

CALVIN EMMONS.

No. 171.—*Improvement in the Machine for Boiling and Washing rags for Manufacturing Paper.*

What is claimed, is the herein before described process of preparing materials for making pulp in the manufacture of paper, by digesting them in a turning vessel with an alkaline solution or other liquid, the heat being applied to the outside of the vessel, or by steam introduced within it, substantially as herein set forth.

JOHN CAMPBELL,
Assignee of the whole right of the late George Spafford.

No. 172.—*Improved concealed Trigger for Fire-arms.*

What we claim as of our own invention, and which we desire to secure by letters patent, is the construction of a concealed trigger, capable of being disclosed and made ready to operate by simple pressure imparted by the hand to its rear end, as described herein.

JACOB PECARE.
JOSIAH M. SMITH.

No. 173.—*Improvement in Harvesters of Clover Heads and other Grain.*

What I claim as my improvement, and desire to secure by letters patent, is:

First. The combination and arrangement of the transverse pendant finger bar I, the mortised right angled plates F, the adjustive slide bars G, and knife or cutter K, with the revolving axle-tree of spring conveyer bars P, arranged and operating in the manner described, by which the heads of clover, wheat, and other description of grain, are severed from the stems or stalks, and delivered into a receiver.

Second. I also claim the combination of the right angled rods L, fingers J, and pendant bar I, with the transverse timber N, for adjusting the knife K, and fingers J, longitudinally and vertically in connection with the spring conveyer bars P, as described and represented.

JOHN HINTON.

No. 174.—*Improvement in Cooking Stoves.*

What I claim therefore, and desire to secure by letters patent, is:

First. The heating chamber in front of the oven, in combination with the arrangement of direct and return flues at the bottom and back of the oven, substantially as described, for the purpose of imparting an equal or nearly equal heat to the oven as described.

And secondly. I claim in combination with the heating chamber in front, and the arrangement of direct and return flues at the bottom and back, substantially as described, the extension of the oven under the open hearth or apron of the stove, substantially as described, whereby the capacity of the oven is increased, relatively to the other parts of the stove, and at the same time heated equally or nearly so, as described.

DARIUS BUCK.

No. 175.—*Improvement in the manner of constructing the Truss Frames of Bridges and other Structures.*

What I claim as my invention, and desire to secure by letters patent, in the construction of truss frames, is the method of uniting the upper and lower stringers without attaching them to the interposed timbers by the combination of the straining blocks, with the timbers interposed for keeping the stringers apart, and the tension rods for drawing them together, substantially as described, whereby the camber can be regulated with facility along the whole or any portion of truss, as described.

WM. HOWE.

No. 176.—*Improvement in Stoves.*

Having thus fully described my improvements in stove furnaces, &c., what I claim as new therein, and which I desire to secure by letters patent, is the air chamber, in which the air is heated previously to its admission to the fuel in combination with the apertures, by which the heated air is caused to impinge on the upper surface of the fuel, substantially in the manner, and for the purposes as described.

ANSON ATWOOD.

No. 177.—*Improvement in Brick Presses.*

What I claim as my invention, and desire to secure by letters patent, is the making the moulds C, C, of extra depth, in combination with the elevation of the bricks in the moulds, after they have been pressed a distance equal to the extra depth given to the same, and there moval of the surplus thickness of the bricks, raised above the tops of the moulds, by a knife or its equivalent, for the purpose of giving uniform solidity and perfection of form to the bricks, prior to their final removal from the moulds, substantially as herein set forth.

ISAAC GREGG.

No. 178.—*Improvement in Printing Presses.*

I claim a platen raised and lowered by machinery, substantially as above described, in combination with the moveable tympan plate on which the sheet of paper is placed, and the bed supporting the type with their faces downwards, the whole being arranged and operating together, substantially in the manner, and for the purpose herein explained and set forth.

I claim supplying the press with paper, and removing the same after it is printed into a box, in fig. 6, attached to the tympan carriage, by means of a vibrating table g', h', (operated by a cam a', fig. 4, on the shaft I, figs. 4 and 6, in combination with a frisket constructed as above described, connected to the frame g, g, of the tympan plate, and pressed down upon said plate by a spring j^2, k^2, and raised when the tympan carriage recedes with the printed sheet by means of a cam o', fig. 2, on the shaft I, through the intervention of a bar w', with a roller v', shaft y', and angular piece of metal a^2, the whole being arranged and operating together, substantially as herein above explained and set forth.

I claim grooving or channeling the fountain roller or plate under the same, in the manner and for the purpose above mentioned.

I claim the peculiar combination of machinery, for the lateral vibration of the distributing roller; said combination consisting of the pulleys v^2, on the shaft B, band w^2, pulleys x^2, rod y^2, z^2, lever a^3, b^3, c^3, rod e^3, f^3, shaft g^3, and distributing roller frame o^2, the whole being arranged and operating together, substantially in the manner and for the purpose above mentioned.

I claim the use of the side strips c^2, d^2, c^2, d^2, and cross strips e^2, f^2, or either of them, in combination with a tympan supported by the platen plate, the said combination forming a pair of nippers, as it were for rigidly holding the sheet, however small the margin may be, until it is effectually free, or disengaged from the form after an impression is produced.

STEPHEN P. RUGGLES.

No. 179.—*Improvement in Shanks of Door Knobs.*

What we claim as our invention, and desire to secure by letters patent, is the method of making the shank for door knobs in two pieces, coupled together near the middle by a notched connection, and held together by means of the escutcheon at one end, and the latch bolt B, (or by the tumbler B′, that operates a latch bolt) at the other, substantially as herein described.

We also claim the constructing the keeper H, and the lever fastener J, of such shape and proportions, that the keeper can be reversed in its position upon the latch plate A, and the lever fastener be reversed in its position in relation to the keeper, for the purpose of adapting our improved locks or latch to doors, opening either to the right or to the left, substantially as herein set forth.

We also claim the connecting the respective shanks of the knobs to each other, and to the lock or latch, by means of the tooth in the halved portion of one shank, fitting into an aperture in the halved portion of the other, and the two being confined to each other by the tumbler *i*, the tube F, projecting from the side of the lock or latch, and the escutcheon E, secured to the door, substantially in the manner herein set forth.

L. R. LIVINGSTON.
JOHN JAY ROGGEN.
CALVIN ADAMS.

No. 180.—*Improvement in Mills for Grinding.*

Having thus described the construction and operation of our bark mill, what we claim therein as our invention, and desire to secure by letters patent, is the vibratory motion given to the concave, substantially in the manner herein set forth.

SIDNEY A. BANTZ.
WILLIAM ANDREW.

No. 181.—*Improvement in Portable Furnaces.*

I claim as my invention, the construction of a portable furnace, by which it may be connected with a stove, in the manner described, that is, a furnace adapted to the boiler, or other hole of a stove, with a downward draft, or diving flue for the escape of the smoke, through the bottom into the stove, substantially in the manner and for the purposes set forth.

MERRITT F. POTTER.

No. 182.—*Improvements in Machinery for turning Irregular Forms.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the cutter wheel or saws, so as to cut in the direction of the grain of the wood or other substance to be formed, when this is combined with the rotation of the pattern, and substance to be formed during the operation of the cutters, substantially as described.

I also claim the rotating cutter wheel, constructed substantially as herein described, of a series of circular saws, secured in an inclined position to an arbor which carries them, as herein set forth.

TIMOTHY CLARK.

No. 183.—*Improvement in the manner of constructing Railroad Carriages, so as to ease the lateral motion of the bodies thereof.*

What we claim, is connecting the said turning bearing to the truck frame of the above described kind, resting on four wheels or more, by a mechanism, substantially such as described, that shall not only allow such turning bearing independently of the wheels and axles, a lateral play movement or movements, in directions transversely of the carriage, but bring or move it back to its central position after the lateral deflective force has ceased to act.

CHARLES DAVENPORT.
ALBERT BRIDGES.

ADDITIONAL IMPROVEMENTS.

No. 93.—*Improvement in Ice Cream Freezers.*

What I claim, and desire to secure by this additional improvement, is first, the spring blade or scraper, constructed and employed as above described.

H. B. MASSER.

No. 94.—*Improvement in separating Stearine from Elaine.*

What I claim as my additional improvement and desire to secure by letters patent, is the application of alcohol, as herein described, for the purpose of making candles.

JOHN H. SMITH.

No. 95.—*Improvement in Tailors' Measures.*

What I claim in these letters patent, additional, is the combinatiom of the socket and rule, figs. 6, 7, with the instrument represented, at fig. 2, also the socket in the arms 6, 7, as represented, also the manner of connecting two instruments together, by bar P, P, as represented on fig. 10, for the purpose of ascertaining the slope of both shoulders at one operation, also the additional width of the lower arm, and the combination of the groove and slide R, S, and rule X, with the lower arm as represented at 0, 8, as set forth.

AMOS STOCKER.

No. 96.—*Improvements in Apparatus for Splitting and Stretching Leather.*

I claim the improvement of the apparatus for splitting and stretching leather, secured to me by letters patent, in April 1850, by adding thereto an additional apparatus for stretching leather, especially belting, said apparatus consisting of the combination of two rods, placed one above the other, in juxtaposition, the upper rod maintaining two clamps to hold the leather to be operated on, the one clamp fixed to one end of the rod, the other clamp moveable along the rod. The said rod being separable from the machine with the leather, after the same has been stretched, for the purpose of allowing the repetition of the stretching operations, with another similar rod, and another piece of leather.

The under rod to be a permanent attachment to the machine, but moveable along its own length, by the wheel work of the machine, or otherwise, so that when the upper rod is temporarily secured to it by one end near the fixed clamp, and the other clamp is held in its position, the two clamps may be gradually separated, stretching the leather lying between them, substantially as set forth in the above specification.

BRADFORD ROWE.

DESIGNS.

No. 258.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of ornamental forms and figures, represented in the accompanying drawings, forming an ornamental design for a cooking stove.

H. L. SHEPERD.

No. 259.—*Design for Stoves.*

What I claim as my new design, and desire to secure by letters patent, is the design and configuration of a cook stove, substantially the same as described and represented in the annexed drawings.

P. J. SIMMONS.

No. 260.—*Design for Stoves.*

What we claim as new, and our invention, and desire to secure by letters patent, is the combination and arrangement of the above described and represented panelings, ornaments, mouldings, &c., into an ornamental design for cooking stoves, when constructed, combined, and arranged, substantially as herein specified and represented.

JOSEPH G. LAMB.
CONRAD HARRIS.

No. 261.—*Design for Stoves.*

We have thus described the ornamental design which we claim as our invention, or production, and desire to secure by letters patent, the design for a stove, called the cottage parlor air tight, herein fully described and represented in the accompanying drawings.

WM. P. CRESSON.
DAVID STUART.
PETER SEIBERT.

No. 262.—*Design for Stoves.*

We have thus described the ornamental design, which we claim as our invention, or production, and desire to secure by letters patent, the design for a stove, called a radiator screen, herein fully described and represented in the accompanying drawings.

WM. P. CRESSON.
DAVID STUART.
PETER SEIBERT.

No. 263.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of ornamental figures, forming respectively the front and side plates of my stove, as herein represented and described.

SAMUEL D. VOSE.

No. 264.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of ornamental figures forming respectively the outside plates of my parlor stove, as herein represented and described.

SAM'L D. VOSE.

No. 265.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of ornamental figures, forming respectively the front, top and side plates of my stove, as herein represented and described.

SAM'L D. VOSE.

No. 266.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the production of the new design for stoves, as described in this specification, and represented in the drawings hereto annexed at figures 1 and 2.

JAMES H. CONKLIN.

No. 267.—*Design for Stoves.*

What we claim as our invention, and desire to secure by letters patent, is the configuration and arrangement of the ornamental figures on the door panels and feet of the stove, constituting together, a design for a stove.

J. D. GREEN.
GEO. WARREN.

No. 268.—*Design for Stoves.*

I do not claim the figures in this plate fig. 1, as being new; but what I do claim as my invention, and desire to secure by letters patent, is the peculiar form, shape, or configuration of the said stove plate, fig. 1, to be used as the front oven plate to an elevated oven, such shape, form, or configuration being a design, independent of any particular ornaments.

LATHROP S. BACON.

No. 269.—*Design for Stoves.*

What I claim as new, and desire to secure by letters patent, is the design and configuration of ornaments constituting a parlor stove, substantially the same as herein described and represented.

WM. L. SANDERSON.

No. 270.—*Design for Stoves.*

We have thus described the ornamental design which we claim as our invention or production, and desire to secure by letters patent, the design for a stove called a cast iron parlor air tight, herein fully described and represented in the accompanying drawings.

WM. P. CRESSON.
DAVID STUART.
PETER SEIBERT.

No. 271.—*Design for Stoves.*

We have thus described the ornamental design which we claim as our invention or production, and desire to secure by letters patent, the design for a stove called air tight parlor, herein fully described and represented in the accompanying drawings.

WM. P. CRESSON.
DAVID STUART.
PETER SEIBERT.

No. 272.—*Design for Stoves.*

What I claim as original, and desire to secure by letters patent, is the arrangement and combination of the several original ornamental figures, letters and mouldings upon this particular stove, as herein described and represented by the annexed drawings. JAMES H. CONKLIN.

No. 273.—*Design for Chandeliers.*

We claim the ornamental design for a chandelier, set forth in the accompanying drawing, as our original design.

ELLIS S. ARCHER.
REDWOOD F. WARNER.

No. 274.—*Design for Stoves.*

What I claim as my new design, and desire to secure by letters patent, is the design and configuration of the ornaments, so disposed on the doors, feet, and other parts of the stove, constituting, in combination, a new design of cook stove, the same as herein described and represented.

SAMUEL A. HOUSE.

No. 275.—*Design for Stoves.*

We have thus described the ornamental design which we claim as our invention or production, and desire to secure by letters patent, the design for a stove, called a complete cook, herein fully described and represented in the accompanying drawings.

RICHARD PETERSON.
DAVID STUART.
PETER SEIBERT.

No. 276.—*Design for a Portable Furnace.*

What we claim, and desire to secure by letters patent, is the above described ornament and illuminated design for portable furnaces.

CHAS. W. WARNICK.
FRED'K LEIBRANDT.
JAS. G. ABBOTT.
ARCHILUS LAWRENCE.

No. 277.—*Design for Stoves.*

I claim as my invention or production, the above described combination of mouldings and illustrated ornamental figures for six plate stoves, and desire to secure the same by letters patent. JAMES WAGER.

No. 278.—*Design for Stoves.*

I claim the foregoing described and illustrated design for stoves.

DAVID L. BARTLETT.

No. 279.—*Design for Stoves.*

What I claim as my new design, and desire to secure by letters patent, is the design and configuration of the ornaments, so disposed on the doors, feet, and other parts of the stove, constituting, in combination, a new design of stove, substantially the same as herein described and represented.

JOSHUA CRANDALL.

No. 280.—*Design for Cooking Stoves.*

What we claim as our new design, and desire to secure by letters patent, is the design and configuration of ornaments in the panels of the doors, and on the feet, so as to constitute, in combination, a new design of cooking stove, as herein described and represented.

J. D. GREEN.
GEO. WARREN.

No. 281.—*Design for Stoves.*

Having thus described the nature of my new design, what I claim therein as new, and desire to secure by letters patent, is the design of ornament and configuration, constituting, in combination, a new design of stove, substantially the same as herein described and represented in the annexed drawings.

P. A. PALMER.

No. 282.—*Design for Painted Floor Cloth.*

And what is claimed as my invention, and desired to be secured by letters patent of the United States, is the arrangement of ornamental figures, forming a design for floor cloths, as shown in the aforesaid drawing.

JAMES HUTCHINSON.

No. 283.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental shape and configuration, of the respective pieces of castings for a stove, as represented in the accompanying drawings, and herein specified.

WASHBURN RACE.

No. 284.—*Design for Stoves.*

Having thus fully described and illustrated my design for cooking stoves, what I claim as new, and for which I desire to obtain letters patent, is the particular form and design, as herein described and illustrated.

D. ROOT.

No. 285.—*Design for Stoves.*

What I claim as my invention in the said design, and desire to have secured to me by letters patent, is the combination of the elongated horizontal panels *i*, *i*, *i*,—*k*, *k*, *k*, and vertical connecting panel *n*, *n*, *n*, all having mouldings in alto relievo, with the several doors and panels, having gothic arches with clustered raised ribs on their sides, and mouldings as above specified and shown in the drawings. A. C. BROWNELL.

No. 286.—*Design for Stoves.*

What we claim as our invention, and desire to secure by letters patent, is the design of the form of the plates consisting of the peculiar manner, the same are ornamented and constructed; we lay no claim to the general form of the stove.

JOEL C. BAILEY.
RUSSEL WHEELER.

No. 287.—*Design for Umbrella Stands.*

What I claim as my production, and desire to have secured to me by letters patent, is the new design for an umbrella stand, herein above described, consisting of branches of a grape or rustic vine, cast in a twisted form about the basin, and then rising vertically and crossing each other, to form the stem, from which other branches project horizontally, and are twined so as to form the loop holes g, g,—g, g, &c., all as above set forth and represented, in the accompanying plate of drawings. WALTER BRYANT.

No. 288.—*Design for Coal Stoves.*

Having thus described and represented my new design, what I claim as new and desire to secure by letters patent, is the ornamental design and configuration of stoves, substantially the same as herein described and represented.

JOHN T. DAVY.

No. 289.—*Design for Stoves.*

What I claim as my invention or production, and desire to have secured to me by letters patent, is the combination of the bull's eyes, in alto relievo, (having radial notches as described,) and of alternating concave and convex radial ribs, and surrounding mouldings, on the several doors and panels of the front and side plates, and the row of pointed leaves m, m, and of alternate notches and ridges n, o, &c., on the moulding of the hearth plate, all as herein above set forth and represented in the drawings.

AMOS PAUL.

No. 290.—*Design for Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination of the four ornamental figures, (as represented,) in the accompanying drawings. ELIJAH P. PENNIMAN.

No. 291.—*Design for Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms, represented in the accompanying drawings, forming together an ornamental design for a parlor stove. JOHN F. RATHBONE.

No. 292.—*Design for Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms, represented in the accompanying drawings, forming together an ornamental design for a cooking stove. JOHN F. RATHBONE.

No. 293.—*Design for Stoves.*

Having thus fully described our improvement, what we claim therein as new, and for which we desire to secure letters patent, is the above described ornamental design and configuration of the plates, as described and represented.

JAMES WAGER.
DAVID PRATT.
VOLNEY RICHMOND.

No. 294.—*Design for Stoves.*

Having thus fully and exactly described the ornaments of our stove, what we claim therein as new, and desire to secure by letters patent, is the com-

bined ornamental design, and configuration of plates, for a cooking stove, substantially as herein set forth and represented in the accompanying drawings.

J. E. OWENS.
JACOB EBERT.
E. G. DYER.

No. 295.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the design of the top and bottom stove plates, represented in the accompanying drawings, and herein set forth.

WASHBURN RACE.

No. 296.—*Design for Cooking Stoves.*

What I claim, and desire to secure by letters patent, is the design and configuration of cook stove, as herein described and represented in the annexed drawing. WM. L. SANDERSON.

No. 297.—*Design for Stoves.*

What I claim, and desire to secure by letters patent, is the design of cook stove, represented in the annexed drawings.

JOSHUA CRANDALL.

No. 298.—*Design for Stoves.*

What I claim as my production, and desire to have secured to me by letters patent, is the ornamental design, herein above described, for the front and back plates of a horizontal cylindroidal air tight stove, and the door of the former consisting of scollop shells, and razor shells, cast in alto relievo in the several positions on said plates, herein above specified, and represented in the drawings.

CALVIN DOANE.

No. 299.—*Design for Lamps.*

We claim the ornamental design of the column or pedestal, the oil cup and the border round the globe holder, set forth in the accompanying drawing as our original design.

REDWOOD F. WARNER.
ELLIS S. ARCHER.

No. 300.—*Design for Stoves.*

What we claim as our invention, and desire to secure by letters patent, is the shape and configuration of the ornamental plates for stoves herein described.

SHERMAN S. JEWETT.
FRANCIS H. ROOT.

No. 301.—*Design for Stoves.*

What I claim as my invention or production, and desire to have secured to me by letters patent, is ornamenting the several mouldings of the top and bottom of a pyramid stove, and the double doors resting on the latter with transverse, longitudinal, and clustered beak-heads cast in alto relievo, as herein above described and represented in the drawings.

APOLLOS RICHMOND.

No. 302.—*Design for Stoves.*

We claim as our invention, and desire to secure by letters patent, the above design which is fully set forth in the drawings accompanying this description.

JAMES H. CONKLIN.
A. W. JONES.

No. 303.—*Design for Stoves.*

Having thus fully and exactly described the ornaments of my stove, what I claim therein as new, and desire to secure by letters patent, is the combined ornamental, design and configuration of plates for a cooking stove, substantially as herein set forth and represented in the accompanying drawings.

J. E. OWENS.
JACOB EBERT.
E. G. DYER.

No. 304.—*Design for Portable Grate.*

What I claim as my invention or production, and desire to have secured to me by letters patent, is the new design herein above described, for the front plate of a portable grate, consisting of the five centred arch mouldings, supported by the triple column pilasters, in combination with the gothic panels on each side of said pilaster, and three sided panels on the horizontal part of the frame; said three sided panels, and the space beneath the arch moulding being filled with the wedge shaped radial ribs, all as herein above described.

AMOS PAUL.

No. 305.—*Design for Cast Iron Brackets.*

What I claim as my invention or production, and desire to have secured to me by letters patent, is the combination of the central Grecian scroll, with its pendent leaves, with the several smaller Grecian scrolls and fluted ties, herein above enumerated and represented in the drawings, the whole forming a connection between the vertical and horizontal plates of a cast iron bracket.

WALTER BRYANT

No. 306.—*Design for Coal Stoves.*

What I claim as my invention and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms, represented in the accompanying drawings, forming together an ornamental design for a coal cylinder stove.

JNO. F. RATHBONE.

No. 307.—*Design for Stoves.*

What I claim as my invention and desire to have secured by letters patent, is the combinations of leaves, vines, curves, and other ornaments, as represented in the annexed drawings, and herein described as a design for cast iron stove plates, making part of a cast iron stove.

R. J. BLANCHARD.

No. 308.—*Design for Stoves.*

What we claim as our invention, and desire to secure by letters patent, is the shape and configuration of the ornamental plates for stoves, herein described.

SHERMAN S. JEWETT.
F. H. ROOT.

No. 309.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental design for stove plates, as herein described, and which is fully set forth in the drawing accompanying this description.

ROBERT DONAVAN.

No. 310.—*Design for a Parlor Stove.*

What I claim as new, and desire to secure by letters patent, is the design and configuration of ornamental stove plates, substantially the same as described and represented in the annexed drawings.

GEORGE W. RING.

No. 311.—*Design for a Stove.*

Having thus described my design, what I claim as new, and desire to secure by letters patent, is the design and configuration of ornamental stove plates, substantially the same as herein described and represented.

WM. L. SANDERSON.

No. 312.—*Design for Stoves.*

Your petitioner claims to be the original inventor or producer of the design and ornamental part of said stove, as above described and represented in the drawings.

CHARL. W. WARNICK.

No. 313.—*Design for Bust of Daniel Webster.*

What I claim as my invention or production, is the design of a bust of Daniel Webster, as represented in the annexed drawings.

JOHN C. KING.

No. 314.—*Design for a Blower Stand.*

Having thus described my new design for a blower stand, I shall state my claim as follows:—What I claim as my invention or production, and desire to have secured to me by letters patent, is the new design herein above described for a blower stand, consisting in forming two halves of said stand in the form of an ancient lyre frame, ornamented with volute scrolls, as herein above set forth and as represented in the drawings.

WALTER BRYANT.

No. 315.—*Design for Plates for Registers, Ventilators, &c.*

What we claim and desire to secure by letters patent, is the particular configuration or design of open scroll or fret work, substantially as described by the annexed drawing, and alluded to in the foregoing specifications. The said design is used by us as a top or front plate of hot air registers and ventilators, and for other useful and ornamental purposes.

CHARLES F. TUTTLE.
JAMES S. BAILEY.

No. 316.—*Design for Plates for Registers, Ventilators, &c.*

What we claim and desire to secure by letters patent, is the particular configuration or design of open scroll or fret work, substantially as described by the annexed drawing, and alluded to in the foregoing specifications The said design is used by us as a top or front plate of hot air registers and ventilators, and for other useful and ornamental purposes.

CHARLES F. TUTTLE.
JAMES S. BAILEY.

No. 317.—*Design for Plates for Registers, Ventilators, &c.*

What we claim, and desire to secure by letters patent, is the particular configuration or design of open scroll or fret work, substantially as described by the annexed drawing, and alluded to in the foregoing specifications; the said design is used by us as a top or front plate of hot air registers and ventilators, and for other useful and ornamental purposes.

CHARLES F. TUTTLE.
JAMES S. BAILEY.

No. 318.—*Design for Plates for Registers, Ventilators, &c.*

What we claim, and desire to secure by letters patent, is the particular configuration or design of open scroll or fret work, substantially as described by the annexed drawings, and alluded to in the foregoing specification; the said design is used by us as a top or front plate of hot air registers and ventilators, and for other useful and ornamental purposes.

CHARLES F. TUTTLE.
JAMES S. BAILEY.

No. 319.—*Design for Plates for Registers, Ventilators, &c.*

What we claim, and desire to secure by letters patent, is the particular configuration or design of open scroll or fret work, substantially as described by the annexed drawing, and alluded to in the foregoing specifications; the said design is used by us as the top or front plate of hot air registers and ventilators, and for other useful and ornamental purposes.

CHARLES F. TUTTLE.
JAMES S. BAILEY.

No. 320.—*Design for Plates for Registers, Ventilators, &c.*

What we claim, and desire to secure by letters patent, is the particular configuration or design of open scroll or fret work, substantially as described by the annexed drawing, and alluded to in the foregoing specifications; the said design is used by us as the top or front plate of hot air registers and ventilators, and for other useful and ornamental purposes.

CHARLES F. TUTTLE.
JAMES S. BAILEY.

No. 321.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the design and ornaments, consisting of cornucopias, and fruits issuing from them, and of vines and leaves issuing from scrolls, as they are delineated in the accompanying drawings, and herein described: I do not claim the open spaces in figure 1; nor is it any part of my invention that there is some open work in figure 3; but I claim the ornaments seen in figure 3, whether the same are made in open work, or in relief. R. J. BLANCHARD.

No. 322.—*Design for Stoves.*

What I claim as new, and my invention, is the combination and arrangement of the above described and represented shapes, figures, ornaments, flutes and mouldings, into the above represented style and design for coal heating stoves, substantially as above shown.

JOSEPH G. LAMB.

No. 323.—*Design for Stoves.*

What I claim as new, and my invention, is the combination and arrangement of the above represented and described mouldings, shapes, figures and ornaments, into the above represented design for cooking stoves, substantially as above shown.

JOSEPH G. LAMB.

No. 324.—*Design for Stoves.*

Now what I desire to secure by letters patent of the United States, and what I claim as original, is the peculiar combination and arrangement of the several ornamental figures and mouldings forming the original design of this stove, as described in this specification, and as represented by the accompanying drawings.

WM. SAVERY.

No. 325.—*Design for Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms, represented in the accompanying drawings, forming together, an ornamental design for a parlor stove.

A. W. JONES.

No. 326.—*Design for Grate Frame and Fender.*

What I claim as my production herein, and desire to secure by letters patent, is the combination and general arrangement of the figures and ornaments, as set forth, and shown in the drawings herein described, for forming an ornamental grate frame, summer piece and fender, substantially as described.

JAMES L. JACKSON.

No. 327.—*Design for Stoves.*

Having thus described and represented my new design of stove plates and register door, what I claim as new, and desire to secure by letters patent, is the design of ornament, shape, and configuration of parlor stove plates, as described and represented in the annexed drawing.

EZRA RIPLEY.

No. 328.—*Design for Stoves.*

What I claim and desire to secure by letters patent, is the design and configuration of ornamental parlor stove plates, substantially the same as described and represented.

EZRA RIPLEY.

No. 329.—*Design for Stoves.*

What I claim as my invention, is the ornamental composition of each foot E or F.

I also claim the ornamental composition of either the base, the cornice, or the blockings, as well as a combination of the whole of the same.

I also claim the ornamental composition or design for the main oven door H, as well as that of either of the small doors I or K.

LABEN EDDY.

No. 330.—*Design for Iron Railings.*

What I claim, is the particular ornamental design or device for a railing and gate posts, as herein combined and specified; that is, the posts, panel, and marginal grape vine base, in form and design, substantially as herein set forth.

WILLIAM BALLARD.

No. 331.—*Design for Bas Relief of Henry Clay.*

What I claim as my design, and wish to secure by letters patent, is the combination of scroll work and vignette, which forms the ornamental tablet, the shield on which history is recording the extract of Mr. Clay's address, together with the side view attitude in which he is represented, and the ornamental tablet on which he stands, from which copies may be taken, for sale or use: either by casting, moulding, embossing, or in any manner, or with any material whatsoever, in bas-relievo, or by copies to be taken by painting, drawing, sketching, etching, engraving on wood or metal, or by any material spread upon it, or by the electrotype, talbotype, or daguerreotype process, or by ruling with machinery, or in any other manner whatsoever.

CHARLES YOUNGLOVE HAYNES.

No. 332.—*Design for Stoves.*

I do not claim the mouldings around the door, as seen in fig. 1, but what I do claim as my invention, and desire to secure by letters patent, is the bunch of leaves tied together, as seen in fig. 1, and the leaf ornament in fig. 2, as such a design as above mentioned.

R. J. BLANCHARD.

No. 333.—*Design for Stoves.*

What I claim as my invention or production, and desire to have secured to me by letters patent, is the combination of the several ornamented parts of the stove, viz: the base plate or hearth, having the diamonds and clustered beak heads cast thereon, as described, the side and back plates having a plinth with semi-pyramidal ribs, gothic arches, diamonds, beak heads, and band at top, with inverted semi-pyramidal beak heads, the cap, with its circular ornamented areas, n', n', and diamonds surrounding beak heads m', m', and the vase, with its exterior ornaments of diamonds, clustered beak heads, semi-pyramidal ribs and open work diamonds, all the mouldings, beak heads, and ribs being cast in alto-relievo, as herein above described and represented in the drawings, the whole combination forming an entirely new design for the exterior of a parlor air tight stove.

APOLLOS RICHMOND.

No. 334.—*Design for Stoves.*

What I claim as new, and which I desire to secure by letters patent, is the design formed and ornamented, substantially as above described and represented in the accompanying drawings.

D. ROOT.

No. 335.—*Design for Carriage Plates.*

What I claim as my invention, and desire to secure by letters patent, is my design for an ornamental carriage plate for the side of a wagon body, substantially in the manner herein set forth.

JOHN S. ROYCE.

No. 336.—*Design for Spool Handles.*

What we claim as our invention, is the new and useful ornamental design or configuration, substantially as represented in figure 1, and as herein before described.

CHARLES P. GORDEN.
GEORGE B. GORDEN.

No. 337.—*Design for Stoves.*

I claim the ornamental design or combination of the star *a*, the fillet *c*, the system of rays *b*, the six torus arcs *d*, *e*, *f*, *g*, *h*, *i*, and two straight connecting toruses *k*, *l*, disposed essentially as specified.

WILLIAM B. GLEASON.

No. 338.—*Design for Stoves.*

What I claim as new, and desire to secure by letters patent, is the design of ornament and configuration of cook stoves, substantially the same as herein described and represented.

SAMUEL PIERCE.

No. 339.—*Design for Stoves.*

Having thus described the nature of our new design, what we claim therein as new, and desire to secure by letters patent, is the design of ornament and configuration, constituting, in construction, a new design of stove, substantially the same as herein described and represented in the annexed drawings.

MORRIS SMITH.

No. 340.—*Design for Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the accompanying drawing, as making an ornamental design for an air tight cooking stove.

CHAS. A. LAMBARD.

No. 341.—*Design for a Cook Stove.*

What I claim herein as new and for which I desire letters patent, is the ornamental design for a stove, substantially as represented in the accompanying drawings.

W. C. DAVIS.

No. 342.—*Design for Stoves.*

What we claim as our invention or production, and desire to secure by letters patent, is the ornamental design, as above described and represented in the accompanying drawings.

CHAS. GILBERT.
W. G. HALLMAN.

No. 343.—*Design for Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms, representéd in the accompanying drawings, forming together, an ornamental design for a parlor stove.

ELIHU SMITH.

No. 344.—*Design for Stoves.*

What I claim as new, and my invention, is the arrangement and combination of the above described and represented shapes, figures, ornaments, flutes and mouldings, into the above specified design for coal heating stoves, substantially as above shown. JOSEPH G. LAMB.

No. 345.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental design for a stove, as herein described and represented in the annexed drawing. S. W. GIBBS.

No. 346.—*Design for Cooking Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the annexed drawings, as making an ornamental design for a cooking stove.
S. W. GIBBS.

DISCLAIMERS ENTERED DURING THE YEAR 1850.

Turn-about for Railroads.

Your petitioner, therefore, hereby enters his disclaimer to that part of the claim in the aforenamed specification, which is in the following words, to wit: "a revolving circular platform, or turning table, is not claimed, but only the method of turning it, by the use or application of a circular rack and pinion, turned by a crank," which disclaimer is to operate to the extent of the whole interest in said letters patent, your petitioner being the sole proprietor thereof.
JEREMIAH MYERS.

Improved Frog for Railroads.

Your petitioner, therefore, hereby enters his disclaimer to that part of the claim in the aforesaid specification, which is in the following words, to wit: "What I claim as my invention, and desire to secure by letters patent, is a railroad frog, constructed with hinged leaves, acted upon by either weights or springs." I desire to limit and restrict this said claim, so that it will only cover and protect the attachment of the said "weights or springs" to that part of the said "hinged leaves" of a railroad frog, at or near the angles of the same, or the point of the V of the frog, and the hinged ends of the said leaves, which disclaimer is to operate to the extent of the interest in said letters patent, vested in your petitioner. HENRY A. LANDRY.

Turning Wooden Bowls, Machinery for.

Your petitioner, therefore, hereby enters his disclaimer to that part of the claim in the aforenamed specification, which is in the following words: "the combination of the semicircular arm E, with the knife frame F, holding one or more knives, and adjustable piece J, holding the gouge T, for the purpose of turning wood bowls or dishes," which disclaimer is to operate to the extent of the interest in said letters patent, vested in your petitioner.
ADDISON EVERETT.

RENEWAL.

No. 24.—*Improvement in Capstans.*

The invention here claimed, and desired to be secured by letters patent, is the improvement of the ships or vessels' capstans, so that increased power may be obtained at pleasure, as above described; with the arrangement, application, and adaptation of the several parts, as herein set forth.
ANDREW MORSE, Jr.

III.

EXAMINERS' AND MACHINIST'S REPORTS.

Honorable THOMAS EWBANK,
Commissioner of Patents.

SIR:—I have the honor to report from my desk, the following facts and observations for the year 1850. At the commencement of the year I had before me 9 applications unexamined. During the year, 559 new applications have been apportioned to me for examination, and I have now before me, 68 new applications untouched. Examination has therefore been had upon 500 new applications. Of these applications, adverse reports were made upon 175. Favorable reports have been made upon 314 applications, old and new, for which letters patent were ordered to issue. Of the 314 ordered to issue, 83 issues were for designs, and of the 175 adverse reports, 17 were upon designs; by which it will be seen that the proportion of adverse reports upon designs, is small. The whole number of adverse reports upon all cases, old and new, coming up for examination in 1850, was 267. It will be borne in mind that adverse reports are often repeated two, three, four or more times upon applications for reconsideration of the same case, and as often confirmed by your decision. The whole number of reports and actions upon applications, old and new, during the year 1850, is 1317. The whole number for 1849, was 1296. The number of cases of interfering applications, reported for 1850, is 17, of which number, 16 were declared and decided during the year.

It is my duty to state here, that the examining force of the office is insufficient, notwithstanding the increase in the number of examiners in 1848. That increase was barely sufficient at the time it was made, and the great increase since, in the number of applications, "calls loudly for help." Permit me here to call your special attention to the following consideration, viz: A numerical statement of the number of cases received or acted upon, cannot be taken as an accurate basis for estimating the amount of work required or performed; and further, that the labor required, increases in a greater ratio than the number of applications. It would be exceedingly difficult to establish the ratio of this increase, as the whole matter is very complicated. But certain facts as criterions, may be clearly stated, although no one but an examiner can fully appreciate the character or extent of his labors. One thing is certain; an examiner's work is never finished. If not a single new application should be presented to the office for the next year, each examiner would still have a full year's work to perform. This may appear a little paradoxical, but the position is fully borne out by the following facts. In addition to the number of applications remaining untouched upon the examiner's desks, there are 1895 applications still before the office, not yet finally decided, and liable

to be called up for action at any time. Upon 1196 of these, unfavorable reports and decisions have been made, but they still await the further intentions of the applicants. Upon 673, the action of the office has been only preliminary, the cases being, for the most part, postponed for the amendment of defects. The remaining 26 are cases of interference not yet decided. The number of applications received by me in 1849, was 481, and 559 in 1850. Applications for letters patent are distributed under the following classification,

LIST OF CLASSES.

Class 1.—Agriculture, including instruments and operations.

Class 2.—Metallurgy and maufacture of metals, and instruments therefor.

Class 3.—Manufacture of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper, &c.

Class 4.—Chemical processes, manufactures and compounds, including medicine, dying, color making, distilling, soap and candle making, mortars, cements, &c.

Class 5.—Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel, &c.

Class 6.—Steam and gas engines, including boilers and furnaces therefor, and parts thereof.

Class 7.—Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers, &c.

Class 8.—Mathematical, philosophical and optical instruments, including clocks, chronometers, &c.

Class 9.—Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs, &c.

Class 10.—Land conveyances, comprising carriages, cars and other vehicles, used on roads, and parts thereof.

Class 11.—Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air and water, or employed in raising and delivering fluids.

Class 12.—Lever, screw and other mechanical powers, as applied to pressing, weighing, raising, and moving weights.

Class 13.—Grinding-mills and mill gearing, containing grain mills, mechanical movements, and horse powers.

Class 14.—Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing mortising, shingle and stave, carpenters and coopers' implements, &c.

Class 15.—Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements and other building materials.

Class 16.—Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness, &c.

Class 17.—Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing, &c.

Class 18.—Arts—polite, fine and ornamental, including music, painting, sculpture, engravings, books, printing, binding, jewelry, &c.

Class 19.—Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder.

Class 20.—Surgical and medical instruments, including trusses, dental instruments, bathing apparatus, &c.

Class 21.—Wearing apparel, articles for the toilet, &c., including instruments for manufacturing.

Class 22.—Miscellaneous.

Class 23.—Designs.

Of these 23 classes, 8 are assigned to my charge, viz:—Classes 5, 8, 12, 15, 16, 18, 20, 23. Under class 5, the applications have been very numerous, and principally for stoves, in which there has been the usual dearth of interest as regards any new principles or developments. An improvement in the candlestick has been patented, consisting of an eccentric ring around the candle holder, by turning which, pressure is made upon the candle, and holds it firmly in place, dispensing with the usual awkward mode of wrapping or packing the candle. Some improvements have been patented in the tubes for "*spirit gas*" lamps, for the purpose of preventing accidents, which not unfrequently arise from attempts to fill these lamps while they are burning. By one of these improvements, the lamp is necessarily extinguished before it can be filled. The unscrewing of the cap forces a slide up over the wick, and puts out the flame. There are few subjects of practical moment so interesting to the community at this time, as that of artificial light. The *camphine or pine oil*, and the *spirit gas* or *ethereal oil*, have to some extent superseded the common oils, but the great number of fatal accidents resulting from their use will prevent their general introduction. Another drawback is also and most justly operating to exclude them from use, and that is, the adulteration of the liquid. The pine oil or camphine, is or should be a pure oil of turpentine, but is now so frequently loaded with the spirits of turpentine or resinous matter, as to render it unfit for burning. The spirit gas or ethereal oil is not so easily adulterated, as it requires a very strong alcohol to mix well with the turpentine, but even this article is now so managed as frequently to burn but little better than alcohol itself. The fact is, it is difficult to get a pure article of anything at the present day. A pure sperm oil cannot be purchased; I say this not without authority. A large quantity of sperm and whale oil is now consumed to manufacture the celebrated cod liver oil, which as now sold, is about one-third part cod liver and other fish liver oils, and the remainder fish and whale oil. Lard oil is unfit for lamps, at least so far as we have had any experience in Washington. I have tried repeatedly that which has been the most highly recommended, and have never yet found any that appeared to be suitable, either for single draft or argand lamps. Seeing all the difficulties that beset us in this matter, we may reasonably account for the excitability of the public mind on the subject of artificial light, and the many vain projects that are from time to time put forth, promising a new and cheap light. The galvanic power has been taxed severely, but thus far to no practical account. Two ways of eliciting electrical light have been resorted to. First, by the arc of flame between two carbon points, and secondly by the incandescence of a platinum wire or foil between two electrodes. The arc of flame is subject to great fluctuations from very slight causes, and this is a serious difficulty to overcome. Several very ingenious contrivances have been made for regulating the light, by preserving a uniform distance between the electrodes, but notwithstanding these, the light is irregular. Of all modes of producing intense artificial light, the oxy-hydrogen light is thus far the most successful and economical, but it is not available, except for special purposes. It has lately been announced, that a new light has been invented in France, consisting in ren-

dering a platinum wire cage luminous by a jet of hydrogen. It would seem as if there must be something more than this simple fact to characterize it as a new invention, for the incandesence of platinum wire, foil, and sponge in a jet of hydrogen or spirit lamp has been known for many years.

Under class 8 there have been some very interesting improvements, especially in the matter of telegraphs. Letters patent have been granted for a thermal telegraph, the principal feature of which, is the use of a platinum wire, heated by the current for burning marks upon a fillet of paper. The platinum wire is bent to an acute angle, which touches with its apex, slightly upon the travelling fillet of paper. Each time the current passes in the wire, the heat generated makes a mark upon the paper. A new species of electro-chemical telegraph has been patented, in which marks are made upon a metallic plate, instead of paper. A small glass tube, holding some acidulated solution, rests upon a large metallic disk, and as the disk revolves, the point of the tube, which is slightly perforated, traverses a spiral line in which the marks or impressions conveying the intelligence are to be made. A platinum wire is inserted in the glass tube, and whenever the galvanic circuit is completed through the platinum wire, acid and plate, a black mark is made upon the plate, which is of brass. These marks are strong and well defined, and after the communication is read off, they are easily effaced from the brass disk. The perforation in the point of the tube is sufficiently small to prevent the acidulated water from running out, though sufficient escapes for electrolytic action.

Electro-magnetic Enunciator.—An invention with this title has been patented, as a substitute for the usual bell ringing apparatus in hotels and other places. It is, in fact, a species of electro-magnetic indicating telegraph, and ingenious in its construction and mode of operation.

Electro-magnetic Repeater.—This invention, but recently patented, is one of considerable novelty and beauty, and is designed for the purpose of repeating or recording a communication in several places at once, along a line of electro-magnetic telegraph, and at the same time allowing the galvanic circuit to remain open when the line is not in use, which is an important condition to be preserved. Another instrument for a similar purpose was patented about the same time, the operation of which requires the circuit to be kept closed.

Telegraph Manipulator.—A very ingenious, though complicated machine, for communicating signals in telegraphs where they are recorded in dots and lines. Ordinarily these are made by striking a lever or key with the finger, but by this instrument any combination of dots and lines representing a letter, is at once made and recorded, by simply depressing a key having the desired letter marked upon it. It requires but one motion of the finger, instead of the great number required for some of the letters in the ordinary way. If the machinery is made accurate, it will prevent many mistakes from being made by telegraphic operators.

Electro-magnetic Engines.—Two engines of this class have been patented, one of them having for its principal feature, the employment of the secondary current produced by one magnet, to charge an auxiliary magnet. The feature patented in the other engine, is a novelty in the *cut-off*. The cut-off is the contrivance by which the galvanic current is conveyed to, and intercepted from the electro-magnets, and is usually made to operate by the pressure of conducting metallic springs upon metallic disks, either the springs or disks being made to revolve according to circumstances. In the present case, revolving metallic points are brought successively into contact with the surface of a metallic roller, which is pressed against the points by means of a spring.

FINE ARTS.

Daguerreotype Plate Holder.—It has long been an object to obtain some means for holding daguerreotype plates in such a manner while cleaning and polishing them, that the plates should not be handled, and that they should present smooth edges to the buff stick or polishing wheel, and at the same time that the plates, when cleaned and polished, could be readily removed from the plate holder. Various kinds of clamps have been tried, and the plates have been cemented to blocks, &c., but no plan seems to have combined the advantages possessed by the one before us. The edges of the plate are turned down to a right angle or more, by means of a burnisher or other tool specially designed, and the block upon which the plate is secured, is an expansible block, the edges of which press against the turned edges of the plate, and thus hold it in place. The expansion of the block is to be produced by springs, wedges, screws, cams or other means.

Electrotyping.—An ingenious device in this art has been patented for preventing the electrotype cast from adhering to the original plate. Many ways have been tried, to obviate this difficulty, but the present is a decided improvement upon them. It consists in acting chemically upon the surface of the copper plate, to so slight an extent as not to injure the impression, nor interfere with the electric deposit. The inventor prefers, in his operations, to iodize slightly the surface of the plate, and then to submit it for some time to the direct rays of the sun.

Coating Types with Copper by the Electrotype Process.—A patented invention, and asserted to be one of great practical value. A very slight deposit of copper is put upon the types, which adds greatly to their durability.

Typographer is the name of a novel and ingenious machine for printing directly by hand. Several machines for writing and printing by hand, have been patented hitherto, but this seems to exceed them all in rapidity of execution. It is too complicated to describe here, but suffice it to say, that by pressing upon lettered keys, after the manner of playing the piano-forte, the printing is rapidly and neatly executed. A full size and very expensive working model is deposited in the office.

Respectfully submitted,

CHAS. G. PAGE,
Examiner.

SIR:—In compliance with your request, I have the honor to submit the following report of the condition of business at my desk, and of its progress during the past year.

The number of applications referred to me within the year is five hundred and twenty-two. You will recollect, however, that an unusually large number of cases were examined by me in 1849, and as actions on them were not all of a final character, many of them were at the date of my last report, in the hands of applicants or their agents, for amendment, or for their further consideration or action. As the whole number acted upon was very great, the number of those partially decided cases was also great—and as they have from time to time been returned during the past year, they of course increase

the number of cases upon which I have been called to act, much above the number referred to me during the year.

The number of applications passed at my desk for patents during the year 1850, is 227—and the number of rejections 406. This last number includes all rejections, and is not confined to the number of *cases* rejected, as it is well known that many applications under new forms are rejected more than once, the whole number of rejections, therefore, is always considerably larger than the number of applications finally rejected. And the number of applications patented and rejected, is much greater than the number referred to my desk during the year. Thus the business of each year runs into the next, and in consequence of inaction on the part of applicants, applications are sometimes left pending for several years; some have been finally decided, nearly ten years after the filing of the same. Thus each year a part of the business of many preceding years, may require the attention and labor of the examiner.

By comparing the number of patents and rejections for the year 1850, with those for the year 1849, it will be perceived that their ratio has not materially changed. It would naturally be supposed that the number of patents relatively to the rejections, would annually decrease, but there has been no such change at my desk during the year that has just closed.

Prior to the introduction of the present system of examinations, applications for patents were never numerous. Although patents were granted to all who applied for them, yet owing to a want of revision by men of artistic knowledge and experience, they were found to be so imperfect, and so large a proportion of them were granted for things that were old, that they afforded very little security. No one feared to infringe a patent, as he was almost sure to be able to defeat it, for insufficiency of description, a defective claim, or for covering what could be shown to be old. The maxim was, that any patentee could be defeated who dared to commence a suit, and the most valuable invention seldom afforded any remuneration to the inventor. Patents were not only defective, but their reputation was bad, and the government did little else for the inventor than keep its promise to the ear.

This system, so utterly defective and so little calculated to accomplish the object for which it was intended, which placed the fraudulent or ignorant pretender on a footing with the meritorious inventor, and gave no protection to either, was finally condemned and abandoned in 1836, and the present system, subjecting all applications to rigid examination, and basing all patents upon novelty and utility only, and refusing them for all spurious and pretended inventions, was adopted and immediately carried into effect. Under this system examinations immediately developed the fact, that nearly half the alleged inventions upon which patents were claimed, were mere repetitions of what was already known, and nearly all the papers filed, upon which patents were to be based, were partially defective, and required amendment before letters patent could be granted.

Thus was marked an important era in patent interests. The standard was by degrees elevated, and old defective patents began to be re-issued in a corrected form, and covering novelties only. When patents granted or re-issued under this system were brought before the courts, it was found that almost without exception they were affirmed, and it was found that the infringement of a patent which had previously been perpetrated, without fear and with impunity, had become a dangerous experiment. Patent property began to be viewed in a different light, and after a few years of experience of the practical effects of the new patent system, almost universal confidence was inspired, and those who had previously abstained from procuring patents because no confidence could be placed in them, now forwarded their applications to the patent office in great numbers. No considerable change was perceived, until the new plan had been long enough in force to be well tested—until the courts had by repeated decisions satisfied the public mind that patents granted under the new system could be relied upon, and that patents could not be infringed with impunity, and the new state of things was fully confirmed by "wailing and gnashing of teeth," among those who had been accustomed quietly and with unconcern, to reap where others had sowed, and to enrich themselves by the dear bought discoveries of starving inventors.

At this juncture, applications for patents began rapidly to increase. Prior to 1844, for several years, the number of applications had averaged about 800; but in 1844, they began steadily and rapidly to increase, until in the short space of seven years, they have almost trippled; the number filed in 1850, being about 2200, while for *fifty years* under the old system, and the incipiency of the new, they had only reached about 800. As time passes, this increase becomes more rapid; the increase of the last two years being much greater than during an equal space of time at any former period. It appears, therefore, that this system of examination, although it results in the rejection of half the applications filed in the office for want of novelty, gives such security for real inventions, as to foster and encourage the intelligent seeker after hidden truth in a vastly higher degree, than any system heretofore adopted in this or any other country.

A few remarks in relation to rejected applications cannot be amiss, as it is a subject much discussed before this office and elsewhere. When it is recollected, that about nineteen thousand patents have been granted in this country alone in less than sixty years—when to these are added the multitudes of thousands, which have been granted in the different States of Europe—when we recollect the thousands of volumes in our libraries of science and art devoted to inventions and discoveries; tens of thousands of which have never been made the subject of letters patent—when we recollect the vast extent and variety of machinery in shops, factories and laboratories, a description of which is nowhere published—we involuntarily exclaim, "who shall show us any new thing:" and when we consider how impossible it is, for inventors to be informed of all these things, or even to gain access to the archives, libraries, &c., where they are to be found, we cease to wonder, that so many inventions are found to be old, and our astonishment is awakened at the ingenuity and perseverance of a people, who can draw out so many new treasures which have been hidden from former votaries of science and art. We cease to wonder, that one-half of all that is presented to the Patent Office is old; but become surprised that nearly half who apply, have discovered something new. It is proper, further to remark, that the most respectable and best informed patent agents, decline to present *one half* the inventions presented to them, on the ground that they are unquestionably old. In all doubtful cases, they of course, make the application if requested. Other agents present a larger proportion, and nearly half who apply employ no agent. The proportion of the patented to the rejected, so far as can be judged by a general view of the subject, is quite as large as can be expected.

In relation to the inventions which are patented, it is proper to state, that it is believed there are very few, which would not be sustained by the courts with any amount of light which could be shed upon them; and this statement is fully sustained by past decisions. From remarks above, in relation to the

numberless improvements which have heretofore been made, and the multitude of books and records over which they are scattered, it could not reasonably be expected, that *every patent* should be sound. With the best opportunities, an old invention will sometimes be overlooked, and with the extraordinary amount of business constantly before examiners, the absolute avoidance of these oversights, would be positively miraculous. But their oversights are so few and trifling that little importance could be attached to them under any circumstances, and their importance is rendered still less considerable by the fact that the decisions of this office are not final, but can be revised by the courts, whenever there is ground to believe that an error has been committed; and it may probably be said, that less than one in a thousand of the patents granted since 1836, have been set aside. I do not recollect to have heard of one.

Indeed, since the re-organization of the office in 1836, patents have so uniformily been sustained by the courts, that many who desire to appropriate other men's inventions to themselves have changed their mode of attack, and strive to give battle under a parchment Ægis, similar to that which they have found so impenetrable in the hands of the inventor. The infringer accordingly takes the invention, which he desires to appropriate, and makes slight changes or additions, preserving the character of the invention, and then demands letters patent for his improvements. These changes are sometimes of a patentable character, though they are often of no importance whatever. If patentable, the patent is immediately used, and often with perfect success, to protect the infringer against the original patentee. Our patents on their face give to each patentee exclusive right to "make, use, &c." the thing invented, but this language does not convey the right idea; a large portion of our patents are granted, and rightfully, for new combinations which can neither be made nor used without infringing pre-existing patents. Thus the combination of A and B is patented, and subsequently some other person improves the machine, by adding another part D, to it. The improvement is obvious, and of course, a patent is granted for the combination of D, with A and B. It is seen at a glance, that this last combination cannot be used without involving the combination of A and B, and therefore, infringing the combination previously patented to another. Patents for combinations, necessarily involving previously patented parts or combinations, form a large proportion of the patents granted, and without them, there would be an end to improvements. But it is absurd to suppose that any patent is vacated by patenting an improvement upon it, however important, or that a patent for an improvement upon a machine gives a right to use the parts previously patented. *The patentee derives no right by his patent, to make or use anything which he would not have a right to make and use without his patent. But it simply gives him a right to prevent others from using his combination without his permission;* and if the wording of the patent could be so modified, as to "forbid all but the patentee to make, use or vend" the thing patented, it would conform to the true intent and meaning of the patent—would have the same force that the patent now has, and would save a vast amount of misapprehension, litigation, and loss to inventors, and prevent numerous impositions intentional and unintentional, upon purchasers, who now suppose from the wording of the patent, that they have a right to *use* anything patented, by permission of the inventor; but, who often learn shortly after the purchase, that there is another patent in the back ground, covering a part of what is embraced in the patent they have purchased.

These difficulties are incident to, and inseparable from the subject. The improvement is often vastly more important than the original machine, and a patent cannot be refused for it, without disregarding law and justice, and trampling upon the very objects for which patent laws are enacted; and as difficulties are great and unavoidable, they ought not to be aggravated by phraseology in the patent purporting to confer rights which are *not conferred, and are not intended to be conferred,* and which deceive a vast majority of those who are interested in patented improvements, and often enable a subsequent patentee of a trifling improvement to strip a prior meritorious inventor of his patent property.

When these improvements which are sought to be patented for purposes of fraud, as above indicated, prove to be unpatentable and are rejected, various kinds of influence are brought to bear upon officers charged with the case, and when finally rejected, the presses teem and the country echoes with charges of unspeakable frauds, and astounding disclosures, which are never made intelligible—and unspecified partisanship against the office and the officer who declines to be bullied or wheedled out of the path of his duty. It would be unjust to say that all who complain are of this character; some who are believed by this office to be honestly mistaken in regard to their rights, complain also—and although the office cannot agree with them in opinion, their feelings are entitled to respect. It is no trifle in the mind of any inventor to see the darling to which he has devoted the best part of his life, and to which perhaps his health and the comfort of his family have been sacrificed, in a moment, crushed before him, and his bright hopes scattered to the winds. It is no joke under such circumstances to return to his home to meet the despair of his family, and the mingled sympathy and jeers of his neighbors. Much may be pardoned to such a man, (and there are many of them,) and if his misfortune is without remedy, his complaints should meet with respect and commiseration. But the complaints of such men do not assume the fulminating character which generally belongs to those of the other class, and newspaper artillery and secret undermining intrigues, do not often emanate from such sources.

The law of patents is in many particulars difficult to understand. It is, as Mr. Justice Story justly remarked, the "metaphysics of law," and even if all who present their claims to the office were fair minded men, who desire nothing but what they thought themselves entitled to, and the law was perfectly administered, there would be many to think themselves aggrieved. But those who have business here are like other men, some are perfectly fair and others desire to carry their point, and are not particularly scrupulous; one class are opposed to the grant of patents, and another class desire that patents shall be granted much more freely than the law will justify; one class denounces nearly all patents as fraudulent, another is furious that so many should be rejected. When a patent of any importance is granted, the office receives the condemnation of one clique, and when refused, it receives the condemnation of the other. It is believed, however, that the great mass of those who are interested in the doings of this office belong to neither extreme, and that they are content with a strait forward discharge of duty, which does not bend to denunciations or commendations of either party of noisy extremists—the condemnation of both furnishing, perhaps, the strongest proof of undeviating faithfulness, as a just administration of the patent laws could not meet the approbation of either. Justice is not what they seek.

The classes under my charge are the following:—1st. Mills, comprehending all kinds of machinery for crushing and grinding, regulators, horse powers, and mechanical movements generally.

2nd. Land conveyance, comprehending all kinds of vehicles and implements of travel, and transportation.

3rd. Machinery for working in lumber, comprehending saw-mills, planing machines, stave machinery, shingle, clapboard, lath machines, boring and mortising machines, &c., with the various implements and tools used therein.

4th. Hydraulics and pneumatics, comprehending water-wheels, windmills, machines for raising water, fire engines, filters, hydraulic engines, &c., &c.

5th. Manufactures of fibrous and textile fabrics, and machinery therefor, comprehending machinery for preparing hemp and flax, cotton gins, wool pickers, carding machines, combing machines, spinning machines, looms, cloth dressing machines, &c., &c.

Some of the improvements in these classes which have been developed at my desk during the past year, I shall concisely notice. It is impossible to command sufficient time to enter thoroughly into the subject. The report of 1847, upon which the last increase of the examining force was based, presented 1531 applications filed during that year, and the number filed during the last year is about 2200, and at the close of the year there were 34 applications upon my desk unexamined. It may further be remarked, that the influx of business is at present much more rapid than usual, and nothing apparently but a considerable increase of force can prevent an accumulation of business as perplexing as that which occurred prior to the last increase of force.

MILLS.

About twenty-four patents have been granted within the past year for improvements belonging to this class, thirteen of which are for improvements in mills for grinding and crushing. So much has heretofore been done in this class, coming home as it does to the wants of man, even in a barbarous state, and having exercised the genius of the inventor from the earliest ages to the present time, that little of a radical character can be expected, and accordingly the improvements patented during the past year, consist of slight modifications of what was previously known. One of these patents is for a mode of steaming grain as it passes from the hopper to the stones, for the purpose of softening the outer coating of the grains to prevent its being ground so fine as to mingle with the flower in such a manner as not to be separated from it by the bolt. The idea of steaming preparatory to grinding, is not new, but the patent was granted for the inventor's convenient mode of applying the steam. Another of these mills consists of two or more hollow cylinders or rollers, the smaller being placed within the larger, and being free to revolve, so that when the outer cylinder revolves, the inner one will also revolve by its weight, and crush whatever substance may be placed in the outer cylinder. Up to this point the mill is old, but in addition it comprehends an arrangement by which the inner cylinder in addition to its weight in rolling, is caused to give a series of blows to the mass for the purpose of breaking the more refractory parts, and freeing others from their adhesion to the sides of the mill. Another pulverises sugar or other materials, in a series of mortars in which the beaters work in succession, while the range of mortars revolves in such a manner as to bring them to the feeding point, and to the discharge aperture, as the material in each becomes sufficiently pulverised. In another of the mills, a very firm elastic substance is placed in the spindle under the cock-head, to prevent abrasion, and to relieve concussions. In another of the mills, the crushing is effected by a series of rollers, between which the grain passes without being rubbed, and the crushed particles then fall upon a toothed roller working a concave, when they are opened and afterwards the flour is separated from the bran. Several other patents for improvements in grinding have been granted, but it is not deemed necessary to give further details. Several patents have also been granted for improvements in bolting and dusting bran, which will not be described, but will be understood by a peruser of the claims.

Horse Powers.—But one patent has been granted within the past year for improvements in horse powers. The subject seems to be nearly exhausted, and until some new track is discovered, very few patents can be expected in this plethoric branch of machinery. The patent above mentioned is for an improvement by which the master wheel is held in position, or allowed to cant over, for admitting the horse.

Letters patent have been granted for an improvement in the friction clutch adapted to various resistances. It is so arranged, that as the pulley revolves upon the shaft, the friction of the clutch will constantly increase, until it becomes sufficient to carry the shaft, at which point the pressure becomes constant; but if the shaft becomes loaded in such a manner that the friction is insufficient to carry it, the friction will immediately be increased to the requisite degree, by the action of the machinery. The device appears to possess much merit.

Letters patent have also been granted for an improved form of rubbing surfaces, for regulating abrasions; a full description of it cannot be given here, but will be found in the English journals. It was patented in England in November, 1848. All are aware that journals, after considerable use, become loose in their boxes, in consequence of friction, and it is well known that boxes and journals have been made in a conical form, or nearly so, in order that after being worn, the joint may be made tight by pushing the journal further into the box. But this plan is an imperfect one, as the different parts of the journal and box will not change their diameters equally. The invention above alluded to, is intended to obviate this inconvenience, with what success, the public have an opportunity of judging. As nothing further is deemed necessary on this division of the subject, I will proceed to the next.

LAND CONVEYANCE.

About fifty patents have been granted during the year, for improvements belonging to this class, and extending to nearly all its sub-divisions.

Railroad Cars.—Five patents have been granted for improvements in railroad cars within the past year. One is an apparatus for holding the wheels upon the rails, the parts of which are so connected as to yield, without injury or diminution of efficiency, to the lateral motions of the car. Another is for a kind of segment connection of the car body with the trucks, by which the trucks are carried as far as may be, to the outside of the curve, and thus afford more safety to the cars in turning curves at considerable speed. Very large car bodies have also been supported at a considerable distance from their ends, upon the centres of the frames of two eight wheeled trucks, the frame of each truck being connected with the wheels in such manner as to give to each truck the capabilities of ordinary eight wheeled cars. There has also been a re-issue of a patent for hanging car bodies, which was granted eight or ten years since, and which, at the proper time, was noticed in the examiner's report.

Car Couplings.—Four patents have been granted within the year, for improved modes of coupling railroad cars. Two of them are for self-coupling, with convenient arrangements for uncoupling in emergencies; one is self-disengaging when the car leaves the track, and a third is a firm coupling, which allows no play of the links, except laterally, and no disengaging or connecting, but by the withdrawal or insertion of the bolt by hand. They do not very strikingly differ from such as have heretofore been in use.

Cast Iron Car Wheels.—Seven or eight patents have been granted within the year, for modifications of cast iron car wheels. They do not greatly differ from those heretofore in use, and do not require a minute description in this place. The great difficulty in the construction of these wheels, consists in their liability to strain or fracture in cooling, and therefore, patents are granted with great liberality for such modifications as may obviate, in any degree, the inconvenience universally experienced in the construction of this kind of wheel.

A patent has been granted for improvements in cars for plank roads. It is a modification of those whose wheels carry around with them an endless chain, upon which the wheels always run. The links are so formed and arranged, as to prevent, in some degree, the injury which the road would sustain from the direct action of the wheels.

Carriages.—Two or three patents have been granted for brakes applicable to wheels of carriages and cars. One of them is so constructed, that after the brake is put upon the wheel, it will remain there, doing its duty, until removed by a device separate from that which brings it into use. In one of the patented carriages the dash board is connected indirectly with the fore wheels, so that as the horses turn, the board will constantly be kept directly behind the horses. Improvements have also been patented for improved couplings for swingle trees, and for improvements in detaching horses from the same by the driver, when the carriage is in motion.

A patent has also been granted for an arrangement of the parts of a carriage, in such a manner that the fore end of the carriage body shall always be supported at its centre, and the fore wheels under it shall be capable of swinging around, by virtue of a joint in the reach, in such a manner that very short turns may be made without bringing the fore wheel against the side of the carriage body. Several patents have been granted for improvements in connecting and disconnecting wheels and axles; for setting up carriage tops; in the construction of covered carriages; for improvements in neck yoking reaches, &c. In an omnibus patented, there is a device by which the driver, as the omnibus stops, may bring brakes upon the wheels, and by the same act put down the steps for the ingress or egress of passengers, and upon withdrawing his foot from the lever, the steps are again folded up and the brakes removed from the wheels.

Three or four patents have been granted for improvements in raising and lowering carriage tops by devices inside of the carriage. The joint rods in one of them, are so arranged on the outside of the cover, and so connected with a handle inside, that by placing the hand upon this handle, the whole carriage top may be raised or lowered at pleasure. In another, the whole or a part may be raised and lowered in a similar way. In another, a spiral spring is placed upon a rod in the inside of the carriage, and the rod so connected with the joint rods, that nearly the whole weight of the carriage top is sustained by the spring, and the slightest force from within is sufficient to raise or lower it.

Other patents have been granted belonging to this class; but those noticed, are a fair specimen of the whole. Very striking improvements are not to be expected in carriages, and it is unnecessary to pursue the subject further.

HYDRAULICS AND PNEUMATICS.

About 24 patents have been granted within the year, belonging to this class. They are quite diversified in their nature, and are scattered over ten sub-divisions.

Pumps.—Six patents have been granted for improvements in pumps, one of which is a re-issue. One of these is for use in very deep wells. It has no piston, but the pump tube, which has a valve at the bottom opening upwards, works up and down in a valve chamber at the bottom. It is said, that this pump may be worked by hand and with comparative ease will raise water eighty feet or more, when it would be impossible to raise water with a hand pump having a piston of any construction. A patent has also been granted for an improvement in that variety of rotary pump, in which there are two pistons, each of which serves alternately as a piston and a stop. The improvement has reference to the alternate releasing and carrying forward of the pistons. Another of these pumps consists of a tight chamber into which the induction tubes extend considerably *above* the bottom, and into which a pump is inserted, extending down very near to the bottom and below the tops of the induction tubes. The pump is separated from the induction pipes by a gauze partition to prevent grain or other matter from passing to the pump, and in the side of the pump, there is a small opening above the point where the water is intended to rise, through which the air which passes up through the induction pipes is pumped out. This apparatus is intended principally for vessels, which transport grain, &c. In another of these pumps, the piston rod has a fixture attached to it, for agitating the water in the well.

Filters.—Two patents have been granted for improvements in filters. One of these is composed of two concentric cylinders, the inner cylinder having flanches at its ends which entirely close the annular space between the two, so that the water enters the inner cylinder which has openings through it, to the annular space at both ends, and is divided into nearly equal parts, by a partition perpendicular to its axis, so that the water passes into the inner cylinder at one end, through into the annular space, and again from the annular space into the other end of the cylinder whence it escapes. Around the inner cylinder and between its flanches, is wound cloth or other filtering material filling the annular space, and if from any cause the filtering medium should cease to fill the space, the filter would be repaired by winding more on the cylinder. The other is called a pocket filter, and consists of a tube through which water is drawn by suction with a filtering material at its lower end. This filter is for use in drinking where the water requires filteration.

Three patents have been granted for improvements in hydraulic apparatus for producing blast. They consist of wheels with compartments in or connected with their peripheries, and revolving in reservoirs of water. The compartments of course, carry air down with them, which when they enter the water, is displaced by the water, and rises through tubes forming the blast. These machines are complex, and perhaps an equal or better result might be obtained in a more simple manner and at less expense.

Letters patent have been granted for a mode of drawing and bringing water from a distance. It much resembles those previously known.

A hydraulic regulator has been patented within the past year. The machinery to be regulated, works a pump which forces water into another cylinder with which the pump is connected at both ends. The cylinder into which the water is pumped, is in a vertical position, and has a piston in it with an adjustable opening through it, and a piston rod passing out at the end of the cylinder, and taking hold of an arm from the valve to be regulated by a slaut and pin; so that the piston and rod may move a certain distance without changing the valve at each operation of the pump. The apparatus is so adjusted, that the water pumped into the cylinder when the machinery works at proper speed, shall pass through the openings in the piston without giving it sufficient motion to disturb the valve; but when the operation is too fast or too slow, the vibrations of the piston will cause the end of the slaut to give a *blow* to the arm of the valve moving it in the direction desired.

Water Wheels.—Three patents have been granted for improvements in water wheels within the year. The modifications which they present, are very slight. Improvements upon water wheels at the present day, depend more upon correct calculations in adapting the wheel to circumstances and upon mechanical execution, than upon invention; and these are no more the subject of letters patent, than a change in the angle of an inclined plane or wedge, to adopt it to the particular duty it has to perform.

Two or three patents have been granted for improvements in waste gates. One of them is formed like a trapezoid, (but may be varied,) narrow at the bottom and broad at the top, with one side nearly vertical and hanging upon a vertical shaft, so that when the water is low, the surface of the gate upon which it presses, is mostly on the side which tends to close it, and as the water rises, the opposite side being wider at the top, finally causes the pressure to be greatest on that side; and the gate is opened and continues so, until the water descends to the point when the preponderance of pressure is changed, when the gate again closes.

Two patents have been granted for improvements in faucets; one of them is a molasses gate, and the other filters the water as it passes circuitously through.

Water Metres.—Two patents have been granted for improvements in water metres; both are intended to be operated on by the water. One of them presents a slight modification of a rotary engine and a rotary pump, of well known construction. The other is a modification of a double cylinder single acting engine, entirely enclosed in a case. In this the pistons remain stationary for a short time at the end of each stroke, in order that the discharge may be more perfect. There is nothing further in this class which need be particularly noticed.

LUMBER.

About sixty patents have been granted within the year for improvements in this class; and they extend to about ten of its sub-divisions, and to various improvements of a miscellaneous character. A considerable variety of machinery has long been known for performing almost every operation in lumber to which machinery is applicable, and in casting the eye over the improvements of the past year, little is seen which possesses commanding novelty. The inventor of the present day is in a very great degree limited to refinements of a practical character, upon principles long since in many ways reduced to practice. The object of improvements and inventions generally, is to produce a given result in a better or more convenient manner than heretofore, or to produce new or useful varieties of manufacture; but there are often other incentives to invention, equally powerful, and which are illustrated in the class under consideration. In several of the sub-divisions of this class, there are machines, the patents for which are still in force, which, according to the general current of decisions in the courts, lie at the foundation of, and monopolise the radical principles of all or nearly all machinery which can effect the objects which they are intended to accomplish. These varieties of machinery are greatly in demand, and are of the most extensive application, and consequently vast interest, and multitudes of our citizens are held under contribution to their more fortunate rivals, who first discovered and secured to themselves and their representatives, these invaluable elements. The condition of the enterprising and ingenious tributary is of course irksome, and he strives for freedom, while the patentee insists upon his "bond." This circumstance is the parent of multitudes of inventions and quasi inventions, and applies the most effective stimulants to ingenuity; each would be rejoiced, if possible, to produce better machinery than is now known for similar purposes; but if baffled in his attempts, he devotes himself even to those which are somewhat inferior, to avoid the claims of the prior patentee upon him. There is also, as I have remarked, an idea extensively entertained, that a patent will in some way give protection against the demands of the prior inventor, and consequently, patents are demanded far beyond what would be prompted by the force of different circumstances. These machines sometimes possess patentable novelty, but it is notwithstanding the province of the courts to determine whether, in addition to these novelties, they do not possess the essential elements of inventions previously patented. The *novelties* are secured by the new patent, *and not* the elements with which they may be united, or blended. It is not to be presumed that all these inventions are prompted in the manner above indicated, but the origin of many can be thus traced, and whatever cause may produce inventions, they ultimately result in the advancement of the arts, and in benefit to the world.

Saw Mills.—About ten patents have been granted within the year for improvements in sawing lumber. The saws in one of these mills are circular, and two are operated at the same time. The shaft of one of these saws is allowed end play, both by a spring and by adjustment, and is also capable of swinging upon the shaft of the other saw, as a centre. When the timber is large, the auxiliary saw can be placed in a proper position to co-operate with the main saw in cutting one kerf, and when the log is small, it may be so adjusted that the mill will saw off two boards at once. In another of these mills the saw is furnished with a kind of cross head at each end, which extends out some distance in front of the edge of the saw, extending around a way prepared for it, against the front of which it bears. Thus when the log presses against the edge of the saw, it has a direct tendency to preserve the width of the saw in the line in which the log moves. As the saw is generally hung, the tendency of the log is to turn the saw out of its proper position. One of these patents is for an improvement in the saw itself. The front of the tooth is slightly hooked, but the backs of the teeth are all parts of the same line, coinciding with the line of the edge of the saw, and the point of each tooth is bent out a little, to take hold of the work. The part of the tooth back of the point does not retire. Experiments made with this saw, seem to indicate that the improvement is of great value. Improvements have also been patented in noddle irons, in the mode of setting saw logs, and in cross cut sawing machines.

Five or six patents have been granted for machinery to cut veneers and clap-boards, and for cutting and dressing staves. In one of these, the knife is placed in an ordinary gate, and that part of the block which is to be separated, rests upon the edge of a spring attached to the table in a position nearly parallel to the knife.

Thus the edge of the veneer is supported until it is entirely separated, and when separated, the spring yields outwards to allow the knife to pass it without injury. In another a very perfect curved drawing cut is effected for cutting staves, which appears to answer a good purpose. The power is exerted lengthwise of the knife, and its descent in the proper curves is effected by slauts, pins and ways.

A patent has also been granted for a new mode of jointing staves, which evinces much ingenuity, but it could not be made intelligible in a short sketch, and must therefore be omitted with some others in this sub-division.

PLANING MACHINES.

Twelve or fourteen patents have been granted within the year for improvements in machinery for planing boards, shingles, &c. One of these machines is intended principally for planing timber. A disc cutter-head is used with smoothing irons in its face, and its edges armed with an annular saw and clearing cutters immediately back of the saw, for the purpose of removing such parts of the wood as are separated by the saw. The centre of the disc presses upon the smoothed surface of the timber, upon which the operation is performed.

Two or three devices for tonguing, grooving, jointing, rebating or otherwise dressing the edges of boards have also been patented, and promise considerable usefulness. In one of the patented planing machines a circular disc cutter-head is used, and the knives are placed around its edge in such a manner, that they move as nearly endwise as is consistent with continued cutting, and each commences cutting before the preceding knife has ceased. This machine has also for tonguing and grooving, a series of saws on shafts perpendicular to the face of the board, the saws varying in diameter according to the shape to be given to the edge, and the planes of all the saws making a slight angle with the axes on which they are placed. Another of these machines is adapted to dressing boards of varying widths,—the edge cutter on the edge of the board is by the action of the board, as it moves forward, caused to approach towards, or recede from the centre of the board, or it may be kept in the same position throughout the operation, for the purpose of producing a straight joint, or giving a certain angle to the edge of the board. This machine has also a device for adapting the feed rollers to any required thickness of stuff, without impairing the action of the gearing. In another of these machines, the board is made to bend slightly over a cylindrical cutter head, and the rest on the upper side of the board is connected to the cutter-head in such a manner as to render the smoothed face of the board parallel to the opposite face while the shavings pass downwards into a proper receptacle, the bend preventing the knots from being torn out by the cutters. The pressure rollers in these machines have also been so arranged, as to approach nearer to the cutter head as the stuff to be plained is thinner, and a cutter nearly in the form of a straight saw has also been used for planing the surfaces of boards. Some re-issues have also been granted.

Boring and Mortising.—Five or six patents have been granted within the year for improvements in machinery for boring, mortising, and tenoning. In one of these machines the central part of the auger is separated from the twist, passes through it, and revolves in boring at a different speed from it. Thus the clogging which often takes place, when the boring and clearing parts revolve together, may be avoided by adapting the motions of the different parts to each other, in such a manner, that each shall perform its duty unembarrassed by the other. In one of the tenoning machines patented, the cutters are jointed to the gates or sides, and are connected with such devices that when they descend they shall be thrown a little forward, to cut, and when they return, they are in like manner thrown back, so as to avoid rubbing against the surface upon which they have just operated. In one of the patented mortising machines, the parts are so arranged that the chisel turns as it descends, thus giving at each stroke a drawing cut. This will doubtless in some instances, be useful.

Some half-dozen patents have been granted within the year for improvements in fences and railings, and about twelve more for miscellaneous improvements in the class of lumber. They are of equal average importance with those which have been noticed, and enough has been said to give a fair idea of the character of improvement in this class, during the past year.

FIBROUS AND TEXTILE MANUFACTURES AND MACHINERY.

About seventy patents belonging to this interesting class, have been granted within the last year. As I have had occasion to remark in former reports, improvements in these branches of manufacture appear to be without limit, and notwithstanding all that has been done, the tide of useful and valuable inventions is still onward. Machinery for fibrous and textile operations requires a degree of perfection which is demanded in but few branches of the arts, and it consists of so many parts and combinations, and so much of it is of an extremely complicated character, as to afford the most ample room for improvement, and the time requisite to bring other branches of machinery to their full maturity, is scarcely sufficient to conduct this out of its infancy. Much as has been done in this class, and wonderful as its improvements have already been, every year makes numerous and important additions and gives promise of more astonishing developments in future. This class includes every variety of machinery which is necessary for reducing the various kinds of fibrous materials to perfect fabrics.

But three patents have been granted within the year for improvements in cotton gins. One of these machines has a plate with teeth at its end, passing between the saws and is placed in a horizontal position behind the grate, and is combined with a brush operating upon the fibres in the saws, to remove the dust and conduct it off upon the plate. The other has a series of small rollers grooved lengthwise, each having a portion removed from its side arranged around a toothed cylinder. These small rollers revolve slowly as the toothed cylinder revolves, and prevent the bolls which rest against them, from passing, while the toothed cylinder takes the cotton from the seeds. When the side of the small cylinder from which a part has been removed, comes opposite to the toothed rollers, if the boll is sufficiently reduced, it will be carried to the next roller, when the seeds will be still further stripped, and so on, to the completion of the operation. Brushes are prepared to take the fibre from the toothed cylinder. A third machine delivers the cotton in endless bats.

Hemp and Flax.—Four patents have been granted within the year, for improvements in machinery for preparing hemp and flax, which do not require particular description. In one of them, there is a device for separating and drawing out the fibres, so that it may be spun like cotton.

Carding.—About four patents have been granted for improvements in carding machines. In one of them, the main cylinder has, in addition to its usual motion, a reciprocating end motion, for the purpose of more perfectly spreading the staple over its surface. In another, a band armed with card teeth works constantly across the cylinder near the doffer, for the purpose of crossing the fibres to produce a bat proper for felting. In a third, wires are connected to good conductors, and with the teeth which operate upon the wool, for the purpose of preventing injurious electrical action. A process of mixing wool and cotton on the cards has also been patented. Each staple is prepared on separate machines until both are ready for the finisher, when they are carried together through the cards and mixed.

Letters patent have also been granted for improvements in apparatus for sizing and drying cotton batting, and for improved apparatus for making hat bodies. They do not greatly differ from such as have heretofore been known.

Spinning and Twisting.—About fifteen patents have been granted within the year for improvements in these sub-divisions; one for improvements in the counter twist speeder. Its object is to prevent the irregular and unsteady motion of the roller upon which the roving is wound. Another, is for an improvement in drawing regulators. It performs substantially the same duty as some already in use, but in a different way. The regulating apparatus is governed by the trumpet as in some other machines. A patent has been granted for improvements in cop spinning. It is a new arrangement of devices for regulating the winding of the yarn in the cop. A combination has also been patented to be used in doubling and twisting, and for stopping the machine when either of the threads break. An improvement has also been patented for use in doubling and twisting silk. It is for holding and releasing the threads, and consists of a bar with a series of spring catches closed by independent springs, but opened simultaneously by a sliding slotted bar—or each may be opened at pleasure, without the intervention of the bar. By this device, the operation is much facilitated. A hand spinner has also been patented, which is a slight modification of others in use. A device for regulating the tension of yarn in spooling, has also been patented; and also two or three machines for making cordage, which are said to answer a good purpose.

Patents have been granted for a knitting machine, for improvements in the manufacture of rugs, folding cloth, shearing cloth, pressing hats, and for other miscellaneous purposes.

Sewing Machines.—No less than seven patents have been granted within the last year for improvements in sewing machines; it is but a few years since these machines were introduced, but as they are found to be useful, inventive genius is already directed in no small degree towards them, and important improvements may be expected. In one of these machines, the needle lies in a groove made in the face of a straight rack, and is held in this position. A pinion works into this rack upon which the cloth is laid—the pinion being at the point of the needle. When the pinion is turned, it at once crimps and carries forward the cloth upon the needle and discharges the cloth by a reverse motion with the seam sewed. The eye of the needle is near its point. In another of these machines, the cloth is placed upon the plate of metal lying over an opening in the table, and perforated for the passage of the needle. The needle is forced through the cloth and the plate, by appropriate machinery. The thread is placed under the plate upon a bobbin, and when the needle is down, by an appropriate motion of parts in connection with the bobbin, the thread is thrown round the needle, which has a notch to hold it, and is drawn through as the needle is withdrawn, and forms a loop on the upper side. The cloth is then fed forward, and the needle is again forced through the cloth and plate, and through the last mentioned loop. The thread is again wound upon the hook of the needle, and drawn up through the cloth and the loop through which the needle previously passed, and by a continued repetition of these operations, the seam is perfected. Several of these machines make the seam with two threads, one of which passing through the eye of the needle, (which is at its point,) is at every stitch carried through the cloth, forming a loop on the opposite side. A shuttle having a thread passes through the loop, and as the needle returns its thread, is drawn down upon the shuttle thread which prevents it from being drawn through. I cannot go fully into the details of these machines; they are adapted to various circumstances, and make their seams by a variety of stitches.

Looms.—About twenty-five patents have been granted within the year for improvements in the different varieties of loom. An unusual degree of attention has been bestowed upon those which have reference to weaving piled fabrics. No less than six patents have been granted for improvements in the manufacture of this variety of fabric. In one of these looms two figuring wires are used, entering the fabric on opposite sides, operated by vibrating arms, and supported by guides at each side. In this manner, the wires may be made about half as long as would otherwise be necessary. Thus the binding of the wire in the act of insertion, is in a great measure prevented. Or these wires may be made of the full length, and inserted and withdrawn alternately, so that one will remain in the fabric, while the other is withdrawn and re-inserted. When such warps are used that two wires will be sufficient, the operation will be much facilitated by this modification. In another of these looms, when two fabrics are woven together, and connected by the threads which are to form the nap, a kind of grate is used to guide the fabrics as they are woven, and to keep them always at an equal distance apart. This device also enables the knife to separate the fabrics in such a manner, as to leave the nap or pile of uniform length. In another of these looms, the guides which support the wires, are composed of jaws which rise and close, leaving a series of small openings through which the wires pass for the purpose of being more perfectly guided, and which open and descend, leaving the wire after it has been properly inserted. In another of these looms, a knife is made to pass below the breast beam which cuts the pile, allowing at each cut one of the wires to be released and to fall into a trough below. An arm extends from the knife holder into this trough, and pushes the last wire, which was released to the left of the loom, and then leaving it in a trough, and two endless belts with hooks work into the trough, taking the wire and carrying it up above the lay at the left end of which there is a trough to receive it opposite the end of the lay. In this trough there is a follower moving lengthwise of it, which pushes the wire into the shed, there being a row of notches in the front sides of the dents of the reed to guide the wire. Thus the wires are inserted, and as the fabric is woven, the pile is cut and the wires returned for re-insertion.

Letters patent have also been granted for improvements in looms for weaving fabrics with small figures. It has not the compass jacquard loom, but it is less complicated, and much more easily adapted to different varieties of figures. The loom has sufficient compass to answer its appropriate purposes, and avoids some disadvantages in working the harness with the jacquard, without sacrificing any of its advantages which are important in weaving the kind of fabrics for which this loom is intended. Patents have been granted for improvements in throwing the shuttle; for making wire heddles; for sizing twine heddles, and for protecting the reed when the shuttle fails to enter the shuttle-box. A hand loom has also been patented, in which all the motions are derived *directly* from fixtures connected with the lay, and for a temple to be used in weaving seamless fabrics.

Other improvements in looms, apparently of great value, have been patented, but neither time nor the complicated nature of this variety of machinery, will justify a further analysis of this class.

It will be perceived by a perusal of the foregoing remarks upon the classes committed to my charge, that the past year, like most others, has developed but few inventions which open new paths, or are otherwise of commanding importance. They are all believed to be useful in the legal acceptation of the term, and many of them will be found beneficial in various degrees, in the branches of the arts to which they belong; some are, however, of very little importance, but their novelty, under the law, entitles them to security by patent, and it is not legally to the purpose, to say that they are no better than things previously known, if they are essentially different. Every one will admit that great and important inventions should be secured to the inventors, and that the benefits flowing from them to society, are so great that all the inconveniences of the system are as nothing. There are numerous inventions within the knowledge of all, which have produced results so important and beneficial, that any one of them would outweigh all the evils and expenses of all the patent systems of modern times; such inventions are of comparatively rare occurrence, but may be expected more frequently as a knowledge of the arts progresses. These, all admit, should be provided for; but the same law which provides for them, must provide also for minor inventions. It is impossible to separate them by legislation; we must loose *the one*, or receive it in connection with the other; and when we recollect that the greatest inventions are often based upon small beginnings, who would desire to frown down these apparently diminutive inventions, from which such splendid results may and often do arise?—a blow aimed at them would inflict a fatal wound upon the growth of the arts, and through them, upon the vital interests of mankind.

W. P. N. FITZGERALD,
Examiner of Patents.

To Hon. THOMAS EWBANK,
Commissioner of Patents.

SIR:—In accordance with your request, I have the honor to submit to you the usual report of the transactions, with reference to such applications for patents as are entrusted to my charge, accompanied as is also customary by brief notices of some of the inventions for which patents have been granted. The whole number of new cases submitted to me for examination during the past year, amounted to five hundred and twenty-nine; of these two hundred and four have been patented, and twenty-five remain unacted upon. The papers appertaining to others, are still in the possession of either the applicants or their attorneys, having been sent to them for amendment, and still others have been rejected and withdrawn. The number of actions upon these various cases has amounted to one thousand and ninety-five. And the number of formal rejections, sometimes two and three to a single case, included therein, reaches the number of three hundred and fifty-three.

As the nature of the various actions upon cases was explained with some care in the reports of myself and colleagues, for the year 1849, I do not deem it necessary again to call your attention to that subject, observing merely in reference to that portion of my own report, that the best efforts of myself and colleagues, have as I predicted, been unable to keep pace with the increased demand upon our labors, arising from the increased number of cases, and that the work before the office is now accumulating. It is my sincere hope either that the force may be increased, or that the cases presented during the year to come may be of such character and so limited in number, that we may be enabled to act upon them all. I know of no one cause which harasses the mind of the inventor to so great an extent as delay in the examination of his case, and I can well imagine how disappointment, arising from the discovery that his invention has been anticipated, is aggravated, when the communication of such unwelcome news is delayed from week to week, and month to month, during all which time he is, as men usually do, picturing to himself in no faint or undecided colors, the honors and the profits, which are to accrue to him, from the production of his brain. A communication to such an effect is to all men a disappointment; others it irritates, and there is a small, I am glad to say but a small number, who conceive that a decision against them, furnishes good ground for a quarrel with this office, and is based upon either ignorance or prejudice. These parties generally labor under misapprehension as to the duties of this office, and are unacquainted with the causes that led to the establishment of the present system. They do not seem to consider that the refusal of patents for devices which have been heretofore known, enhances the value of such patents as are based on novelty. They appear never to reflect that if all the patents asked for were granted, then would the community, unable to submit longer to the burden imposed upon it by patents granted for old things, and justly unwilling to pay for the right to use that which is common property, call upon the government not merely to establish such a system as is now in force, but perhaps to refuse protection even to original and useful inventions. It appears further, that it is a common misapprehension for these men to suppose that this office is established to protect and encourage invention, and to afford facilities to inventors, meaning by that term, not those who have contributed to the arts, but every person who may find it convenient to make application for a patent. When the term is employed in its true sense, then is their opinion a correct one, provided the duties that this office under the law owes to the public are also taken into consideration.

This office stands in fact between the public on the one side, and the inventor on the other; its duty to the former, however disagreeable it may be to those who perform it, is to see that no machine, art, or process, or improvement thereon, receives the protection of a patent, granting to the owner a monopoly of the same, unless there shall exist in it some new and useful thing heretofore undescribed. Its duty to the inventor, is to grant patents to him for such new and useful improvements, aiding and assisting him, as far as possible, to cover every inch of ground to which he has a clear title, and when the deed for that title is granted, seeing as far as the law will permit, that he is not harassed and ruined by the grant of other titles, for apparatus changed indeed in appearance, but not altered in reality, from that described by the original inventor.

There is another misapprehension, not productive of so much mischief, nor leading to so much ill feeling, which it will be well to notice. True inventors are often rejected, having their claims disallowed many times, merely on account of their not claiming that to which they are entitled, presenting to this office claims for old devices, covering ground which is either common property, or appertains to some previous invention.

By examination of references furnished by this office at each time it rejects, they at last perceive and are able to define the precise point in which the invention consists; their way to a patent is then a clear one, and the propriety of withholding the same up to that time, would appear to be obvious. Such however, is not the case, and there are some applicants, and even some patent attorneys, who ought to be better informed, who think that the office in this way, loads itself with useless labor and harasses the applicant with unnecessary delay. The absurdity involved in granting a deed for that to which there is no title, and not the shadow of a claim; when the applicant has, during the whole time good and sufficient warrant for something else which really belongs to him, and is afterwards, and as soon as he applies granted to him, seldom or never seems to strike their minds. When it does, they wonder that the office did not point out the new thing, light upon it by intuition, and explain it to the inventor, forgetting that he who made the machine is, or ought to be, best acquainted with its peculiarities; forgetting too, how excessively awkward it would be (to say the least,) for this office one day to state that it believes a thing new, and discover by examination, or be informed by the inventor himself the next day, that it is old.

I have discussed these points at some length, for one reason, and for one reason only, namely, that I believe an exposition of the true position of this office will lead to an increase of good feeling between it and the whole brotherhood of true inventors, and that they will continue to believe, that in performing our duties we are acting under a true sense of the responsibilities of our position, and striving with the best lights we possess to do those duties impartially and honestly; and that they will acknowledge when we happen to differ from them in opinions, and are perhaps in error, from which no human tribunal is free, that such errors in judgment arise merely from mistaken sense of duty, and not from want of sympathy with their feelings, or desire that they should be deprived of their rights.

During the past year, three appeals to his honor, the Chief Justice of the District of Columbia, have been taken from decisions made in the classes which are under my charge. In all of these, the question of novelty in the alleged invention was the point in dispute, and in all of them the decision of the office has been affirmed.

Of the patents granted in classes allotted to me, during the present year, but few are based on striking novelties in principle, but few point out entirely new pathways to old results; they are generally modifications in, and improvements on well known apparatus, detours from some points in the beaten track, passing around an obstacle and returning again to the old trodden road. A large majority of the inventions thus patented, promise to afford useful practical results, appearing to be made by those well acquainted with both the excellencies and the defects of existing contrivances, and not emanating from that class of minds which would reform before the evil is known; would bring forward systems new to them, but long since abandoned by those acquainted with the art. In noticing these inventions briefly, I will as far as possible follow in the order observed in my last report, not only as regards the classes, but the sub-divisions of the same.

METALLURGY.

In this large and important class, about ninety patents have been granted, which are divided among the various sub-divisions of this class, much in the same ratio that they were during the preceding year, with the exception of those which have for their object the separation of the precious metals from the impurities with which they are found mechanically mixed. These ore washers, or gold separators, are not so numerous in proportion, as during the year 1849. The field of invention has been, to a great extent, covered by the machines of the previous year, and there is more difficulty in discovering novelties, either in the application of principles, or in the adaptation of mechanical devices for bringing such principles into more successful action. Moreover, the market is filled with the machinery already manufactured, the demand and the profits are both more limited, and there is less inducement for the inventor to rack his brains, and concentrate his abilities for the improvement of this class of machines.

But five patents have been granted for such machines, and only two of these differ in any great degree, from those previously existing. In one of these the finely pulverized ore and water is introduced into a revolving basin, the cavity of which is deepest near the edges. From the bottom of the deepest part of the basin, and attached to it, descend tubes largest in their bore at their upper ends. As the basin revolves, the lower ends of these tubes, which are all on the same level, pass in succession over the surface of mercury contained in a ring shaped trough; their length being sufficient to give the stream of ore and water passing through them such an impetus as will drive it to the bottom of this trough. The water and the impurities rise by virtue of their greater levity, to the surface of the quicksilver, and run to waste over the sides of the trough. A portion of the gold is amalgamated and retained by the mercury; other portions of it rise to its surface, but as they rise are met, and again forced under by the stream of fluid proceeding from the next succeeding tube. The gold is thus immersed and reimmersed continually, until it is kept so long in contact with the mercury, as to be amalgamated and retained.

The machine is said to save nearly all the precious metal, and to be working to advantage on the Virginia ores, which yield but a small per centage of gold. In the other machine referred to, a species of oscillating and *shocking* motion in two directions, in planes at right angles to each other, is communicated to the same pan. It is not known that this machine has come into use, but its peculiarities appear to be such as would render its action successful upon ores, in which the gold is found in large particles.

A process *for making steel from cast iron* has been patented, the novelty in which consists in decarbonizing cast iron, in the shape of thin plates, and piled in layers, with strata of pulverized oxide of iron. The materials thus arranged, are exposed to the action of heat for several days, in an oven, such as is employed for making blistered steel, care being taken not to raise the heat sufficiently high to melt the mixed mass. Samples are from time to time withdrawn, to ascertain the degree to which decarbonization has proceeded. When the operator judges that the proper extent has been reached, the thin plates are withdrawn and treated in a crucible, much in the same manner as blistered steel is, when converting it into cast steel. Good steel is produced by this process, and works for carrying it on are now in successful operation.

A patent has been granted for improvements in well known processes for obtaining wrought iron directly from the ore; the novelty consisting in arranging the deoxydizing chamber, which is heated by the waste heat, in such a manner that its contents shall not be exposed directly to the flame; while at the same time they can be permitted, at pleasure, to descend upon the working bottom below, without being exposed to a current of unburnt atmospheric air.

Patents have been granted for several tuyers, and for an improved arrangement of a steam boiler, in connection with a cupola furnace.

A patent has been granted for an improvement in steam hammers, the novelty consisting in attaching the hammer to the cylinder, instead of to the piston rod. The piston stands at rest, while the cylinder rises and falls; the advantages of the arrangement are obvious, and the inventor proved that his discovery was prior to an English publication of the same apparatus.

A patent has been granted for certain very ingenious improvements in the blacksmith's striker, which is worked by the foot of the smith. An intelligent description of them, without a drawing, would be difficult.

Two patents have been granted for devices for giving a rotary motion to the fluid iron from which chilled rolls are cast, and one for a plan by which large kettles can be cast with facility in metallic flasks, which are in shape nearly similar to the kettle to be produced. The process consists in applying a stream of cold water to the inner half of the flask or lantern which supports the core, at a time when the melted metal enclosed, is arrived nearly at a solid state. The inner part of the flask is thus caused to contract rapidly, and when contracted in diameter, it can easily be withdrawn, both from the kettle and from the exterior half of the flask.

Another plan for accomplishing the same result, has been devised and patented; it consists in making the core supporter, or inner half of the flask, a flexible iron basket, which, it is obvious, cannot be either broken, or pinched fast by the contraction of the cooling kettle.

Patents have been granted for an apparatus for applying water to the outside of the hubs of cooling car wheels; for machinery for forming cores for small pipe; and for improvements in the composition from which small cores are formed.

A very ingenious machine has been patented for forming the wrought-iron railroad chairs, which are now by degrees taking the place of the cast ones hitherto employed. In this machine, the iron in bars of the width and thickness of the intended chair is fed by hand between a pair of moving jaws; which, as they approach each other, cut off the proper length for a chair, punch in it the spike holes and clamp it firmly between them. While the blank is thus held, a pair of punches rise up, make the necessary slits in the chair, and as they proceed, bend the lips at right angles to the bed. These same punches, then approach each other and bend the lips over towards a common centre, and into such a shape as shall embrace the lower fin of the rail. The upper jaw then rises and separates into two parts, and the finished chair is thrown from the machine by a discharger.

A machine for making chains into which a wire or rod is fed by self-acting mechanism, and from which a finished chain is discharged, presents, perhaps, the most curious triumph of persevering ingenuity over apparently insurmountable difficulties, that has been brought before my notice during the present year.

This machine is not complicated, when the various duties that it has to perform are taken into consideration; but its construction is such, and its parts are so numerous, that a clear description of it without drawings is almost impossible; suffice it to say, that the wire is first presented to nippers or shears, which cut off a length sufficient for a single link. One-half of this length is then bent into an annular figure, leaving the other half still unbent and projecting from the ring.

Other mechanism then approaches, seizes the unbent portion and forms it into another ring, a plane passing through which is perpendicular to a similar plane passing through the first named ring. A link, technically termed a jack-chain link, is thus completed. The last named mechanism then retires, leaving the link still held fast by the first set of bending machinery, which in its turn moves backwards, carrying and holding the finished link in such position, that the succeeding length of wire is fed through the last formed ring of the link. These operations are repeated in succession, and the finished chain drops in a stream from the bed plate of the machine.

Such chains are employed for chain pumps for household purposes, and are furnished so cheaply, that pumps constructed with them, and of sufficient size for ordinary wells are furnished complete for about 15 to 20cts. a foot.

Patents have likewise been granted for self-acting feed gear, for drilling and boring machines, for a method of punching sheet metal as it passes between rollers, for a machine for making eyelets, and for improvements in the machinery for making wrought-iron car wheels.

A machine or rather a series of machines for making four sided or harness buckles, and one for shaping the circular cutters or burrs, which are used to form the teeth of small gearing, have also served as the basis of patents.

Two couplings, one for hose, and the other for small metallic pipe, have been patented. In the latter device the pipes are cast without either flange or socket; a ring is attached to, and surrounds one of the pipes at a short distance from its extremity. Over the end of this pipe and projecting beyond it, with its larger end abutting against the before named ring, is slipped a sleeve of soft metal the exterior of which is the frustum of a cone; over this sleeve is adapted another of hard metal closely fitting the exterior of the former one. The end of the other joint of pipe is now inserted into the projecting end of the soft metal sleeve, until it abuts against the end of the first-named joint. The hard metal sleeve is then driven by a hammer over the soft one, and towards it, the larger end thus compressing it firmly against the periphery, and between the joints of the pipes.

This coupling is cheap, simple, secure, and easily attached and detached.

Two patents have been issued for improvements in lead pipe machines; the novelty in the one consisting in a method of cooling or setting the lead in

the cylinder before it is forced through the dies; and the other depending for its patentability upon a peculiar shape of both core and die. Certain minor improvements in the process for making copper pipe without a seam have also been patented.

In the subdivision of this class, under which are examined applications for patents in nail and screw machinery, many patents have been granted; among which are two for cutting the threads of wood screws, and one for nicking the blanks. The improvements in these machines would appear trivial, if not valueless, to those unacquainted with the fact that apparently slight differences produce important changes in the action of machines, which are required to perform such nice and accurate work as these execute. To those who have traced step by step the improvements in such machinery, which have resulted in the production of the deep threaded, highly finished American screw, which has taken the place of the rough imported article, but little if any superior to a nail, the improvements serving as the basis of these patents, will present themselves as important inventions.

The nail machines present no very important changes or improvements. One of the two patented machines, for feeding nail plates to the cut nail machine, deserves special notice. It has long been a desideratum to contrive some apparatus which should take the place of the nailor, as he is now termed, who feeds into the jaws of the machine, the heated iron plate, lifting it upwards, drawing it backwards, turning it half round, and advancing it again, each time that the machine makes a nail. These mechanics, by long practice, become so expert as to repeat this set of motions 300 times every minute. None of the many mechanical feeders that have been contrived, have answered in practice. The one here noticed, carries the nail plate through all the motions above cited, and is comparatively simple; as far as can be determined by examination, it appears to approach much nearer to the desideratum than those which have preceded it; whether or not this opinion be a correct one, practice alone can decide.

Several locks and bolts, sash fasteners, sash stoppers, door springs, and other apparatus appertaining to the closing, opening or securing of windows, doors, blinds and shutters, have been patented. Among the former is a very ingenious bank lock, numerous in its parts, but not complicated, and affording, as it would appear, sure protection against the skill of the pick-lock, or the destructive force of crow bars or gunpowder.

Several patents have been issued for machines for cutting and bending sheet metal, for making candle moulds, tin tubing, and cylindrical or conical boxes. These machines present many features of novelty, important when the great number of such articles that are annually manufactured, is considered, and two of them exhibit decidedly new devices for bending up the sides of cups, and such articles, from their bottoms.

A patent has been granted for a machine for beveling the surfaces of washers, clinch-rings, and circular metallic disks, in which a series of small rollers are located in, and project from the inner surface of a hub or drum, with their axes nearly parallel to the axes of the drum.

Revolution is communicated to the drum, and the small rollers act in succession upon the surface of such disks as may be presented to them, a revolving motion being also given to the disk. By this arrangement, the edges of the disk are drawn out and beveled, as they would be by drawing blows of a hammer, but in a more regular manner.

A machine which the inventor confidently asserts will supersede manual laber, as employed for beating gold into leaves, has also been patented. The gold in sheets, and protected by animal membrane, as is usual, is adjusted in layers within a frame which is supported by a marble slab. A trip-hammer, worked by machinery, beats upon the pile, which, in its enclosing frame, is moved hither and thither, and back and forth, under the hammer, by means of cams and levers.

The idea is not a new one; machines of a similar character having been long since employed in France, and I believe abandoned. The claims, therefore, rest upon the particular devices employed by the inventors, to give the requisite motions to the bundle of leaves.

Handles which are adjustable to many auger shanks, and can easily be attached to, or detached from them, have been patented; so also have been improvements in machinery for grinding twisted knives; devices for regulating the parallelism of vice jaws; modifications of the sliding wrench, and a machine for making horse shoes.

STEAM ENGINES.

Of the contrivances examined under this head, about thirty have been patented. Comparatively few applications have been presented, describing improvements in rotary engines, and none of them have been patented. An arrangement of two double acting cylinders, connected to the same shaft, through the intervention of rock shafts, arms, and connecting rods, located with respect to each other, in a peculiar manner, has some claims to notice. The result of the arrangement is such, that the main or driving shaft, makes two complete revolutions to each full stroke of the pistons, and this, without the intervention of cog wheels, drums and belts, or the other usual devices for changing the velocity of rotary motion. The engine is described, as applied to the driving of screw propellers, and is intended to put an end to the noise, and obviate the various other inconveniences resulting from the employment of gearing, or its equivalents, on ship board.

Boilers.—Five patents have been granted for improvements in boilers. Two of these describe modifications of that form of boiler, in which the water is contained inside of tubes, and the flame acts upon their outer surface. The outside shell of either of them may be made in any of the usual forms; so also may be constructed, the fire boxes and water legs, from the former of which, towards the chimney, extends a large rectangular flue, surrounded, or nearly so, by water spaces, the upper one of which is, as usual, in connection with the steam dome. In one of them a series of tubes is attached to the water space farthest from the fire. These tubes extend along the flue, rising slightly as they advance, until they reach the fire box; there they are bent gradually upwards, until they meet, and are attached to the crown sheet. In the other, the tubes are attached to the water space, and proceed from it in the same manner, but when they arrive at the fire box, are connected with a depending water space or spaces, which hang down from the crown sheet. The former depends for its novelty, upon combining in one boiler, the water spaces, the flue, and the bent tubes peculiarly located. The latter upon the peculiar manner in which the tubes in the flue are connected to the depending water space. The former has the advantage that the tubes are not liable to be broken by expansion or contraction, the curve acting as a spring: the latter possesses superior facilities for repair when any of the tubes have become injured. Both of them, it is believed, will cause the water to circulate more completely than it does in other boilers of the same species. The former

boiler has been actually employed on a locomotive fitted for burning anthracite coal, and is reported to have fully realized the expectations of its inventor; based not only upon the features above described, but upon other and minor improvements, upon which claims are granted.

Another of these boilers is specially adapted to the use of locomotives, working heavy grades, and in connection with it are patented certain improvements in the engines.

Several devices for indicating want of water, for registering the action of the firemen, etc., have been patented. One of these consists in attaching a rope of felt to either side of the shell, which is tightly stretched in such a manner, that it shall be in contact with the upper sides of the ordinary return flues. To this rope is attached a rod which communicates with bells, cocks, &c. When the water falls below the top of the flues, the felt rope parts from the action of the increased heat, the rod attached to it is free to be dragged upwards by a weight, and motion is thus communicated to the bells, cocks, and other appendages, which at the same time warn the engineer, and act of themselves to avert the impending danger.

Two spark arresters have been patented, and also an ingenious arrangement of mechanical devices, by which locomotive engines can be reversed, and the lead changed at the same time; only one set of eccentrics being employed, and the change being effected by the movement of a single hand lever.

Two improvements in the surface condenser are worthy of notice; in one of these a receiving vessel for the exhaust steam and the water resulting from the condensation of the same, is combined with the condenser proper in such manner, that a considerable quantity of the heat contained in any one portion of exhaust steam, is absorbed by the water which has resulted from the condensation of a previous portion of the same. Hotter water is thus supplied to the boilers, and a smaller quantity of fuel is required to evaporate an equal bulk of water.

The other condenser has for its object, to relieve the tubes in which the steam is condensed from pressure; thus obviating one of the great practical difficulties incident to the use of the condenser, familiarly known as Hall's. The tubes in this latter condenser contain exhaust steam and water, resulting from its condensation; their interior surface is in vacuo or nearly so: their exterior is surrounded by a constantly changing body of cold water, which presses upon the tubes, tending to colapse them, with a force due not only to the atmospheric pressure, but to the height of the column of fluid. These tubes are of small size, and their collective length in some steamers is more than a mile; there are consequently many joints, and these are liable to be broken by unequal expansion and contraction, or by the straining of the vessel. When a leak occurs, the cold water rushes with great force to the interior of the tubes, and a small leak is sufficient as it is technically termed, to drown the condenser, filling the tubes to such an extent with water, as to forbid access to the exhaust steam, and rendering the condenser useless. To obviate this difficulty, and to render practicable the employment of thin tubes, this patentee originated the idea of admitting the water to the outside of the tubes in such a manner, that in one of his arrangements they should be exposed on their exteriors to the pressure due to the height of the water only; that in the other arrangement, the pressure on both sides of the tubes should be exactly equal, and leakage in consequence, produce no evil whatever.

In this last arrangement, the case containing the tubes is air tight and sufficiently strong to resist atmospheric pressure; cold water is admitted to the top of it, and falls in a continuous shower through a perforated plate upon the cluster of tubes, cooling their surfaces, and condensing the steam within them; as it collects at the bottom it falls by gravity into the well of a pump, which latter lifts out the water. Openings are made through the tubes, connecting the space outside with that inside of them, and thus an absolute uniformity of vacuum in the two spaces is maintained. This condenser has been in actual use for several months; report speaks highly of its performance, and it is stated that it is as little liable to injury as the ordinary injection condenser, while it at the same time returns back to the boiler the steam condensed and unmixed with salt or impure water as is the case in Hall's condenser.

An improvement in packing for pistons, in which soft and hard alloys are employed, and an arrangement by which the inventor believes, that in high pressure engines a portion of the escaping steam may be returned to the working side of the piston, and this without increased pressure on the other side, have also been patented; so likewise have been several modifications of valves and valve gear, and of cut-offs, as applied to puppet-valves. In one of these latter, the toe which actuates the lifter is free to turn on the rock shaft during certain portions of the stroke, being clutched fast to it at the proper time for raising the valve, and disconnected when it is necessary to drop the same, by means of self-acting machinery, which can be so regulated, as to permit the valve to drop at any required time.

NAVIGATION AND MARITIME IMPLEMENTS.

In this class, some six and twenty patents have been granted, among which is one for a peculiar form of vessel, scow bottomed with keels at the sides projecting below the bottom, and below the water line at both bow and stern. By such a form, a wedge as it were of air with its edge toward the vessel is enclosed at the bow, by the keel, by that portion of the bottom which projects over the water, and by the surface of the water itself. As the vessel is forced onwards, and waves strike in this wedge shaped space, each one in its turn forces a quantity of air under the bottom, and below the surface of the water; this air is retained in contact with the same until it makes its way out astern, being prevented from issuing at the sides by the keels before cited. A patent was some years since granted, for applying air to the bottom of vessels: thus, in fact, supporting them on a thin layer of air, and alleviating the friction arising from the passage of water along the outside planking; which friction has of late years been discovered to form an important element among the resistances which oppose the progress of vessels. A vessel built on this better plan in which the air is discharged under the bottom by powerful pumps, is now in actual use in the harbor of New York, and with fair success. The patent granted the present year, has been presented as an improvement on this plan, and the inventor states that his peculiar model will enable him to dispense, not only with the pumps, but with the power necessary to work them.

An arrangement of two flexible bars connected to each other, and to a rigid bar between them by means of cross pieces, which are free to slide on the rigid bar, and can be clamped to it at any required point, has been patented. The whole apparatus constitutes a rule, the outer edges of which can be made to assume many different curves. Its object is to save the wood and labor employed in making the patterns or moulds, from which timbers for vessels are cut. The rule is set to the chalk lines on the laying down floor, and the position of the cross pieces with respect to the rigid bar is noted and marked: it is then set to the lines representing another timber, and so on for any convenient number. The rule is then carried to the yard, re-set by the marks in its previous positions, and the outline of its edges marked on various sticks of timber.

Patents have been granted for various improvements upon submerged propellers; for improvements in the method of propelling vessels in shallow water, by means of setting poles acted upon by machinery; for a method of arranging and operating swinging buckets for paddle wheels; and for an improved apparatus for indicating the depth of water in ships' holds. Several improvements in the gun harpoon have been patented, some of which promise to produce important practical results. A curious piece of machinery for regulating the trim of steamboats, consisting of an immense rocker running athwart ship, which supports a railway on which a chain box is free to move, has been patented. The machine appears to merit praise, rather from its ingenuity and originality, than from important advantages to be obtained by its employment.

An improvement in the truss for sustaining ships' yards; another in the method of attaching grummets to sails, and certain modifications in the deep sea diving vessel, have been protected by patents. A number of improvements in that class of steering apparatus, in which ropes and pulleys are dispensed with, cogs, screws, shanks, and cranks taking their place, have been patented; so also have been improvements in the pumping windlass, and an improved method of carrying ships over the bars which usually obstruct the mouths of the rivers and estuaries of our coast. The latter process consists in supporting the ship by an apparatus differing from the ordinary camels, chiefly in the fact that it is provided with a bow, connecting together the camels located on each side of the vessel, which not only renders easier the passage of the machine through the water, but prevents the sea from dashing between the sides of the vessel and the camel, causing them to change their relative location, and strike violently against each other to the imminent danger of both the vessel and its supporters.

CIVIL ENGINEERING AND ARCHITECTURE.

In the wide range of subjects examined under this head, about 28 patents have been granted.

Bridges.—Certain improvements in the arrangement of arches and tension rods, the feet of such arches resting on a long girder, and abutting against each other, while the feet of a second series of arches rest on the same girder, at points vertically beneath the crowns of the first set of arches, and the tension rods extending from the arches to the girder in lines radial to each arch, have been patented. A compound arched girder in which the arch or bow has, as is usual, a metallic string or tension rod, which rod—and here consists the novelty—is not attached to the feet of the arch, but is carried entirely over the exterior of the same, and resting upon, but not fastened to its periphery, has been patented. By this arrangement, it is said that the arch is prevented from rising at any one point, when pressed by a load unequally distributed upon it.

Several excavators have been patented, some of which are ingenious, but present no striking novelties; so also have been improvements in the method of fastening and forming the frame and filling of iron houses; improvements in window sash and shutters, in mantel pieces, canal gates, and stump extractors.

A process for forming embankments, and filling depressions in the earth's surface, through the agency of streams of water, has been patented, and likewise a method of sinking hollow piles, coffer dams, and other things of like character, by means of creating a vacuum therein, which causes the sand, mud, or shingle to rise within them, and the piles to descend. The process is the invention of a foreigner, was patented by him in England, some years since, and is reported to have been employed with great success in obtaining foundations in the hard sand banks found in the vicinity of the coast of that country.

An improvement in the form of railroad bars, rendering them applicable, not only to car wheels, but at the same time, to the use of those of ordinary carriages, has been patented. These rails are well fitted for being laid down in streets, and it is believed that they will obviate many, if not all the difficulties that have hitherto prevented the employment of rails in the great thoroughfares of our towns. A wrought iron railroad chair, the merits of which consist in the cheapness with which it can be manufactured, and in the iron being bent in such a manner as not to injure its strength, has been patented; and with certain improvements on the method of making cornices, and in the arrangement of inverted arches in bridge trusses, completes the list of such inventions as have been patented in the class under discussion.

FIRE ARMS, IMPLEMENTS OF WAR, &c.

Similar causes to those which led to a diminution of the numbers of the gold washers, presented to this office for examination, have acted upon the minds of those engaged in the manufacture or improvement of fire arms, and but fifteen patents have been granted during the past year in this class. Two of these are for improvements in the sliding piston breech gun, one of them being for a method of moving and holding the piston, and the other for certain apparatus for preventing accidental explosion of the charge, while the operation of loading is proceeding.

Several patents have been granted for modifications of those arms familiarly known as Cochrane's and Colt's.

Two of the latter have been issued to the original inventor, one of them being for certain improvements in the form of the locking notches of the revolving breech, which prevents any one chamber of the same form being thrown past the axial line of the barrel, and for arrangements rendering it impossible for the charge to explode when the pistol receives a violent fall or jar. The other consists in permitting the spindle on which the cylinder revolves to pass only partially through the hole in the latter, and in closing up that end of the same, which is nearest to the barrel. The improvements claimed under both patents, will remedy certain defects of the pistol, as at present manufactured, and the one last noticed is believed to be especially important, as it prevents all smoke, dirt, small pieces of lead, &c., from entering between the spindle and the cylinder, and obstructing, if not entirely preventing its revolution.

Patents have been granted for several improvements in that class of locks in which the hammer is raised and discharged by the same trigger. One of these is based upon such an arrangement of the parts, that one pull cocks the lock, and leaves all the parts held in position, as is an ordinary lock when cocked; a second pull of the same trigger, but requiring much less force, will then discharge the piece. Two advantages result from this arrangement, when applied to fire arms with revolving barrels; one being that the arm is not thrown out of the line of aim by the violent pull on the trigger in the act of discharging; the other that the barrel is at rest before it is discharged, and the ball has only the motion derived from the explosive force of the powder, and not the compound motion derived both from it and from the revolution of the barrel, as is usually the case.

Improvements in the method of revolving the travelling hammer noticed in last year's report; in the method of forging rifle barrels, and in the apparatus for giving increasing twist to the grooves in the same, have been patented.

An ingenious combination and arrangement of the two well known machines for forming and charging percussion caps, has been patented, and in connection therewith, certain improvements in the feeding and carrying apparatus appertaining to the same machines. By these improvements, caps finished and charged, are delivered from the machine, which is supplied merely with the copper in sheets, and with percussion powder. No previous slitting of the sheet is required, no sorting of the caps previous to charging them.

GENERAL MISCELLANEOUS.

In this class only five patents have been granted, and these are based upon improvements in traps, in apparatus for harvesting ice, and upon certain modifications of machines for removing the contents of sinks and privies. One of the former is based upon a curious arrangement of mirrors, by which is reflected to the entering rat, not only his own image, but those of the rats already caught, and all of them in such a position that they appear to be striving which shall first secure the bait. The question whether rats are animated by the passions of larger animals, and are urged by rivalry or emulation, must be determined by those more skilled in natural history than myself. If they decide in the affirmative, the trap here noticed will be as productive a source of danger to the rats, as it has been of amusement to those to whose attention has been brought the certainly very new and odd idea of the inventor.

This description closes my annual brief enumeration of machines, apparatus, processes, and articles patented during the year past; and in conclusion, I must remark, as heretofore, that a full and complete digest of inventions thus patented, would be of use, not only to the inventor, but to the office and the public, and express the hope that in future we may either have ourselves a sufficiency of time to make the same, or that the preparation of such a work may be confided to some competent officer.

All of which is respectfully submitted.

HENRY B. RENWICK,
Examiner.

Hon. THOMAS EWBANK,
Commissioner of Patents.

SIR:—In accordance with your instructions, I have the honor to submit a report of the history and present condition of the business of the office committed to my charge during the past year.

In my report for the year 1849, I gave as the number of cases received at my desk, during the year, 463. Besides these, there were upon my desk 180 cases, the arrears of 1848. All of these were acted on during the year 1849; so that at the commencement of 1850, I had no cases upon my desk that had not been examined. During the year 1850, there have been received at my desk 539 cases, only 497 of which, have been disposed of, leaving on hand 42 applications unexamined. It might seem singular without explanations, that 643 applications should have been examined by me in 1849, and only 497 in 1850; and I am the more anxious to give this explanation, because it illustrates an important principle. It will be remembered, that the honorable Commissioner of Patents, toward the close of the year 1849, expressed great anxiety that the arrears of cases on the desks of the examiners should be disposed of, if possible, at the close of the year. To meet this desire, an unusual amount of labor, both mental and physical, was accomplished by all the examiners on the work before them, and most of them brought up the business at the close of the year, so that there were but few cases in arrears. The business of my own desk was reported as finished up to 1850. But as it generally happens in work done hastily, so it was here. Much of the business had to be reviewed and re-examined, and the correspondence growing out of it, and the delays resulting from it, showed conclusively that hasty examinations of applications for patents, like hasty legislation, are productive of great evils and of little or no good. For these reasons I have examined fewer cases in 1850, than I did in 1849. But I have the gratification of feeling and of knowing that the work has been done on a more solid and broader foundation.

There will be fewer cases calling for re-examination in the coming year, than there have been in that which is past. This remark made of my own desk, it is believed, applies equally to the desks of the other examiners: showing as it is believed it does, that the business of examining patents was never done better than at the present time.

The classes exclusively under my charge at the present time, are the following:

1. Agriculture; 2. Chemistry; 3. Household Furniture; 4. Wearing Apparel; 5. Leather.

This last I also examined until April 1850, when that class was transferred to Dr. Page; consequently all of the cases in this class acted on previous to the transfer will be reported by me.

The class of *Agriculture*, embraces all the instruments used in cultivating the ground, and in collecting and preparing its products.

Chemistry, embraces chemical processes, apparatus for processes, and compositions of matter.

Household Furniture, includes machines and implements for domestic purposes.

Leather, embraces all operations in tanning and dressing leather, with the tools and machines used for such purposes; also the manufacture of leather into boots, shoes, saddles, and harness, and all other articles, usually made of leather.

Wearing Apparel, also embraces articles for the toilet, with the construction of the implements and machines used for their manufacture.

As before stated, 497 cases have been examined out of the cases referred to me during the past year, besides which, a large amount of pending applications from the preceding year have been disposed of, by being patented or withdrawn, or are still pending. It is, therefore, scarcely possible to give even a clue to the amount of work done on pending applications. The number of actions at my desk during the year, on new and old cases still pending, is more than a thousand. In exact number it is 1029. Now out of the 1029 actions recorded on my books, 240 were examinations where the cases were ordered to issue, 313 were first rejections, 90 were second or third rejections. The remaining actions, being 375, are on cases that have been withdrawn, or are still pending.

Of the applications which have been ordered to issue, 230 are patents, 7 re-issues, 2 extensions, and 1 additional improvement.

Character of the Inventions as compared with those of 1849.—It is a fact worthy of remark, that the progress of invention amongst mankind is by no means uniform. Sometimes a new field of invention is opened and a galaxy of inventors swarm about it to develop the hidden treasures. This principle is illustrated in the multitude of inventions that followed the cotton gin, the steam engine, and the electric telegraph. And the same principle is carried out in all the smaller details of the application of science to the useful arts.

The plough clevis is a very old and well known instrument, and is constructed with a vertical, and a right and left movement, so as to vary the width or the depth of the furrow, or both, as may be desired. After the different devices for doing this, had been exhausted, inventors began to look for substitutes for the clevis. One of the first of these was the plough beam, so constructed as to turn on the standard as a pivot, and the end attached to the handles by means of a horizontal graduated arc for varying the width of the furrow, and a vertical arc for varying its depth. When the various modifications of devices for accomplishing this result seemed to be exhausted, the rear end of the beam was made the pivot or centre of motion, and the beam caused to vibrate to the right or to the left, on the standard, by means of a slot in the beam of sufficient length to admit of the motion. A vertical motion of the beam through which the standard passes is accomplished in the same general way, &c.

During the year 1849, several patents among my classes opened new and important fields of invention, which were noticed in my report for last year. The present report, if it presents less of brilliant discovery or invention, embraces much that is useful, and performs an important part in the progress of general improvement.

In reviewing the several classes of my work for the year 1850, and comparing the inventions with those of 1849, I find a greater uniformity than was anticipated. Agriculture, which embraces nearly half of the cases presented at my desk, included in 1849, 117 issues, and the same number were issued in 1850.

The following tabular view will show a comparative representation of the cases patented in the last two years in my classes.

AGRICULTURE.—Cases patented in	1849.	1850.
Churn and Butterworkers	10	13
Ploughs	15	13
Cultivators	6	2
Seed Planters	20	27

	Cases patented in 1849,	1850
Rakes	4	6
Harvesting Machines	15	15
Thrashing and Grain Separators	9	5
Hullers and Smut Machines	8	8
Winnowing Machines	9	5
Corn Shellers	7	3
Straw Cutters	5	10
Bee Hives	5	3
Miscellaneous	4	7
	117	117
CHEMISTRY.		
Patents granted	44	53
LEATHER.*		
Boots and Shoes	7	0
Tanning and Finishing Leather	5	3
Saddles and Harness	9	6
Miscellaneous	0	5
	21	14
HOUSEHOLD FURNITURE.		
Washing Machines	6	3
Cutters of Meat and Vegetables	7	4
Bedsteads and Fastenings	19	13
Tables and Chairs	13	3
Miscellaneous, including Refrigerators	10	20
	55	43
WEARING APPAREL.		
Patents granted	9	11
Total No. of patents, re-issues, and additional improvements	246	238
Extensions		2
	246	240

CLASS 1.—AGRICULTURE.

Having stated the number of patents granted in the several classes referred to me, following the practice of the office for the last ten years, I should proceed to notice the most important inventions that have been examined at my desk during the past year. Commencing with the minor divisions of agriculture, I shall first notice

Churns.—Of the 13 patents granted, very little can be said of the merit of the inventions which they set forth. They are not entitled to any special notice, except to say, they are detailed variations in the modes of agitating fluids. I shall notice two of these. The first is what is called an *atmospheric churn*, consisting of an upright cylinder with a rotary dasher, which gives to the cream a rapid rotary current, causing a current of air to be drawn down through a series of vertical pipes bent at the bottom at right angles, and

* For the remaining patents in this class, see Page's Report.

in the direction of the current of liquid put in motion by the rotation of the dasher. Claims the combination of the dasher and the tubes, for discharging air beneath the surface of the cream.

Another patent was granted for an atmospheric churn, consisting of two vertical cylinders, and an intermediate air chamber communicating with the cylinders by a grated opening or passage—the two cylinders are supplied each with a plunger, and the plungers are moved from the ends of a working beam not unlike the pistons or plungers of a fire engine. The effect produced, is the agitation of the cream by forcing it alternately from one cylinder into the air chamber, and thence into the other cylinder and then back again, by reversing the motion of the working beam.

Ploughs.—Thirteen patents have been granted on this division of agriculture. Three of these for improvements in the plough clevis, three for devices for cleaning the various matters that are liable to adhere to ploughs as grass and stubble; two gang ploughs, two hill side ploughs, one subsoil, one coulter fastening, and one spring beam plough. None of these patents, except perhaps the last, requires any remarks—the subject having been so nearly exhausted, that there is little room for invention. The construction of a *plough beam*, so as to render it flexible, is believed to be a new device, and on the ground of obtaining the result of avoiding the breaking of the plough when striking a fast rock or stump by the spring of the beam, the patent was granted.

Cultivators.—Two patents have been granted under this division, neither of which seems to present any remarkable novelty worthy of notice.

Seed Planters.—Twenty-seven patents have been granted, most of which are for minor points of novelty, and require no notice from the examiner. The following may receive a passing notice.

A patent was granted for a *seed planting barrow*. In this the gist of the invention lies in the device for receiving and transmitting, or distributing the seed. It is so constructed, that the reciprocating, semi-rotating, horizontal seeding disk, takes the seed from the hopper above it into its seed measuring cups, in which cups the seed is carried around on the surface of the underlying plate, until it is brought over a hole in the said under plate through which it falls into the furrow. The patentee claims the devices for moving the seed disk in combination with the disk itself.

A patent was granted for the construction of a *drill tooth*, so that when it should meet with a fast rock or stump, or other fixed obstruction, it might disengage itself without the danger of being broken. Devices for accomplishing this result are rather common within the last year or two. The tooth in this case, is so made as to be hung by a pivot at its top, and to be grasped at its front and middle part by the lips of a pair of tongs, the jaws of which project horizontally backwards, and hold the tooth with sufficient force to resist the action of ordinary soils; but if the drill tooth meets with any fast obstruction, it pulls away from the grip of the tongs, and swings back on its pivot, and when it has past the obstruction, may be pressed between the jaws of the tongs by the attendant.

A patent was also granted for a *planting cylinder*, in which the invention consists in the device for varying the size of the seed cavities in its periphery. This is done by means of an arrangement of radial bars or rods like the spokes of wheels running towards the periphery, and extending into the bottoms of the seed cavities, and thus filling them up in whole or in part only. The radial arms or rods are moved in mortised grooves outward and inward, by means of cams working in screw thread depressions. The cylinder being composed of two short cylinders or disks on the same shaft, one having the cams and the other the screw thread depressions, so that by rotating the inner faces of the disks upon each other, the radial arms are advanced or retarded, so as to vary the size of the cavities in the seeding rollers.

A patent was granted for a *seed distributing apparatus*, in which the invention consists in the use of cogs of wheels having their peripheries pass through the hopper of a seed planter, and each cog takes up and carries over a small quantity of seed and deposits it in the seed drills; there being one drill tooth for each cog wheel.

Another patent was granted, the gist of which consists in the arrangement and in the working of the seed valves in the bottom of the hopper, in combination within one of the sides of the hopper, so made as to slide up and down, and thus vary the capacity of the seed measuring space, contained between the upper and lower slide valves, by causing the valves to recede from or approximate towards each other. In sowing seed, the two series of valves move alternately, the upper being opened first, lets down its charge upon the lower one, while the latter is yet shut, and as soon as the upper one is closed, the lower one is opened, and the seed falls into the furrow. The upper and lower valves, each is worked by a separate set of cams on the driving axle.

Cart for Spreading Manure.—A patent was granted for this apparatus, consisting of the sides and ends of a manure cart-body on a pair of wheels, on the axle of which the body is capable of being slided rearward, or run back on rollers for the purpose of the discharge of its contents. The bottom part of the said cart-body or box is made to consist of an endless apron on a series of rollers, the forward end of the apron is made fast to the forward end of the box, while the near end of the apron winds up on a roller situate underneath and near the rear end of the cart. It discharges the contents as the body of the cart moves or slides backward. The manure is spread by winding up the rear end of the apron on the under roller, which process brings the contents slowly backward, and distributes them broad cast or otherwise at the rear of the cart body.

Harvesters.—Under this division, fifteen patents have been granted. For the last two years much attention has been given to this class of agricultural machines. At first, they were confined to the cutting of grain chiefly, then to grain and grass, and now they have been extended to almost every herbaceous growth of the soil. Thus we have grain and grass harvesters, corn harvesters, cornstalk harvesters, cotton harvesters, cotton stalk harvesters, cloverhead harvesters, hemp harvesters, &c. I shall notice several of these, as they present something of interest to prairie farmers, especially.

The first machine which I shall mention in this class, is a *machine to harvest cotton stalks* in the field. It is a machine having two horizontal shafts, running from side to side. The upper and forward one has radial knives or beaters, which rotate rapidly, and beat down the stalks, while the rear shaft is supplied with radial longitudinal knife edges extending from side to side, and as the blades come down they chop the stalks in pieces.

The second machine noticed under this division, is a *grain and grass harvester*, presenting two principal points of invention. First; the cutters, which consist of two horizontal saw blades, lying flat upon each other, with the teeth looking forwards, and vibrating upon each other as the face of the saws is pushed forward against the standing grass. The peculiarity of these teeth consists in their being made concave on their inner faces, so that when

they slide past each other, they cut somewhat on the scissors' principle, and are, to some extent, self-sharpening. Second; there are what are called cyma-reversa fingers, working in combination with certain rake teeth, designed to hold the charge while the fingers take it and deposit it upon the ground.

The third machine of this division is a *corn stalk harvester*, the frame of which resembles a low three wheeled truck, and bearing upon its upper surface, near its middle part, two broad metallic disks, armed with teeth on their peripheries, which teeth slightly overlap each other, and are capable of seizing and holding within their grasp, any herbaceous matter, and as the machine moves forward, to tear it up by the roots. The meeting of these teeth is near the central part of the machine, anterior to which the space is perfectly clear, so that when the machine is driven over a row of the corn stalks, the latter are successively brought against the teeth of the metallic disks, and drawn out of, and deposited upon the ground.

The fourth machine is an ingenious contrivance for distributing the cut grain of a harvester into suitable parcels for bundles, by the weight of the grain. It is called a *grain binder*. It consists of a self-regulating rotary cylinder, mounted on the rear end or extreme right side of the machine and having its axle parallel with the rear end of the machine. This cylinder is supplied with catches and springs, and so arranged that when a certain weight of grain is received into one of its three compartments, it performs a third part of a revolution, and deposits the amount received for a bundle, while the next compartment of the cylinder is being charged for a second bundle, and so on.

One patent has been granted for a *machine to harvest hemp*, a prominent peculiarity of which consists in the method of severing the stalk, by means of an oblique chop stroke of the cutters falling obliquely across the spaces between the fingers, and upon the edge of the finger on the further extremity of the finger space; the oblique stroke being given by the shaft on which all the cutters are arranged, which shaft is semi-rotated in screw thread bearings, so that the shaft in so rotating and re-rotating as to raise and depress the cutters, should, in performing this operation, give the oblique motion which severs the stalk, as set forth.

Two machines adapted to harvest maize, have been patented. The first of these contains a thresher to husk and shell the grain. The harvester consists of a machine, in its general arrangement not unlike a clover head harvester. But it has a series of pairs of rollers, one pair between every pair of teeth, to seize the stalks and pull them downwards, until the ear is drawn against the tops of the fingers by which the ear is severed from the stalk. The ear then rolls down an inclined plane to the thresher. A *second machine for harvesting maize or grain* has also been patented. The gist of this invention consists in the construction of the grain reel, made with rows of fingers, projecting radially, and rotating over or through the standing grain. The stalks being received between the fingers, the ears are pulled off and deposited on an inclined endless apron.

A Grass Harvester of a novel construction has been patented, which it will be difficult to describe without the aid of drawings. Some idea of its general character, however, may be formed, by supposing a flat washer-like ring of metal to be cut out of a sheet of metal, and placing it in a horizontal position. Now place upon its surface, symmetrically, a series of sharp razor blades a few inches apart, having the shank confined to the ring by a screw or rivet, and the ends of the blades projecting beyond the periphery of the ring. If now the ring be rotated, so that the cutting faces of the blades be forward, and in this state be brought against the standing grass, it is contended by the inventor that the machine will be a successful instrument. The cutting blades are supported in their position by suitable contrivances, and the ring, with its cutters, has also suitable devices for supporting it, and rotating it as the carriage moves forward, which it is unnecessary to refer to here.

Horse Rakes.—Only one apparatus under this division is regarded worthy of special notice, although six patents have been granted.

This invention is denominated *a machine for binding grain.* The frame of it resembles the platform of an ordinary harvester, so constructed that curved rake teeth, projecting upward through the floor, and passing across the same from side to side, collect the grain at the opposite side, where it is brought against a curved arm, between which arm and teeth the grain is pressed, and at the same moment another curved finger rises through the floor from behind, to support that half of the bundle, while at the same time, the curved rake teeth, by means of the machinery, fall backward through the floor, and are carried back to the opposite side of the platform, or to the starting place, for a new charge.

The gearing could not be explained without a drawing. The only part required of the attendant with the machine, is to tie the band for each bundle or sheaf.

Thrashing Machines and Grain Separators.—Five patents have been granted; two thrashing machines, and three for separating the grain from the straw, or for carrying away the straw after thrashing. I shall notice only one of these, namely, a thrashing cylinder. This cylinder is constructed in short sections or rings, in such manner as to be slipped over a solid cylinder, and made moveable on it, so that when any one section receives a stone or other hard body between the teeth, instead of its breaking out the teeth, the ring will slip round the solid cylinder and thus allow the obstruction to pass through the machine without doing injury.

Winnowing or Fanning Mills.—Five patents have been granted; three of these for ordinary fanning mills, none of which present any general interest for their novelty in invention. The points claimed are minor ones.

Machines for Hulling Grain and Rice, and separating Smut and Dirt.—Eight patents have been granted; three of these for hulling clover, four for smut machines, and one for separating garlic from wheat. I shall notice three of these machines. The first is for the construction of the basis for setting the teeth on the cylinder of a clover huller, or on the concave of the same. The teeth are first set in a compact sheet of leather, and this fixed upon a basis of cork, for the purpose of rendering the teeth capable of a slight flexibility so as to prevent breaking from the accidental introduction of stones or other foreign bodies.

A Clover Huller has been patented; the novelty of which consists in the form and arrangement of the teeth on the concave and on the cylinder. The one (say the cylinder,) has teeth proper of an ellipsoidal form, running between serpentine ribs of alternate expanded and contracted dimensions on the sides, so that the grain between the roughened sides of the ribs and the roughened sides of the teeth, may receive a sufficient amount of friction to clear it of hulls.

A Garlic Machine has been patented, for the purpose of separating garlic from wheat or other grain. It consists mainly of a horizontal slatted or ribed cylinder, between whose ribs or slats the pinion teeth of another cylinder are allowed to mesh, and against which they are pressed by a spring with suffi-

cient force to crush the garlic without injuring the wheat. The garlic is thus mashed and made to work its way out of the machine, through the ends of the cylinder.

Corn Shellers.—Three patents have been granted; none of which present sufficient novelty to require special notice. One being to give the ear a screw motion as it is forced through the machine, another feeds the corn between the two contiguous faces of the concave rims of a pair of shelling wheels, another makes his shelling disk answer the double purpose of a sheller and a fly wheel.

Straw Cutters.—Ten patents have been granted. Three of these will be noticed—the first belongs to the class of straw machines in which the blade is worked by hand. The point of novelty is in the device of fastening the jointed end of the knife on a spring, so that in working the knife, the slight yield of the spring produces a draw cut in severing the straw.

In the *second* machine noticed in this division, the novelty of the invention consists in so arranging the spirally ribbed feeding rollers and horizontal knife with its edge towards the said rollers, and brought so close to the ribs, that those of the upper roller, cut against the upper edge of the knife, while those of the lower roller cut against the lower edge of the knife; and thus the straw that is fed through, is all cut either by the lower or upper edge of the knife.

Under this division of agriculture, there has been patented a *vegetable cutter,* presenting some novelty worthy of mention. The machine in the general consists of a short cylinder lying or supported on its side, and having its cutting apparatus on the upper part of the cylinder over which the hopper is placed. The two edged knives, which have a reciprocating motion in an arc corresponding with the periphery of the cylinder, are hung on arms attached to each end of the axle of the same, and vibrate across and just above the opening in the bottom of the hopper, and perform a cut with both the forward and back stroke.

Bee Hives.—Three patents have been granted; but none of them presents sufficient novelty to require special notice.

Miscellaneous of Agriculture.—Seven patents have been granted; one for a *curry comb,* three for *hay forks,* one for stanchions for cattle, one for a machine to fumigate plants, and one for the construction of an ox yoke. Of the last of these the novelty consists in having two staples instead of one, as is common, and placed in the middle. The design of the invention is to enable a weaker or a lighter ox, to draw his end of the yoke equally with a stronger animal. In the common ox yoke, the chain by which the animals draw the load, is attached to the staple in the middle of the yoke. In this improvement there are two staples, each one about three inches from the centre, one on each side of it. The chain leading, say from the plough, is divided twelve or eighteen inches from the yoke, into two branches, one leading each staple; one of the branches has an adjustable device for varying the relative lengths of the branches—by this adjustment, the advantage may be given to the one or other ox, as may be desired.

Class 4.—CHEMISTRY.

This class contains fifty-three patents, under the following heads:

Manufacturing candles and purifying the materials,	5
Preparing manure from animal compound,	1
Gas manufacture,	3
Manufacture of sugar,	3
Manufacture of soap,	1

	1
Manufacture of soup bread,	3
Distilling alcohol, oils, &c.,	1
Enameling hollow ware,	1
Manufacture of glucose, (grape sugar,)	2
Gas metres,	6
Manufacture of India rubber,	4
Paints, and covering cements,	1
Extinguishing fires, (by means of suffocating gases,)	2
Preserving vegetable fibre in wood or in cordage,	3
Refining and separating gold,	1
Grinding rags for paper making	1
Parti-coloring yarn,	1
Sizing compound,	1
Manufacture of stannate of potash and stannate of soda,	1
Manufacture of gutta percha,	1
Preparing wheat for grinding,	1
Preparing sugar cream, for the use of tea and coffee,	1
New burning fluid,	1
New material for printers' ink,	1
Manufacture of comfits, or sugar plums,	1
New glazing compound for the laundress,	1
Manufacture of alum from the green sand,	1
Apparatus for salting meat,	1
Machine for filtering oils,	1
Manufacture of starch from maize,	1
Manufacture of caviar, (an article of food from the roe of the sturgeon,)	1

Several of these inventions will be noticed more in detail.

Water Gas.—It will be remembered, that in my report for 1849, I noticed somewhat at length the subject then, and still regarded by the community as a prominent novelty of the day, namely, the *water gas.* I gave the outlines of the history of gas making from steam or water, and showed by the references, that the invention was at least twenty years old, and that four or more English patents had been granted for modifications in the manufacture. But as the public mind has been held in a state of feverish excitement by newspaper squibs, promulgating the most astonishing discoveries, from time to time, throughout the last year, on the subject of illuminating gas derived from water or its elements, I deem it proper to make some further remarks respecting it. Water gas is an old and well known invention, and it requires no small share of inventive power to make an improvement that would be valuable to the public. The pale combustible gases, as obtained from steam passed over red hot charcoal, have been more highly charged with carbon, to increase their illuminating power in two ways; the first, by forcing them through highly or finely pulverized charcoal or equivalent carbonaceous matter, and then through scraps of iron at a low red heat, to remove the excess of carbon. The second consists in mingling the pale combustible gas with the vapor of spirits of turpentine, naphtha, or other hydro-carbon, by which the gas is sufficiently carbonized to give the requisite illuminating power. It is stated in the American Year Book of Facts for 1850, that even atmospheric air may in this way be charged with the vapor of any hydro-carbon, so as to render it capable of being used as an illuminating gas. To this second mode of carbonizing combustible gases belongs the invention of Mr. Donovan, patented in England

in 1830, and of Molleras patented in 1834, and the celebrated Paine light of newspaper renown the world over.

A patent has been granted during the past year for a peculiar form of retort for the manufacture of the water gas. It consists of three cylinders cast in one piece of metal, designed to lie horizontally in the furnace, so that the three lie on nearly the same horizontal level; the largest in the middle, and a smaller one on each side. Suppose the spectator to be looking towards the end of the retort, as it lies in its position in the furnace, the small retort on his right is charged with finely pulverized charcoal, the one on his left with scrap iron, and the middle one is charged with anthracite coal or other matters, to increase the amount of decomposing surface. The water or steam is forced into the right hand compartment, and carried along the whole length of this retort through the red hot charcoal, where it takes up a certain amount and thence passes, by means of a small conducting tube, across to the left retort, through the length of which it passes, and deposits its excess of carbon, as alleged by the inventor, and then enters the large retort by means of a short tube at the end nearest the spectator, where it mingles with the rosin, or oil gas generated in the same vessel in the usual manner. The utility of the water gas has not been yet sufficiently tested to enable the public to judge of the cost of this gas, compared with that from coal, rosin, or other well known agents. The inference is pretty strong, that if the twenty years' experience in England, from the time of Michael Donovan's patent to the present, has not introduced the water gas there, it must be because it costs more than it is worth, or else they have not invented the right kind of apparatus for its successful use.

I have been led to make these remarks at greater length than might otherwise be deemed justifiable, from the frequent applications, public and private, made at this office for information respecting the so called Paine patent. No such patent has been granted in the United States. A patent has been granted for an apparatus for generating illuminating gas from asphaltum. The material is introduced into the retort in a semi-cylindrical iron tray, and the tray removed at the end of every charge of four or five hours heating.

Soup Bread.—This preparation is made by mixing up with flour, the liquid or soluble parts of meat, reduced by boiling and concentration to a jelly, and forming these materials into dough, which is then rolled out into cakes or loaves, and baked at a low oven heat.

Glucose, or Grape Sugar.—An article under this denomination has been patented; it is a process. The sugar found in raisins and in most acid fruits at maturity, belongs to one kind or species, and is distinguished from cane and maple sugar by being not more than half as sweet as the same weight of the former. It was found many years ago, that if starch were suspended in water, slightly acidulated with an acid, and boiled briskly for some ten hours, the starch would be converted into its own weight of a sugar identical with that found in raisins and other fruits, which fruits are acid in the green state; this product is called *glucose*. The patentee has learned by experiment, that if he boils his starch compound at a higher heat than 212°, he reduces the time required to finish the process, so that what was before done in ten or twelve hours, may now be done in six or seven. He mixes 25 bushels of corn meal with 150 gallons of water, at the temperature of 175°, and adds about 25 pounds of oil of vitriol, and after well stirring the same, adds 50 gallons more of water, and runs the whole into the boiler, lets in steam, and allows the contents to boil under pressure, by adding weight to the safety valve. He continues the boiling until the tincture of iodine no longer indicates the presence of starch in the material. Chalk is now added, to neutralize the sulphuric acid, and the solution concentrated to crystallize.

Zinc White, or White Oxide of Zinc, is now largely used as a subsitute for white lead, in painting. The great value of white lead as a vehicle for other paints, consists in the fact that the carbonate of lead is soluble, to a certain degree, in oils; it is now found that the same is true of the oxide of zinc, and hence its peculiar fitness for the uses set forth, as a vehicle for paints, and a substitute for white lead. The subject of the patent is the construction of a furnace for oxidizing the metal, arranged with air passages for oxidizing, and reception tubes for collecting the product.

Sugar.—A patent has been granted for a process of refining sugar from the beet or cane, which consists in adding to the cane juice, or beet juice, or to the solution of sugar in water, a quantity of baryta, to form the saccharate of baryta, which is removed from the liquor by mechanical means in the state of magma. The baryta is separated by means of carbonic acid gas forced through it; an insoluble carbonate of baryta is formed and precipitated by adding sufficient water, so that the solution of sugar will be of the strength of 30° Baumé, from which it may be concentrated to the state suitable for crystallization in the usual way.

Draining Sugars.—This is an improved apparatus on Hurd's machine for draining sugars by centrifugal force, and consists in surrounding the wire gauze cylinder by a steam case, to be supplied with steam, or a fine spray of water, the design of which is to prevent the gumming up of the meshes of the wire gauze, which is liable to occur when the surface of the cylinder is freely exposed to the atmosphere.

Refining of Gold.—Three processes have been patented for separating gold from other metals, or from gold sands, only two of which will be noticed here. As this subject is one of great importance, inasmuch as from present appearances, gold is likely to become the chief metallic currency of our land, I deem these processes of sufficient interest to the public, to give them somewhat in detail.

Most of the native gold brought to the mint for refining, contains silver, from which it must be separated before it can be supplied with the uniform proportion of alloy required by law in gold coin. For this purpose, the process now in use throughout the world, is to melt the gold to be refined previous to coining it, with two to three times its weight of silver. It is then granulated and exposed to the action of hot nitric or sulphuric acid, which dissolves out nearly all the silver, both that in the native metal, and that added by the refiner, and thus leaves the gold in nearly a pure state, and ready to receive the necessary portion of alloy required in the gold coin. It will be seen at a glance, that allowing a million of California gold to weigh (53,250) fifty-three thousand two hundred and fifty ounces, or nearly two tons, it would require nearly six tons, or (161,250) one hundred and sixty-one thousand two hundred and fifty ounces of silver, and worth about ($190,000) one hundred and ninety thousand dollars, to be kept constantly on hand to work it. The desideratum is, therefore, to find some process of working the gold, by which this great outlay of silver may be prevented, and by which greater celerity may be effected; both of these results, the inventors allege, they have obtained.

In the first, the argentiferous gold is converted into the chloride by the action of nascent nitro-muriatic acid generated by the re-action of sulphuric acid upon a mixture of nitrate of soda and common salt, or by other equivalent means. The silver contained in the native gold, is also coverted into the chloride by the same chemical re-action, and it is prevented from incrusting the gold by the more intense affinity, and the agitation produced by a jet of steam which is constantly being forced into it. The gold is next precipitated in the metallic state upon the chloride of silver, by means of pulverized copperas. After washing the precipitate of gold and chloride of silver, the latter is reduced to the metallic state, by the re-action of zinc and dilute sulphuric acid; and subsequently, the silver is dissolved out by means of nitric acid. From the nitrate of silver obtained above, the metal in the pure state is precipitated in the usual way by the re-action of zinc and dilute sulphuric acid.

In the second patent referred to, the design of the invention is to avoid the use of chlorine in the first part of the process. The argentiferous gold is first melted down with zinc or other metal baser than silver, from which alloy the baser metal may be dissolved out by dilute sulphuric or other cheap acid, and the bullion pulverized, or an alloy of great brittleness made, which may be easily crushed or broken down by mechanical means, so as to fit the gold bullion for the direct action of nitric or other acid. The inventor states, that he first mixes the argentiferous gold with twice or three times its weight of zinc, melts and stirs well the alloy, and then granulates the same by pouring it into water. The alloy thus obtained, is next treated in wooden vessels lined with lead, with dilute sulphuric acid, which removes the zinc, and leaves the argentiferous gold in a finely divided pulverulent or spongy state. In this second operation, heat is not required, and but little more sulphuric acid than will be necessary to form the sulphate of zinc.

Third. The argentiferous gold thus reduced to a spongy state, and still containing the silver untouched by the re-agents used, is treated with hot nitric or sulphuric acid, (the sulphate of zinc having been first entirely removed by washing,) by which the silver is entirely removed, and to be obtained in metallic state as in the former process or in usual way. Finally, the operation is finished by cupelling the gold or melting it with such fluxes as borax, nitre, &c., and casting it into bars.

Alum, process of Manufacturing, from the "green sand formation" of New Jersey. It consists in igniting the green sand free from lime and magnesia, stirring it in the mean time and exposing it freely to the air, the object of the exposure being to peroxidize the iron contained—care being taken to avoid carrying the heat so high as to fuse the mass and prevent the action of sulphuric acid upon it. It is next treated by sulphuric acid to dissolve out the potash, and the alumina is added in the requisite proportions to form alum.

Red Oxide of Zinc prepared as a Drier of Paint.—This ore is procured from Sussex County, N. J., is heated and partially converted into the white oxide, and by this means rendered friable, and the foreign matters are thus easily separated from it. It is then exposed to the action of the oil as other driers.

Manufacture of India Rubber.—Two patents for improvements in the manufacture of *India Rubber*, have been granted during the past year, which claim some notice in this place. The first of these, is for the use of the *hyposulphite of zinc.* This salt is prepared in the following manner: In a solution of caustic lime, pot-ash, or other caustic alkali, boil flowers of sulphur until the liquor be saturated, and into this liquid pass sulphurous acid gas by any of the known means for the purpose of obtaining a hyposulphite of the alkaline base. The liquid is allowed to stand and cool, and the clear liquor is then decanted into a vessel containing a suitable quantity of a saturated solution of the nitrate or other analogous salt of zinc. On mixing these solutions, the zinc is precipitated in a white powder which is regarded as the hyposulphite of zinc. It is then washed on a filter, dried and subsequently ground in a paint mill. Three pounds of this powder is mixed with ten pounds of India rubber, and heated from three to five hours at a temperature of 260°, 280°. The rubber, according to the inventor, will be found completely cured or vulcanized, and requires no free sulphur to be used in any part of the process, and no washing with alkali as do the ordinary materials used for vulcanizing. Hence, it is alleged, that this process is adapted to the covering of silks, and other delicate textures, and colored fabrics.

Another patent for a *compound for vulcanizing India rubber*, has been granted, in which the mode of treatment is much the same as the last, and produces the same result. The material is the artificial *bi-sulphuret of zinc.* The inventor claims the use of this composition without the use of sulphur in any part of the process of manufacture, and the washing with alkaline solutions is not required, and is not used in this mode of manufacture.

Manufacture of Caviar.—This is a process of preparing the roe of the sturgeon. The process consists in placing the roe in a pickle of salt and water for a time, by which a fermenting action takes place, and the roe rises to the surface of the liquor, while the various foreign matters settle to the bottom, and are in this way easily separated. The roe is then subjected to the process of being mixed, and incorporated with a portion of the oil of the male sturgeon, and is then packed in suitable tin canisters for the market.

Burning Fluid.—The ordinary burning fluids are mostly mixtures of spirits of turpentine and common alcohol, or spirits of turpentine alone, under the name of camphine, or chemical oil. To explain the nature of the invention patented, it must be premised that there are known to chemists several kinds of alcohol; 1st. *common alcohol* or spirits of wine; 2d. *amylic alcohol* obtained in the distillation of potatoes, Indian corn, or rye, or other cereal grain, and called *corn oil*, potato oil, essential oil of grain, &c; and 3d. *methylic alcohol*, pyroxylic alcohol, or wood spirits, obtained by the distillation of wood in close vessels. The compound burning fluid claimed herein, consists of a mixture of the amylic alcohol and common rosin, in such proportion that the carbon of the rosin shall neutralize the hydrogen in the alcohol—rules for which mixture are to be found in the specification.

Manufacture of Starch from Maize.—The process as stated by the patentee, consists in soaking the grain in water, until it germinates sprouts of a certain length, and then he extracts the starch in the usual way. It is stated by the inventor, that a bushel of corn weighing fifty-six pounds, will yield by this process twenty-eight pounds of starch.

Distilling Crude Turpentine, so as to accomplish two processes in one, namely, distilling the turpentine and boiling soap. This is done by mixing the raw turpentine with the requisite quantity of alkali to saponify the rosin at the same time that the spirits are evaporated and passed into a condenser for use; the rosin is thus saponified and prepared for the business of soap making.

Purifying Gas in the Retort where it is generated.—A patent has been granted for this device which consists in the mixture of coke and lime in the retort for generating coal gas. The inventor alleges that he increases the quantity as well as the quality of the gas, and saves a considerable amount of matter usually deposited in the purifiers and other parts of the condensing apparatus.

Preparing Wheat for Grinding.—The object being to so act on the hull of the grain by a chemical agent, as to render the process of separating it more easy and more perfect. This consists in sprinkling the grain before grinding with a dilute acid, which hardens and stiffens the hull, and thus loosens it, by which process it is readily separated, and as alleged by the inventor, grain so treated is fitted to make better flour.

Class 17.—HOUSEHOLD FURNITURE.—43 Patents.

Washing Machines.—Three patents have been granted; but none of them presents any novel features worthy of particular notice.

Cutters of Meat and Vegetables.—Four patents have been granted. One for a meat cutter with blades rotating in a circular box; two for sausage stuffers, and one for cutting dried beef. The last of these machines, consists of two blades fixed horizontally upon a small table with a suitable aperture for the cut beef to drop through, and a drawer beneath to receive it. The cutting blades are arranged on the table in front of the operator, in the form of an inverted V, and the beef is pushed by the hands against these blades so as to chip off a thin slice each time.

Bedsteads and Fastenings.—Thirteen patents have been granted. One for a bedstead, four for bedstead fastenings, three for sofa-bedsteads, one for an invalid couch, two for spring mattresses, one for a folding cot bedstead, and one for a camp bed. This last is a camp bed or chest, so arranged that when the chest or bureau lets down its top and sides, so as to be opened in the widest way, it constitutes a wide bed, that is, when the front and back are let down—but when the ends are let down it forms a narrow or single bed.

Chairs and Tables.—Three patents have been granted. One for a nursery chair, one for a car seat, and one for an extension table.

The first of these claims a passing notice. The principal feature of novelty consists in the removal of the back, and fitting it in front, and drawing out at the same time a slide in the side of the chair, and taking with it one of the arms, which together constitute the end piece and bottom support of the cradle, so that a rocking chair with a high back may be converted into a cradle by the removal and adjustment of the parts herein named.

The point of novelty in the extension table is chiefly confined to the leaf, or leaves, which are constructed of thin plates of metal, having the ends of the leaves bent down, so as to constitute a flange, each individual flange being received into that of its fellow, or vice versa, so that when the leaves are closed up to make a compact table, each leaf of the extensible parts is shut in under or over its fellow, and when drawn out the leaves, edge upon edge, lie over each other like the shingles of a roof, and yet the leaves are so thin that they appear when seen extended, as a plane surface.

Refrigerators.—Only one patent has been granted on this division of household furniture, and the novelty is of minor importance.

Miscellaneous of household furniture presents nineteen subjects of patent.

For kneading dough, ...	1
Furniture castor, ...	1
Frame for drying clothes, ...	1
Clasp for holding down bedclothes, for cradles, &c., ...	1
Rule joint, ...	1
Improved window curtain, (apparatus for,)	1

Venetian curtain blind,	1
Construction of a base, or support for a stand,	1
Fly trap,	1
Machine to wash dishes,	1
Quilting frames,	3
Store counter,	1
Bureau drawers,	1
Cracker machine,	1
Machine for pounding beef steaks to make them tender,	1
Fly brush,	1
Machine for cutting and assorting broom corn,	1

Some of these machines merit a more special notice. The machine for *kneading dough* is the combination of a reciprocating breaker or chopping knife, moving vertically, with a reciprocating kneading table, which moves horizontally, and with a motion separate from the other machinery. The table is moved forward and then backward, so as to bring every part of it under the breaker, which latter does not move out of its position.

A Fly Trap has been patented of the following construction. It consists of a horizontal cylinder, rotating within a box open above. The upper part of the cylinder with its ribs, projects a little above the body of the box, and has its surface smeared with molasses. On one side of the box, and that side towards which the cylinder rotates, a space is cut away and a glass plate let in, in its stead, which glass plate fits pretty closely to the projecting ribs on the cylinder. The cylinder rotates very slowly, by means of clock work. Flies alight on the upper surface of the cylinder and feed on the saccharine matter while the cylinder rolls slowly forward, and brings the fly behind the glass plate before he is aware, and from which there is no escape. He is gradually carried to the under and dark part of the box, where he is brushed off by machinery moved for this purpose.

Machine to wash dishes.—Designed as a substitute for the ordinary hand work. It consists of an oblong, somewhat irregular shaped vessel, generally made of tinned plate metal, and containing on one side a vertical rotating cylindrical frame, to contain the dishes to be washed, and on the other, a horizontal reel formed cylinder, with buckets or dashers on the arms of it, which are designed to dip into the water in the lower part of the vessel, and to dash the same against the dishes in the vertical revolving frame, so that every part of it shall be exposed to the hot water in the machine.

Beef Steak Machine.—The design of this patent, is a machine to be used as a substitute for the old method of pounding beef steaks to make them tender. It consists of a pair of rollers armed on their surfaces with cutting teeth, so as to sever the tough fibres of the beef, and render it more easy to masticate. When the steaks are ready to be cooked, they are run through these rollers one or more times, and transferred directly to the broiling apparatus.

A machine to cut and assort broom corn, has been patented, which it would be difficult to describe, without the aid of a drawing. The design of the machine, is to cut the broom corn into lengths according to the size of the stalk, and to assort them into parcels, according to their lengths, by the machine, so that they may be properly distributed for making different sized brooms. The machine consists of a long table with an endless apron running lengthwise, and beside it, and on the same level and a little obliquely to its direction, is arranged a pair of rollers running the whole length of the long

table. These rollers lie one upon the other, and are farthest from the endless apron at the entering end. This endless apron is a belt of slat work, put in motion by machinery, and gradually moving forward from the entering or feeding end of the table, where the broom corn is fed to it by hand, and laid directly across the apron with the butts all in one direction. When the broom corn has traversed about one-third the length of the table, it is brought under compressing rollers, while at the same time that the body of the stalk is held firm in its place, the butt is brought between two rotary disks with cutting edges arranged like two rotary or circular saws, having their cutting faces edge to edge, yet slightly lapping each other. The edges of these cutting disks are very thin, and the under one serrated. As the endless apron travels from the feeding to the discharging end, it brings successively the butts of all the corn stalks between the cutters by which they are severed, and as they still move forward, those stalks which are the longest, and consequently project farthest, are caught first between the rollers, and by this means carried from the endless table, while those which are shorter, are taken by that part of the rollers that is farther along. To avoid distributing the broom corn throughout the whole length of the assorting rollers, portions of the lower roller are turned out, leaving only enough to constitute the axle, and thus preventing any of the material from being drawn through in these sections, which divides the assorted material into several series or parcels, in number equal to that of the sections cut in the lower roller.

Class 21.—WEARING APPAREL.

Eleven patents have been granted under this class, as follows:

Instruments for drafting garments,	3
Mode of varnishing buttons,	1
Machine for cutting cap fronts,	1
Mode of fastening hooks and eyes upon paper cards,	2
Construction of shoulder stay and brace for ladies,	1
For improved suspender buckles,	2
For an improved stud and button for shirt bosoms,	1

None of these patents presents any novelty of general interest, and the class will be passed over without further remark.

Class 16.—LEATHER.

Fourteen patents have been examined at my desk and issued. This class having been transferred from my desk in the early part of the year, to equalize the work at the several examiners' rooms, with a single exception, I have only to report on the cases examined by me previous to the transference.

Improved fastening of terrets to saddle trees,	1
An improved breast plate for a carriage harness,	1
A mode of simultaneously locking a trunk and fastening it to the floor,	1
Improved harness buckle,	2
Machine for manufacture of leather into hollow ware, &c.,	1
Machines for breaking hides,	2
Harness hames,	2
Machines for splitting and stretching leather,	2
Spring wings to a harness saddle,	1
Improved process of tanning leather,	1

This last patent being the *re-issue* of a patent granted in 1849, and noticed in the report of that year as a new tanning process, demands further notice from your examiner as the experience of tanners brings it into use.

It appears from accounts, direct and indirect, that have reached this office, that the inventor so far as can be learned from statements that have been presented by the tanners from different sections of the country, who have made trial of the process, that the inventor has been enabled to penetrate the philosophy of tanning, and has developed the principle, or an important application of chemistry to this art, in the use of a *free acid* in combination with the *tannic acid;* the former to open the pores in what is called *plumping*, and the latter to enter through the openings when thus made and convert the gelatinous matter of the animal covering into leather. Quick tanning has been performed before. Such process, therefore, in itself, is not new, and has no claims to consideration. But the novelty consists in the combined use of the two acids named. This constitutes, what is denominated in the technical language of the office, a "*patentable combination*," in which neither of the elements by itself, is capable of performing that which is done by the combination.

Respectfully submitted.

L. D. GALE, *Examiner of Patents.*

Hon. Thomas Ewbank, *Commissioner of Patents.*

January 1st, 1851.

Hon. Thomas Ewbank,
Commissioner of Patents.

Sir:—In conformity with your requisition, I have the honor to submit to you the following report in relation to the condition of the model department, which you were pleased to place under my charge in November last, and also the number of models received each year, for the past fourteen years; the space occupied by them, and the room necessary for their proper exhibition.

It would be very inconvenient, if not impossible, to allow a free access to visitors, to see the drawings and records in the Patent Office, but not so with the "models;" they should be accessible to all, and particularly to inventors, who should be at liberty to see them without the aid of the machinist, or his assistant.

To carry out the requirements of the office, every model of rejected applications, as well as patented inventions, should be placed under glass, distinctly labelled, and classed according to the arrangement adopted in the published reports, and according to their dates. This was contemplated, and provided for in the 20th section of the act of July 4th, 1836—[Sec. 20. "And be it further enacted, that it shall be the duty of the Commissioner to cause to be classified and arranged, in such rooms or galleries as may be provided for that purpose, in suitable cases, when necessary for their preservation, and in such manner as shall be conducive to a beneficial and favorable display thereof, the models and specimens of compositions and of fabrics, and other manufactures and works of art, patented or unpatented, which have been, or shall hereafter be, deposited in said office. And said rooms or galleries shall be kept open during suitable hours, for public inspection "] but has never been fully carried

out, in consequence of the insufficiency of room. A printed catalogue, or index, should then be prepared, the cost of which would be trifling compared with its advantage to the office, as well as to inventors.

The average space required for the exhibition of the models, may be set down as about one square foot for each. The number now in the office is as follows:

Of patents granted,	8524
" applications rejected,	7890
" " pending,	170
" " suspended,	673
Total	17257

The models of patented inventions are now crowded into 22 cases, capable of holding for exhibition but 2720, (one model should never be placed before, or on top of another,) consequently they occupy less than one-third of the space required for their proper exhibition.

The models of rejected applications are now stored in the west basement of the building; and not being arranged in cases, they cannot be opened to the inspection of the public; this is contrary to the spirit of the law, which requires that they shall be open for public inspection.

As shown above, the cases now in use for the exhibition of models, measure but 2720 feet of available surface, while 16414 feet are required, not including room for models of pending and suspended applications.

The great hall on the upper floor, containing the collections of the late exploring expedition, also the collection of the National Institute, etc., in 62 cases constructed for the Patent Office, has not been used for the reception of models. These 62 cases are capable of holding 128 models each, or 7936 in all; which, added to those in the model room now in use, would give room for 12352 models; leaving 4062 without a place, unless they should be improperly crowded, as they are at present.

The number of models received during the past year was 2140, consequently, without calculating for any increase in the present year, over the last, we will have, in December, 1851, 6372 models unprovided for; they would nearly fill the hall of the east wing, which will be capable of accommodating about the same number estimated for the main hall, viz: 7936. The increase over former years, will certainly be sufficient to fill it, as soon as it is finished to receive them.

The following list of models received since the burning of the Patent Office in 1836, exhibits an increase annually, of about 225 in the last few years: the three first years being swelled by the models of restored patents, which had been destroyed by fire.

Year 1837, models received	1069
" 1838 " "	1263
" 1839 " "	1189
" 1840 " "	740
" 1841 " "	773
" 1842 " "	868
" 1843 " "	869
" 1844 " "	963
" 1845 " "	1149
" 1846 " "	1215

Year 1847	models received	1472
" 1848	" "	1698
" 1849	" "	1909
" 1850	" "	2140
Total now in the office,		17257

If this rate of increase should continue ten years, we may calculate on the reception of 33775 models; and by adding this to those already deposited, it will be seen that in the year 1860, inclusive, we shall have 51032; a number quite sufficient to fill, under proper classification, all the halls on the upper floor, including the north front and west wing of the building, supposing it to be finished for their reception, as originally designed; besides the hall designed for the same purpose, on the second floor of the west wing.

A room is indispensable for the models of pending applications, which require to be guarded from public view; it should be at least 20 × 40 feet square. These models are now kept in the machinist's room, where boxes are unpacked, and where applicants daily present their models in person. It is difficult, if not impossible, to prevent such applicants from seeing the models of other applicants, which have to remain sometimes thus exposed for months before the completion of their papers. A private room, of at least 20 feet square, with proper shelving, should also be provided for "caveated models," which have not, as yet, had a special place provided for them; a somewhat remarkable fact, as they are considered as belonging to the "secret archives" of the office.

A workshop is much wanted, where damaged models may be repaired: many of them being of delicate structure, are liable to injury in transporting them to the office, and afterwards subject to various accidents during their examination. A model maker should be employed, under the direction of the machinist, to perform this work, as well as to supply duplicates when required.

Here it may be well to remark, that models must be regarded as a part of the original records of a patent, and on no occasion should they be allowed to be removed from the office. Cases have occurred, when it was suggested that they were altered after they had been taken out of the office to be used in court as evidence, in cases of appeal; certified copies, in such cases, would answer the purpose better.

Workmen not belonging to the office, are engaged when duplicate models are wanted, who, from necessity, are admitted to the machinist's room, to take dimensions, while models of new applications are constantly being exposed to their view. This would be entirely prevented by having a suitable workshop, and a model maker under the control of the office, and in the same building. Two rooms of 20 feet square each, (one for working metals, and the other for woodwork,) now occupied by clerks in the basement, should be restored for this purpose. They could be better accommodated on the second floor of the east wing.

Other matter might be offered for your consideration, but for the present, the more important, above stated, it is believed, will be sufficient.

Respectfully submitted by

Your ob't servant,

SAM'L P. BELL,

Machinist.

IV.

HISTORICAL NOTICES OF INVENTORS AND PATENTEES.

JAMES RUMSEY.

THE preface to Mr. Fitch's "*Original Steamboat*," (see last year's Report,) is dated in May, 1788. The pamphlet purports to be a reply to one by James Rumsey, of which a second edition had just appeared, entitled, "A short Treatise on the application of Steam; whereby, is clearly shown from actual experiments, that steam may be applied to propel boats or vessels of any burthen against rapid currents with great velocity. The same principles are also introduced with effect, by a machine of a simple and cheap construction, for the purpose of raising water sufficient for the working of grist mills, saw mills, &c., and for watering meadows, and other purposes of agriculture. By James Rumsey, of Berkely County, Virginia. Philadelphia: Printed by Joseph James, Chestnut-st., 1788." [From a copy in the library of Colonel Force.]

This treatise on steam, constitutes House Doc., No. 189, 27th Congress, 2nd Session, and therefore, need not be re-printed here. Soon after the second edition appeared in 1788, Mr. Rumsey sailed for Europe, and his friend Mr. Joseph Barnes, "a very ingenious mechanic, employed by James Rumsey, in constructing his several machines," undertook to defend him from the charges contained in Fitch's "*reply.*" Mr. Barnes' pamphlet, now rare, is annexed.

REMARKS

ON

MR. JOHN FITCH'S REPLY

TO

MR. JAMES RUMSEY'S PAMPHLET,

BY

JOSEPH BARNES:

FORMERLY ASSISTANT, AND NOW ATTORNEY IN FACT,

TO

JAMES RUMSEY.

PHILADELPHIA:
PRINTED BY JOSEPH JAMES,
Chesnut Street.
MDCCLXXXVIII.

REMARKS, &c.

MR. RUMSEY, before his late departure for England, by an advertisement, begged the candid public to suspend their opinion, respecting the controversy between him and Mr. Fitch, until time should be afforded to state his claim, and answer such objections as should occur, from a pamphlet which Mr. Fitch then had in the press, but had not appeared before he left this city.

Since that time Mr. Fitch has been busily employed in traducing Mr. Rumsey's character, and endeavoring to establish, in the public mind, an opinion, that Mr. Fitch was the first person who actually attempted to apply the force of steam to the purposes of navigation. If this assumption was admitted, which, however, will be fully disproved, nothing would thence follow prejudicial to Mr. Rumsey's claims; for it will appear from a cloud of testimony, that although both of them entertained the idea of applying the force of steam to the purposes of navigation, their modes of effecting it were as different from each other as possible. Mr. Fitch proposed to apply the action of steam by a number of cranks to oars or paddles; Mr. Rumsey thought of the force of reaction on the fore part of the boat, by a column of water forced through a trunk in the body of it. That Mr. Fitch originally entertained no other idea, than applying the force of steam to the working of paddles, will abundantly appear from his repeated models and experiments; from the plan published in the magazine, taken from a draught sent to the proprietors of that publication by Mr. Voight; and from his public declarations, that Mr. Rumsey's scheme could not be made effectual. That Mr. Rumsey had a different mode of applying the force of steam to navigation, is sufficiently apparent, not only from his publications on the subject, but from his apparatus now in this city, which was fitted between two and three years ago, and was last year actually applied to the purpose on the river Potowmac, and produced the desired effect, by propelling a boat, with a burthen of three tons on board, at the rate of four miles an hour, against the stream of that river.

In order to destroy Mr. Rumsey's character and views, which Mr. Fitch has thought dangerous to his interests, (although fortified by an extraordinary act of assembly,) he has published a pamphlet, containing a variety of depositions and certificates, tending to shew that Mr. Rumsey has anticipated a whole year, and by an attempt at witticism, has acknowledged his powers of condensation in this respect. That Mr. Rumsey's narration of facts is true, will be proved (if further proof was necessary,) by the several certificates and depositions hereto annexed, to which the reader is referred: but this is not the immediate object of the present publication. Mr. Rumsey had in the year 1785, prepared a steam engine upon the plan used and improved in Europe, to propel his boat, but was prevented by the frost from exhibiting it that fall; being thus prevented, he employed himself during the ensuing winter, in projecting more easy methods of producing the like effects: and by experiment, he discovered a mode of generating steam, so effectual, as to promise very great advantages to the inventor. To bring this invention to act on his former machinery, required some time, which was employed in perfecting it; several experiments were accordingly made, and in the end Mr. Rumsey's principles were proved to be good. During this time, Mr. Arthur Donaldson, a very ingenious mechanic, (whether from the strength of his own genius, or from hearing something of Mr. Rumsey's scheme, is not material in this dispute with Mr. Fitch, to ascertain) took up the idea, and made several experiments, which fully proved that the re-action of a column of water, forced with rapidity from the stern of a boat, would propel her forward so as to answer the end required for navigation. Mr. Donaldson communicated his ideas and experiments to many gentlemen in Philadelphia, who were satisfied of his principles, but they doubted whether the size of a boiler, and the quantity of fewel necessary to keep it heated, would not occupy so large a part of a boat, as to render her freight of no value; to reduce this to a certainty, gentlemen acquainted with steam engines in Europe, were consulted, and their opinions confirmed the doubts entertained, so that Mr. Donaldson gave up the idea of prosecuting his scheme.

While Mr. Donaldson was employed in experiments, Mr. Fitch had applied to the assembly of Pennsylvania, for the exclusive privilege of navigating by the force of steam, and was opposed before a committee of the house by Mr. Donaldson, when Mr. Fitch claimed all possible modes whether *invented or to be invented by himself, or others*, of using steam for that purpose; and as Mr. Donaldson, before a report was made by the committee to the house, was convinced by his friends that no boiler *then known* would generate steam in a sufficient quantity, and at a cheap rate, to answer the end, he declined his opposition, and a grant was made to Mr. Fitch, of the exclusive use of steam for navigation, in very large and comprehensive words. Since this grant, Mr. Fitch, and a large company, who associated with him, have made many experiments to reduce their boat to practice; all of which were to apply the force of steam (generated in a large boiler, agreeably to the old practice, long used in Europe,) to the working a number of paddles, on the sides of the boat, the abortive events of which have been too public to need repetition.

But about the month of January last, Mr. William Askew, of Berkeley county, who had been long acquainted with Mr. Rumsey, and had seen his apparatus, came to this city, and stimulated by curiosity, went to see, Mr. Fitch's preparations, and there fell into conversation with Mr. Voight, Mr. Fitch's partner, and operator, and communicated to him such an idea of Mr. Rumsey's new invented boiler, as enabled him to form a plan of one upon the same principles. In the month of April last, Mr. Rumsey came to this city, and exhibited with little or no caution, a draft of his boiler, to a number of persons, and after some time laid it before the Philosophical Society, and was not a little surprised to find that Mr. Voight produced a draft of a boiler, upon the same principles, though a little differing in its form, before the society, the same evening. The several contrivances by which his cotemporaneous production of Mr. Rumsey's original invention, and a surreptitious copy from it was effected, are well known, and will be proved upon a proper occasion; it is sufficient for the present, to inform the public, that Mr. Rumsey's original boiler is now in this city, and may hereafter be exhibited to them; *that* a new one with great improvements, is making, with all possible dispatch; *that* its efficacy in producing steam with vastly less expense, and yet in greater quantities than any mode yet practised in Europe, will be proved; *that* Mr. Rumsey is *gone* to England, to prevent a surreptitious copy of his first invention (which there is reason to believe was sent thither with great secrecy) from being *there* palmed on the public as an original, *and to* claim to himself the rights of an inventor.

About three weeks ago I came to this city, and brought with me most of the following depositions and certificates, the publication of which will, I have no doubt, establish all the facts asserted by Mr. Rumsey in his pamphlet. The circumstance of my superintending the different mechanics who worked for Mr. Rumsey, gave me the advantage of being competent to the explanation of the subject, and I can assure the public that Mr. Fitch has not got a single affidavit or certificate from Frederick Town or Baltimore, that has any relation thereto, except Mr. Christopher Raborg's, the copper-smith, No. 21, in his pamphlet.

The certificates and affidavits Mr. Fitch obtained in Frederick Town, Nos. 14, 15, 16, 17, 18, 19 and 20, allude to an eight foot tube, which Mr. Rumsey had made in the year 1786, for a second machine, an improvement on the one prepared in the fall, and do not at all relate to the first machine fitted on the boat in the fall; which was actually ready for experiment, and prevented by the ice in December, 1785. And from those certificates and affidavits, Mr. Fitch endeavors to prove, that as this work was done for Mr. Rumsey in the year 1786, therefore it follows, that no other work could have been done for *him*, by any mechanic whatever, before that period; according to this kind of logic, it could be proved, that Mr. Fitch never can possibly invent a steamboat to answer any useful purpose; for instance, because after sundry fruitless experiments with his *crank boat* machinery, he has not yet been able to accomplish this business; therefore it follows, from the nature of things, that he never can invent a steamboat, *probatum est.*

I have introduced in the following pages, certificates and depositions, which I trust will be satisfactory to the public. No. 1, 3, 5 and 7, prove the priority of Mr. Rumsey to the pipe boiler.

The silver-smith, or watch maker, mentioned in Mr. Askew's deposition, No. 3, is Mr. Henry Voight, a partner in Mr. Fitch's *intended* steamboat, whose name Mr. Askew (being a stranger) did not recollect at the time his deposition was taken, but whose residence and occupation are therein sufficiently described; from which it appears *what* were Mr. Voight's sentiments of Mr. Rumsey's boiler for generating steam, at *that time;* his doubts concerning its efficacy, might either arise from the novelty of the idea, a want of a thorough knowledge of its principles, or from a desire to draw from Mr. Askew a more full explanation thereof; otherwise he would not have waited from that time until several weeks after Mr. Rumsey came to this city, and had more fully explained the principles of his boiler to many characters here, previous to his sending a plan thereof to the Philosophical Society, and (as it is said) to Europe, and that nearly in the same form, and exactly on the principles of the boiler made by Mr. Rumsey some years ago, and this before he had himself made such a boiler, with the necessary apparatus, or tried any experiment of its efficacy.

Certificate No. 2, and the depositions 4 and 6, are pointed to the proof of the time when the cocks were actually made. No. 8, is an additional proof of the time, that the steamboat with her machinery, was brought down to the Shanandoah Falls, in the month of December, 1785. No. 9, 15 and 16, prove that Mr. Rumsey's ideas and experiments of a steamboat, were prior to any theretofore, suggested by Mr. Fitch. No. 10, is Mrs. Zimmer's deposition, upon whose certificate of the particular workman, who turned some of the works, Mr. Fitch lays so much stress, which is explicit as to the time when the first machinery was made, agreeably to Mr. Rumsey's assertions.

No. 11 is Mr. Raborg's deposition, who has been more clear and explicit on this subject, than even Mr. Fitch would have wished; as in Mr. Fitch's pamphlet, No. 21, Mr. Raborg has given his belief of the time, which in this deposition is fully confirmed by circumstances since discovered by him.

No. 12 and 17, are also important, the first being Mr. Weir's deposition, proves that he was mistaken in the time he mentions (as to the making of the four brass cocks) in the certificate given to Mr. Fitch, and published in his pamphlet No. 22.

I consider myself happy, that Mr. Fitch, by a serious acknowledgment, has acceded to the merit of Mr. Weir, whose character as a man of honor and integrity, I am fully convinced of, and beg leave to mention, that the certificate he gave Mr. Fitch, No. 22, introduced in page 28, of Mr. Fitch's pamphlet, was from the best recollection he then had on the subject, and that this was from memory only; but upon his discovering a receipt, he candidly and ingeniously first informed Mr. Fitch of the mistake, and afterwards, gave an explicit deposition, which we pre-

sume will satisfy the public. The certificate No. 17, will explain how unhappy Mr. Fitch has been, in his mode of attempting to invalidate Mr. Rumsey's statement of facts, as it retorts the charge of encouraging *perjury, upon Mr. Fitch with the additional turpitude of soliciting the commission of so heinous a crime by the offer of a bribe.* How far this conduct will comport with the introductory declaration of Mr. Fitch, in his pamphlet, where he says: "*It is the duty of every man not only to avoid the commission of a crime; but so to conduct himself through life, as to bear the strictest scrutiny,*" I shall not at present comment on.

Certificates No. 18 and 19 corroborate the above fact, and introduce a further proof of Mr. Fitch's conduct in procuring certificates, by an actual commission of bribery being proved against him.

No. 13 proves the fact, which Mr. Weir's deposition No. 12, is adduced to authenticate, which is likewise stronger than from memory, from which alone, he gave Mr. Fitch the certificate No. 23, in his pamphlet.

Having now made a short reference to the depositions and certificates annexed, it may be proper to reply to Mr. Fitch's remarks on Governor Johnson's friendship towards him, when he disingenuously calls in question the Governor's *memory of candor*, though he seems *modestly* to acquit the latter. Whether Mr. Fitch's *gratitude* appears to advantage in this illiberal attack on so respectable a character, after such an instance of patronage and friendship, is easily decided. I shall take the liberty of stating, that, although previous to Mr. Fitch's application to Governor Johnson, Mr. Rumsey had in confidence, mentioned to him his idea of applying steam to the purposes of navigation, and bespoke some of the boat machinery at his iron works; yet Governor Johnson, not expecting, that either Mr. Rumsey or Mr. Fitch, had an exclusive right in the power of steam, as applied to navigation, or any other purpose; and taking it for granted, that their modes of application might be different, held himself at liberty to patronize both Mr. Rumsey and Mr. Fitch, not knowing which might produce the most approved plan, and succeed in so desirable an object. This line of conduct is consistent with the practice of the most enlightened characters in the philosophical world.

In pages 14 and 15 of Mr. Fitch's pamphlet, he says, "I have been greatly indebted to the assistance of my ingenious friend, Mr. Henry Voight, of this city; who has uniformly from my first undertaking to build a boat, afforded me valuable hints; and has united with me in perfecting my plans; to his inventive genius alone, I am indebted for the improvement in our mode of creating steam, a thought which struck him above two years ago; the drawing having been shewn to several persons, for we *never made a secret* of any part of our works; but a fear of departing from old established plans, made me fearful of adopting it, until I had found by his invention of *creating steam*, that a *condenser* might be constructed on the same principles, (viz: a spiral pipe or worm,) only by reversing the agent, for the best way of applying fire to evaporate *water into steam*, must also be the best way of applying *cold water* to condense steam, that is the bringing the greatest quantity of fire into action upon the greatest surface of water, or the contrary. And we had an additional inducement to study this subject, because the common way of fixing boilers required so great a load of brick work, that it overloaded our boat; therefore, the first thought that must occur to every man attempting to raise steam on board a boat, must be to acquire that method which would require the least weight." A few remarks on this extraordinary paragraph are subjoined; first, as it appears from his own words, "*we never made a secret of any part of our works.*" If such a boiler had actually been invented, the public would have heard of it long before Mr. Rumsey's arrival in Philadelphia, last April; and *a fear of departing from old established plans*, it is presumed would not have prevented his making use of it in some of his experiments, had he understood the principles, *because the common way of fixing boilers required so great a load of brick work, that it overloaded our boat*, more especially, *as the first thought which must occur to every man attempting to raise steam on board a boat, must be to acquire that method which would require the last weight.* How unhappy is it for Mr. Fitch, not to have attended to the first thought, which must have occurred to every man on the subject, until he actually was acquainted with the experiments made by Mr. Rumsey; however, we confess this is not much to be wondered at, when he says, he found that from what he calls Mr. Voight's invention of creating steam, a condenser might be constructed on the same principles, viz: *a spiral pipe or worm*, only by reversing the agent, which is a true definition of every worm of a common still, and which Mr. Fitch claims as an original invention, though we presume his claim of this invention, will scarcely be acceded to, by those who have even seen a distillery, and only shews how far he can carry his bold attempts to deprive others of their rights. This same wonderful *spiral pipe or worm*, Mr. Fitch has made use of to prove, that the thought of creating steam by reversing the agent, must be known to every man who did but consider the subject, and had seen a pipe used in condensation; if so, the common worm of a still must have suggested the idea to every man, who considered the subject from the earliest period. That this is not a truth, facts unquestionably declare.

It may not be improper to remark here, that when Mr. Rumsey applied to the different legislatures, it was in order to obtain an exclusive right to his boat exhibited at Bath, in 1784, although previous to that time, he had actually conceived the idea of applying steam to the purposes of navigation, but not having fully perfected the most advantageous mode of application, he did not think himself authorized to introduce to the committees of the assemblies an *immatured* subject, which it appears Mr. Fitch's *modesty* permitted him to do, for from his own pamphlet, it is evident he has not yet brought his plans to any maturity. This will reconcile what was said in General Washington's letter to Governor Johnson, of Mr. Rumsey's idea of steam, being in his opinion at that time an *immatured idea.* As to Mr. Rumsey's assertion in his letter to the General, 10th March, 1785, as mentioned in Mr. Fitch's pamphlet, page 13, "*that he was not less sanguine* in his boat projects, than when the General saw him at Richmond, and that he had made such further discoveries as would render them more extensively useful than was at first expected;" this can only apply to the machinery of the steamboat, as the use of the pole boat could not be extended so far as Mr. Rumsey in that letter has suggested his improvements would reach. See No. 19, in Mr. Rumsey's pamphlet in which are these words:

After mentioning that kind of machine for propelling boats which the General had seen a model of, I proceed to say—"I have taken the greatest pains to perfect another kind of boat, *upon the principles I mentioned to you at Richmond*, in November last, and have the pleasure to inform you that I have brought it to great perfection; it is true, it will cost something more than the other way, but, when in use, will be more manageable, and can be worked with as few hands; the power is immense—and I have quite convinced myself that boats of passage may be made to go against the current of the *Mississippi* or *Ohio rivers*, or in the *Gulf Stream* (from the *Leeward* to the *Windward Islands*) from sixty to one hundred miles per day. I know this will appear strange and improbable to many persons, yet I am very certain it may be performed, besides, it is simple (when understood) and is also strictly philosophical."

What can we think of Mr. Fitch's *candor* after this ungenerous violation of it, by alleging that these further discoveries could only allude to the pole boat, notwithstanding this letter is published unmutilated in Mr. Fitch's pamphlet, and Mr. Fitch must be sensible that Mr. Rumsey therein mentions another kind of boat; and that poles could not be used in the *Gulf Stream*, and from the *Leeward* to the *Windward Islands*.

Mr. Fitch goes on to say, that the *further discoveries* mentioned in General Washington's letter to Mr. Rumsey, will not apply to steam, because steam could be no *new* discovery; from this mode of reasoning, it will appear, that not only Mr. Fitch himself has made no *new* discoveries, nor even had a *new* idea on the subject of steam, (which will be readily granted by any candid man who is acquainted with him) but that no such *new* idea or discovery has ever been *suggested* to him by his friends, because as they related to steam, and that being no *new* idea or discovery, from Mr. Fitch's own relation of the subject, therefore as he has applied the conclusion to Mr. Rumsey, it is fair to hand it over to himself. Mr. Fitch, it seems, could not comprehend that the discoveries mentioned in the General's letter, could allude to the mode of applying steam to the purposes of navigation. This however is of a piece with the rest of the false reasoning which spreads very generally through Mr. Fitch's pamphlet, in order if possible, to evade the stubborn facts Mr. Rumsey has adduced. Mr. Fitch, when he finds himself hard pressed in the right of priority, says such a claim is entirely useless, as others "projected it before him, and if bare projections were sufficient to build a claim on, I have no doubt but there are people now in their graves, whose heirs may set up more early claims than either of us." On the contrary, when it is proved that Mr. Rumsey has succeeded earliest in this business, he then says it is shifting the ground, which sentiment will not be strenuously opposed, as it appears clearly to be the true ground on which the dispute will in all probability, eventually be determined; or lastly, he intrenches himself behind what he *with great propriety* calls "my laws," which were obtained, not because he was the first man who thought of steam in its application to natural purposes, nor because he first accomplished so desirable an object, but as being the first person who applied to different legislatures, in order to obtain an exclusive right to his own *immatured ideas*, or an exclusive right to exercise the faculties of the human mind, as far as they relate to *steamboats*, insomuch that Mr. Fitch has repeatedly in conversation alleged, that if any person in Pennsylvania should invent a steamboat, upon different principles, and far superior, either to his own or Mr. Rumsey's, the inventor dare not produce it to the public without being liable to the full penalties of *his* law; and it is alleged that should even a vessel owned and navigated by the citizens of any of the United States, or by the citizens of any foreign state, arrive at Philadelphia, propelled by the force of steam, however applied, such vessel would be liable to the penalties of *his* law. If this be really the case, the candid public will determine how far the principles of *this* law can be reconciled to the liberties of a free people, or to that encouragement which all enlightened states afford to every useful discovery in the arts and sciences.

In page 23 of Mr. Fitch's pamphlet, after some remarks on the principles on which exclusive privileges are founded in justice and policy, he proceeds in an uncandid manner to state the modes established in England, by which an inventor may claim the full benefit of what he had already invented; and endeavors to give so specious a turn to the period, as though a patent obtained in England, would give a person the exclusive privilege to things *invented*, or *to be invented*.

Should any one in England make application for an exclusive right in a steamboat, he must of necessity, first file or record a plan or model of the machinery by which she was to be propelled, in which alone he could have an exclusive right; and should he afterwards make further improvements therein, it would be necessary for him to apply for a patent for those second improvements, as has been the case in other instances; and should a person applying allege (agreeable to Mr. Fitch's ideas) that although he might not be the first person who thought of steamboats, neither had yet perfected any thing effectual, but that he was uncertain whether he should not try twenty different modes of obtaining some one useful model, and that he would therefore wish an exclusive right in any or all of them *when invented*; and that as a reward for his being the *first* person who had applied thus to register his thoughts on the subject, he considered that he ought in justice to be legally invested with the right of invention, to the exclusion of all others; the officer to whom such an application should be made (if persisted in) would require no other mark of the applicant's insanity. As a proof that Mr. Fitch's ideas on the subject were not so *matured* as to authorize him, in justice, to apply to the legislatures, it is sufficient only to add, that he repeatedly shifted the machinery of his steamboat, since he exhibited the model before the Phi-

losophical Society, in the year 1785, and that he at length made an experiment in the river Delaware, with a boat moved by paddles and cranks, which, notwithstanding his various accounts of her wonderful performance, he has since deserted, as totally incompetent to any useful purpose, and it is said he is now about making an experiment with another boat, wherein it has been suggested that he designs using a boiler nearly in the form, and exactly on the principles of the one invented by Mr. Rumsey, but still paddles and cranks are introduced. Should this plan not succeed, Mr. Fitch says in his pamphlet, page 22, "I am now trying an experiment, and the machine is nearly finished, to propel a boat, not by expelling *water*, but *air*, and I hope Mr. Rumsey will allow that this is a mode peculiar to myself." From this, one would suppose, that Mr. Fitch is not content with the exclusive privilege already obtained by a law, constituting him *prince* of the power of water or steam, but is desirous of being also created *prince of the power of the air*; and when this title is extinct in the present possessor, Mr. Fitch may step forward, it is presumed, upon clear and indisputable grounds, and his right of succession will not be disputed by Mr. Rumsey; but in the meantime, should this air boat fail, he may at length resort to Mr. Rumsey's plan of a trunk, &c., (in which he will meet with more difficulties than he may expect, although well described by Mr. Rumsey in his pamphlet) for which he appears to be paving the way, by introducing Mr. Clymer's certificate, No. 13, which he will say was originally Dr. Franklin's plan. Mr. Rumsey, to whom Mr. Fitch had read the whole or part of his pamphlet previous to its publication, conceived that it implied an accusation that he had taken his ideas from the Dr.'s communication of such a plan to the Philosophical Society, to which it is supposed Mr. Fitch must allude in page 22 of his pamphlet, where he also says the thought came originally from France, but by whom brought, or how communicated, he does not tell us; Mr. Rumsey, therefore, before his departure for Europe, (as I am informed) waited on Dr. Franklin, and mentioned that his plan of a *steamboat* was, as to *him*, an *original* invention, and assured him that before he came to this city, he had neither seen nor heard of his communication to the Philosophical Society; when the Dr., with his usual candor and politeness, presented him with one of his pamphlets written on this subject.

Mr. Fitch's assertion relative to the mode of drawing water in at the bottom, and *pushing* it out at the stern, and his contending the right of using it with Arthur Donaldson, before the assembly of Pennsylvania, in the beginning of 1786, is altogether false, as Mr. Donaldson was desirous that Mr. Fitch should only have an exclusive right to his own particular inventions, and not avail himself of the privilege of using any discovery or improvement *invented*, or *to be invented* by others; Mr. Fitch contended for the exclusive right of applying the agency of steam to the purposes of navigation, in every possible mode, and alleged that he did not know but he might try twenty methods of effecting this object. This vague manner of application, if it means any thing, certainly amounts to a desire to engross, not only the right of inventing, to the exclusion of all others, but to a claim of property in their inventions. Notwithstanding, at the time Mr. Donaldson and Mr. Fitch were before the committee of assembly, the latter appeared acquainted with the principles of a steamboat, as laid down by Mr. Donaldson, as Mr. Clymer expresses himself in No. 13, page 22, of Mr. Fitch's pamphlet; this only proves what otherwise might have been doubted, that Mr. Fitch is capable of understanding the principles of a thing, when communicated to him, which communication can be proved to have been made to him previous to this period—though this was long after Mr. Rumsey had bespoke some of his works for his steamboat, as will appear from the various certificates on this subject.

It may be necessary now to add that the heavy charges of perjury, falsehood, want of memory or candor, which are so illiberally brought by Mr. Fitch, against the fairest characters, were made by a *man*, who not only *attempted* to bribe a gentleman of character to swear to a falsehood, but who *actually committed* this heinous offence, in order either to avail himself of Mr. Rumsey's invention, or to prevent him from deriving the emoluments due to his ingenuity. How Mr. Fitch can, *after* this instance of flagitious conduct, expect the patronage of any *honest* man, I am at a loss to determine.

The depositions and certificates which follow, will, it is hoped, be sufficient to establish the principal facts stated by and in behalf of Mr. Rumsey, until a competent jurisdiction shall require a more full and pointed state of the case. Whether Mr. Rumsey's or Mr. Fitch's *patrons have committed themselves too unreservedly to strangers*, time alone will determine; but as Mr. Rumsey has been happy enough to cultivate and possess the friendship and esteem of some of the most eminent characters in the United States, so he has expressed the highest sense of gratitude for the honorable patronage afforded him, though a *stranger*, by a number of respectable characters in Philadelphia; and I am well assured, he will so conduct himself in the new and untried scenes of life, into which he is now about to enter, as not to cause a blush in the countenance of one of his friends, either in Europe or America; and he will expect the patronage of those friends, no longer than he shall himself support the character, not only of an *ingenious*, but of an Honest Man.

July 7th, 1788. JOSEPH BARNES.

PROOFS, &c.

Virginia, *Berkeley County*, ss.

[L. S.] I, Moses Hunter, Clerk of the said county, do certify, that the following certificates, to wit, No. 1, signed by John Ritchie, No. 2, signed by John Mark and Abraham Shepherd, and the following depositions, William Askew, No. 3, taken by John Kearsley

Charles Morrow, No. 4, taken by Cato Moore; Michael Entler, No. 5, taken by John Kearsley; Conrad Byers, No. 6, taken by Cato Moore; Jonathan Osborn, No. 7, taken by John Kearsley; Francis Hamilton, No. 8, taken by John Kearsley. I do certify, that the above named John Kearsley and Cato Moore, gentlemen, were at that time, and still are justices of the peace for the said county, and that all due faith and credit is, and ought to be given to all probates by them signed, as well in justice courts, as thereout.

In testimony whereof, I have hereunto set my hand, and affixed the seal of the said county, this 19th day of May, 1788.

MOSES HUNTER.

(No. 1.)

ANTEATUM IRON WORKS, Maryland, May 15th, 1787.

At the request of Capt. Charles Morrow, I have examined the books of Richard Henderson & Co., respecting the time when Capt. James Rumsey had some iron bars drawn here, in the shape, and about the size of gun-scalps. I find accordingly, that he had,

1786, January 26th,	2 scalps,	weigh	27½lb.
" February 1st,	do.	do.	84
" " 4th,	6 do.	do.	67

At the time Mr. Rumsey applied for the above, I understood he wanted it for some of the purposes of his machinery. Given under my hand, the date above.

JOHN RITCHIE.

BERKELEY COUNTY, May 17th, 1788.

We do certify that Mr. John Ritchie, manager of the Anteatum iron works, in a letter to us directed, set forth the very same facts, which are stated above on this paper, in his handwriting, and mentioned to us in his letter, that if necessity required, he would come into this county to acknowledge the same. Given under our hands, date above.

JOHN KEARSLEY.
CATO MOORE.

(No. 2.)

We, the subscribers, were at Capt. Charles Morrow's house at the time he received a letter from Mr. James Rumsey, dated at Philadelphia, 8th day of May, 1788, wherein he informed the said Morrow, that Mr. Fitch had obtained an affidavit from the founder that cast some large cocks for said Rumsey, setting forth that they were cast in March, 1786; said Morrow then produced his books, and turning to Mr. Rumsey's account, in which said Rumsey was charged with nine pounds, sixteen shillings, paid Mr. Raborg for cocks, the 29th of October, 1785

JOHN MARK.
ABRAHAM SHEPHERD.

I certify that the above signers are men of good fame; that they are personally known to me, and acknowledged their signatures before me, this 17th day of May, 1788.

CATO MOORE.

(No. 3.)

Berkeley County, ss.

This day, William Askew, of the county aforesaid, came before me, John Kearsley, one of the justices of the peace for said county, and made oath on the Holy Evangelists of Almighty God, that he was in the city of Philadelphia, in the month of September, 1787, when he had an opportunity of seeing the steamboat, (said to be constructed by Mr. Fitch,) which boat was shewn to this deponent by a gentleman, a silver smith, a German; who said, he was in connection with Mr. Fitch, in the undertaking of the boat aforesaid, and was so obliging as to invite this deponent to see the performance of said boat; the external incumbrance of the boat, the weight of the boiler, and the necessary quantity of wood, this deponent conceived, would render Mr. Fitch's boat of little utility, as he has endeavored to set forth in his depositiou, No. 6, in Mr. Rumsey's pamphlet. The gentleman alluded to as aforesaid, Mr. Fitch's partner, the silver smith or watch maker, in Second street, on the opposite side of the way from Messrs. Wager & Hawbacher, wine merchants, whom this deponent had a considerable discourse with, on the subject of Mr. Rumsey's steamboat; the said silver smith or watch maker, seemed to be of opinion, that Mr. Rumsey had borrowed his knowledge of the steamboat from said Mr. Fitch: this deponent then informed said silver smith or watch maker, partner to Mr. Fitch, that he personally knew Mr. Rumsey, had been about three years before that time at work at said steamboat, and that he had been endeavoring to perfect said boat since that period, under a variety of difficulties, for the want of mechanics, resources, &c. This deponent further saith, that he was again in the city of Philadelphia, in January and February last past, and that he then told the said silver smith or watch maker, that the boiler in said Fitch's boat was of such weight, and would require so much wood to boil the same, that of course, it would be of little or no use. This deponent drew the model of Mr. Rumsey's pipe boiler, and explained the manner of its working, and advised them to adopt a similar mode of making steam, and lay aside the mode of making steam in their way, which form said silver smith or watch maker seemed to be an entire stranger to. After a day or two spent, and after talking on the subject of steam, the silver smith aforesaid, endeavored to convince this deponent, that a pipe boiler could never be of any use,

and argued the impossibility of its answering the least good purpose; this deponent as strictly urged the practicability of the advantages of the pipe boiler, and said their boat in his opinion would be more perfect, if they would adopt Mr. Rumsey's new invented mode of making steam which mode the said silver smith or watch maker reprobated, and said it would not answer the purpose, and shewed this deponent several modes of making steam, as practised in Europe, and said they were preferable to the pipe boiler. And further, this deponent saith not.

This 15th day of May, 1788, William Askew, the above deponent, came before me, and made oath according to law, that the above deposition, is just and true, according to the best of his knowledge and belief.

JOHN KEARSLEY.

(No. 4.)

Berkeley County, ss.

This day, came Charles Morrow, before me, Cato Moore, one of the justices of the peace, for said county, and made oath, that to the best of his memory, Mr. Joseph Barnes, returned from Baltimore, early in the month of October, 1785, where he had been sent by Mr. Rumsey, to get some parts of the machinery cast for his steamboat, that the said Barnes on his return, told this deponent, that he had got four large cocks cast, that he had been disappointed in procuring money that he expected to receive in Baltimore, had therefore, left the cocks with Mr. Raborg, (the gentleman who had got the founder to cast them,) that they should be sent for the first opportunity, that he imagined they would cost somewhere about ten pounds: and this deponent further saith, that shortly after Mr. John Thornbury was going to Baltimore with his wagon, that this deponent wrote to Mr. Raborg, (Mr. Barnes being absent) either in his own or in Mr. Barnes name (he is not certain which) for the cocks, and sent the money by said Thornbury; and this deponent further saith, that upon examining his books, he finds Mr Rumsey charged the 29th October, 1785, with £9 16s. 0d. paid Mr. Raborg for cocks, which entry this deponent is persuaded, must have been after the said Thornbury returned with the cocks, as the sum they cost, could not have been ascertained until then; and further this deponent saith not.

Sworn to before me, this 16th of May, 1788.

CATO MOORE.

These are to certify, that the within named Capt. Charles Morrow, has lived in Shepherd's Town many years, great part of his time has been spent as a merchant, and has served in offices pertaining to the public. We believe, in every one of his employments, (and as a citizen,) he has distinguished himself as a gentleman of strict honor and veracity. Given under our hands, this 17th day of May, 1788.

THOMAS WHITE,	JOHN MARK,	CATO MOORE,
JOHN KEARSLEY,	SMITH SLAUGHTER,	HENRY BEDINGER,
DANIEL BEDINGER,	FRANCIS HAMILTON,	JOHN KEYES,
ABRAHAM SHEPHERD,	WILLIAM SPALDING,	CORNELIUS WYNKOOP,
WILLIAM MORGAN,	ADAM STEPHEN,	HORATIO GATES,
MOSES HUNTER.		

I certify, that the above signers are personally known to me, are men of good fame, and acknowledged their signatures before me, this 17th of May, 1788.

CATO MOORE.

(No. 5.)

Berkeley County, ss.

This day, came Michael Entler, before me, John Kearsley, one of the justices of the peace for said county, and made oath, that as well as he remembers, about the beginning of February, 1786, he and Jonathan Osborn, began to weld some pipes for Mr. James Rumsey; the pipes were about the size of gun barrels, and he well remembers, that at the time the last six scalps were brought to him from the forge, that he and said Osborn, were at work at the first brought scalps; that, after they were welded, he and said Osborn cut the male screw on one end, and a female screw on the other end of each barrel, in order that they might be all screwed together; that after they were so far finished, they lay in my shop six months, or perhaps longer; after which, Mr. Joseph Barnes came to me, and told me he wanted them put together; said Barnes then prepared a block, and assisted me to screw them together and bend them, they were bended nearly in the shape of a worm of a still, with this difference, that the rounds were placed so close, as nearly to touch each other; and this deponent further saith, that he understood that the above pipes were for the use of the steamboat, and further this deponent saith not.

Sworn before me, May 16th, 1788.

JOHN KEARSLEY.

We, the subscribers, have been long acquainted with the above named Michael Entler, and have found him a worthy, honest, sober man, and a man of truth.

THOMAS WHITE,	JOHN MARK,	HENRY BEDINGER,
CORNELIUS WYNKOOP,	WILLIAM SPALDING,	WILLIAM MORGAN,
ABRAHAM SHEPHERD,	THOMAS SHEPHERD,	JOHN KEYES,
JOHN MORROW,	CATO MOORE.	

I certify, that these signers acknowledged their signatures before me, this 17th of May, 1788.

CATO MOORE.

(No. 6.)

Berkeley County, ss.

This day came Conrad Byers, before me, Cato Moore, one of the justices of the peace for this county, and made oath, that about the latter end of October, or beginning of November, one thousand seven hundred and eighty-five, Mr. James Rumsey or Joseph Barnes, brought to my shop two large brass or copper cocks, and requested that handles might be made for them, which the said Byers, being assisted by Philip Strider, did make; they also made two springs, which the deponent understood was for the opening and shutting the same; and this deponent further saith, that toward the latter end of November aforesaid, he made (being assisted by said Philip Strider) two pistons of about thirteen inches diameter, to which he brazed flanches, about one and a half inch broad; and this deponent further saith, that he made sundry other things, which he understood were all of them parts of the machinery for Mr. Rumsey's steamboat.

Sworn before me this 16th of May, 1788. CATO MOORE.

We, the subscribers, have been long acquainted with the above mentioned Conrad Byers, and certify that he has supported the character of a worthy, honest man, and a man of truth.

THOMAS WHITE,	JOHN MARK,	HENRY BEDINGER,
CORNELIUS WYNKOOP,	WILLIAM MORGAN,	ABRAHAM SHEPHERD,
THOMAS SHEPHERD,	JOHN KEYES,	JOHN MORROW,
JOHN KEARSLEY,	WILLIAM SPALDING.	

I certify, that these signers are personally known to me; that they are men of good fame, and acknowledged their signatures before me, this 17th of May, 1788.

CATO MOORE.

(No. 7.)

Berkeley County, ss.

This day came Jonathan Osborn before me, John Kearsley, one of the justices of the peace for said county, and made oath, that as well as he remembers, about the first day of February, seventeen hundred and eighty-six, this deponent and Michael Entler, began to weld some pipes for Mr. James Rumsey, they were about the size of gun barrels, and this deponent well remembers that at the time the last six scalps were brought to them from Anteatum forge, they were at work at the scalps that were first brought to them; that after they were welded they cut a male screw on the one end, and a female screw on the other end of each pipe, as they were all to be screwed together; that after this was done, they were left in said Michael Entler's shop six months or upwards; that after this, Mr. Joseph Barnes and said Entler put them together and bended them round a block, in shape resembling the worm of a still; this deponent understood that these pipes were for some of the purposes of said Mr. Rumsey's boat machine, and further this deponent saith not. Sworn to before me, this 16th day of May, 1788.

JOHN KEARSLEY.

We, the subscribers, have been long acquainted with the above named Jonathan Osborn, and certify that he supports the character of an honest man.

JOHN MORROW,	THOMAS WHITE,	JOHN MARK,
HENRY BEDINGER,	CORNELIUS WYNKOOP,	WILLIAM SPALDING,
CATO MOORE,	WILLIAM MORGAN,	ABRAHAM SHEPHERD,
THOS. SHEPHERD,	JOHN KEYES.	

I certify that the above signing was acknowledged before me, this 17th day of May, 1788.
CATO MOORE.

(No. 8.)

Berkeley County, ss.

This day came Francis Hamilton before me, John Kearsley, one of the justices of the peace for said county, and made oath, that as by a review of his, the said Francis' day-book, it appears that in the month of December, in the year of our Lord one thousand seven hundred and eighty-five, Mr. Joseph Barnes and James McMechen brought down the river Potowmac, to the Shannandoah Falls, a boat of about six tons burthen, with a variety of machinery on board, amongst which were two cylinders of copper, about thirteen inches diameter, and near three feet long, a copper boiler, four large brass or copper cocks, pumps, &c., where the said Barnes and McMechen, under the direction of Mr. James Rumsey, continued adapting and suitably fixing said machine to said boat, until the seventh of January, 1786, when the ice driving in the river, obliged them to desist proceeding further for that season, and they accordingly, that same day, drew the boat in the mouth of the run, took off the machinery, and laid it in my cellar for and during the winter. Further, that on the fourteenth day of March, a trial was made of the same, with some alteration in the machinery; that she moved against the current some distance, though not to much satisfaction, owing to the imperfection of the machinery. Furthermore, that said Barnes and McMechen were on board, likewise Captain Charles Morrow, and I myself, steered—and further saith not. Sworn to before me, May seventeenth, 1788.

JOHN KEARSLEY.

We, the subscribers, have been long acquainted with the above named Francis Hamilton, and have ever found him a gentleman of strict honor and veracity.

THOMAS WHITE,	JOHN KEYES,	ABRAHAM SHEPHERD,
DANIEL BEDINGER,	HENRY BEDINGER,	CORNELIUS WYNKOOP,
CATO MOORE,	SMITH SLAUGHTER,	JOHN MARK,
JOHN MORROW,	WILLIAM MORGAN.	

May 19th, 1788.

I have been acquainted with Mr. Francis Hamilton twenty-six years, and found him a person of veracity and respectable character. ADAM STEPHEN.

I believe Mr. Hamilton to be a gentleman of integrity and character.

HORATIO GATES

I am of the same opinion. MOSES HUNTER.

I certify that the above signers are personally known to me, that they are men of good fame, and acknowledged their signatures before me, this 17th day of May, 1788.

CATO MOORE.

(No. 9.)

I do hereby certify, that in November, 1784, being at Richmond, attending the assembly as a representative from the county of Berkeley, I was in company with Mr. James Rumsey, he being an acquaintance, and from the same county, and that he then informed me (as I understood, in confidence) that he intended to construct a boat which was to be wrought altogether by steam; that he had tried the principles, some of which he mentioned, but I cannot ascertain the particulars; upon the whole of our conversation, I understood from him at that time, that his principal dependance, in the operation of his boat, was upon steam. Given under my hand, in Berkeley county, this 19th day of May, 1788. MOSES HUNTER.

Witnesses present at signing. JOHN MORROW.
ABEL WESTFALL.

(No. 10.)

This day came before me, Jacob Young, justice of the peace in and for this county of Frederick, and State of Maryland, Elizabeth Zimmer, and being duly qualified on the holy Evangelists of Almighty God, declared and said, that one week before the twenty-third of November, in the year of our Lord one thousand seven hundred and eighty-five, Mr. James Rumsey engaged my husband to make a quantity of copper work, among which was two round copper things of about three feet long, and better, and one foot wide, and may be better, all which parcel of work was finished before Christmas of the same year, and taken away. This deponent also well remembers of a certain John Peter, an artificer in tin work, to have been engaged to do some tin work, relative to the same machine, at the same time, and which was likewise finished before Christmas of the same year. This deponent likewise remembers to have seen three or four large cocks of metal, the same as still cocks, fixed to the same machine before it was taken away, and further this deponent understood, that the machine was to drive a boat, and that the round things was to raise water; this deponent likewise remembers of a certain gentleman, of a certain spare, thin complexion, and black hair, some time in April last, of this year one thousand seven hundred and eighty-eight, asked her, relative to the above subject, to which I answered in manner as herein recited, and further saith not. Sworn before

May the 16th, 1788. JACOB YOUNG.

I certify being present, when the above deposition was taken.

THOMAS PRICE.

Maryland, *Frederick County, to wit:*

I do hereby certify, that Jacob Young, gentleman, before whom the within deposition was made, and who hath thereunto subscribed his name, was at the time thereof, one of the justices of Frederick County Court, duly authorized and qualified, &c.

[L. S.] In testimoney, whereof, I have hereunto subscribed my name, and affixed the public seal of Frederick County Court, the 16th day of May, 1788.

WILLIAM RITCHIE, *Clk.*

(No. 11.)

State of Maryland, *Baltimore County, ss.*

On the 9th day of June, 1788, came Christopher Raborg, of Baltimore Town, coppersmith, before me the subscriber, one of the justices of the peace for the county aforesaid, and made oath on the Holy Evangelists of Almighty God, that when he gave his certificate to Mr. John Fitch, on the 26th of April last past, that he the said Christopher, had got four brass cocks made by Mr. Charles Weir & Co., in the Fall, 1785: but not having made any charge thereof, to ascertain the time exactly, could not be more particular, but that he, the said deponent, hath since been able to ascertain the time when the said four cocks were made, for Mr. James Rumsey, by order of Mr. Joseph Barnes, and doth swear and declare, that the said four brass cocks were made some time in the months of September or October, of the year of our Lord, one thousand seven hundred and eighty-five; and it hath since appeared to this deponent, that the said four brass cocks were for the use of Mr. Rumsey, to be employed in his steamboat, and further this deponent saith not.

Sworn to before me, GEORGE GOULD'TH PRESBURY.

Baltimore County, to wit:

I do hereby certify to all whom it doth or may concern, that George Gould'th Presbury, gentleman, before whom the within deposition was taken, and who hath thereto subscribed his name was at the time of the taking and signing thereof, and still is one of the justices of the peace, in and for the county aforesaid, and to all certificates by him given as such, due faith and credit is, and ought to be given, as well in courts of justice as thereout.

[L. S.] In testimony whereof, I have hereto set my hand, and affixed the seal of my office, this tenth day of June, in the year of our Lord seventeen hundred and eighty-eight.

WILLIAM GIBSON,
Clerk, Baltimore County.

(No. 12.)

STATE OF MARYLAND, *Baltimore County, ss.*

On this 9th day of June, 1788, came Charles Weir, of Baltimore town, founder, before me, the subscriber, one of the justices of the peace for the county aforesaid, and made oath on the Holy Evangelists of Almighty God, that when he gave his certificate on the twenty-sixth day of April, last past, of having made four brass cocks to Mr. John Fitch, he could not then recollect the exact time when; but that he, this deponent, by means of a receipt for money paid by him, which he has since found, can declare the time with precision, and doth positively make oath as aforesaid, that he made the said four brass cocks by the direction of, and for Mr. Christopher Raborg, (for the use of Mr. Rumsey's steamboat, as he has since learnt,) and delivered the said four cocks to said Christopher Raborg, on or about the 15th day of October, in the year of our Lord, one thousand seven hundred and eighty-five, and this deponent further saith, the money mentioned to be received in the receipt above alluded to, and dated the seventeenth day of October, seventeen hundred and eighty-five, was money received by this deponent, of the said Christopher Raborg, for the said four brass cocks; and further this deponent saith not.

Sworn before me, GEORGE GOULD'TH PRESBURY.

Baltimore County, to wit:

I hereby certify to all whom it doth or may concern, that George Gould'th Presbury, gentleman, before whom the within deposition was taken, and who hath thereto subscribed his name, was at the time of taking and signing thereof, and still is one of the justices of the peace, in and for the county aforesaid, and to all certificates by him given as such, due faith and credit is, and ought to be given, as well in courts of justice as thereout.

[L. S.] In testimony whereof, I have hereunto set my hand, and affixed the seal of my office, this tenth day of June, in the year of our Lord, seventeen hundred and eighty-eight.

WILLIAM GIBSON,
Clerk, Baltimore County.

(No. 13.)

STATE OF MARYLAND, *Baltimore County, ss.*

On this 10th day of June, 1788, came Isaac Cursten, of Baltimore town, founder, before me, the subscriber, one of the justices of the peace, for the county aforesaid, and made oath on the Holy Evangelists of Almighty God, that the certificate this deponent gave Mr. John Fitch, respecting four brass cocks made 29th March, 1786, by the deponent and Co. for Christopher Raborg, could not be the cocks alluded to, for, on further examination of my books, I find the price charged does not agree with the amount ascertained of the cocks made for Christopher Raborg, at the time he was employed by Mr. Joseph Barnes, neither does the time; for I am now satisfied, and do positively declare, and make oath as above, that the cocks were made some time at or about the 14th of October, 1785, that was for the use of Mr. Joseph Barnes, as we then thought; but have since learned, it was for the use of Mr. James Rumsey's steamboat, and from every circumstance, I find they have never been charged or booked, as it appears the cash was received at the delivery of said cocks; and further this deponent saith not.

GEORGE GOULD. PRESBURY.

Baltimore County, to wit:

I hereby certify to all whom it doth or may concern, that George Gould'th Presbury, gentleman, before whom the within deposition was taken, and who hath thereto subscribed his name, was at the time of the taking and signing thereof, and still is, one of the justices of the peace, in and for the county aforesaid, and to all certificates by him given as such, due faith and credit is and ought to be given, as well in courts of justice, as thereout.

[L. S.] In testimony whereof I have hereto set my hand, and affixed the seal of my office, this tenth day of June in the year of our Lord one thousand seven hundred and eighty-eight.

WILLIAM GIBSON,
Clerk, Baltimore County.

(No. 14.)

Berkeley County, ss.

I do hereby certify, that having an occasion of boarding with Mr. James Rumsey, in the month of January, in the year of our Lord one thousand seven hundred and eighty-five, where, amongst many of his curious experiments, one I remember very particularly, which was, he caused to be made a hollow square tube (made of pine boards) about eight feet long, and about one inch and a half diameter in the cavity of the tube, which he suspended upon fine cords, and having a common gimlet hole bored at the end of said tube, and on the one side of the same, and hanging some weights over a small pulley, by a thread tied to the end of said tube, whereupon

pouring water by hand into said tube, it drew up a certain weight; which being repeatedly tried, I asked Mr. Rumsey what he meant or intended by this experiment, to which he made answer, that by that principle he would make the boat go, and after some small matter of conversation, he took his pen and ink, and retired to make his calculations, as was his custom after experiments made, many of which he made during the winter; in testimony of which I have hereunto set my hand, this 19th day of May, 1788.

NICHOLAS ONICK.

We, the subscribers to these presents, do hereby certify, that we have been long acquainted with the within mentioned Nicholas Onick, and have every reason to believe him to be a gentleman of strict honor and integrity.

ADAM STEPHEN,	HORATIO GATES,	MOSES HUNTER,
GEORGE ROOTS,	PHILIP PENDLETON,	JOHN MORROW,
JOHN MARK,	JOHN COOK,	DAVID GRAY,
CORNELIUS WYNKOOP.		

Berkeley County, ss.

We do certify, that we received a letter from Nicholas Onick, saying that he drew the within certificate himself, and that if called on he would make oath to the same. Given under our hands this 19th of May, 1788.

CATO MOORE.
JOHN KEARSLEY.

(No. 15.)

I do certify, that Mr. James Rumsey, of Berkeley County, Virginia, in a conversation I had with him at the Warm Springs, in the latter end of July, or beginning of August, 1783, told me that he intended to construct a boat to go by the power of steam, and pointed out the great expenses it would save in water carriage.

JOHN WILSON.

PHILADELPHIA, July 4th, 1788.

(No. 16.)

I do certify that John Wilson, of Philadelphia, on his return from the Warm Springs, in the summer 1783, told me that Mr. James Rumsey was about to construct a boat that would go by strength of fire and steam, which the said Rumsey intended to have completed soon.

PHILADELPHIA, July 4th, 1788. JULIANA STEWART.

(No. 17.)

This is to certify, that at the time I gave my certificate to Mr. John Fitch, in April last past, respecting having made four brass cocks, as per my certificate in Mr. Fitch's pamphlet, No. 22, and page 28: that the said Fitch then urged me to prove what I had therein certified. I told said Fitch that I was not then positive of the time they were made, therefore could not prove it. Said Fitch persisted in soliciting of me, and said he would give me any thing I would ask, only to prove it, and I should be handsomely rewarded; but I positively refused. And further, that at the time Mr. Fitch called on me on his way to Annapolis, in May or June last, that I then showed him a receipt I had found since he had my certificate, that enabled me to be positive as to the time said cocks were made, and he said he was very sorry for it, that *they* would make a handle of it, and asked if *they* had called on me respecting it. I told him not.

CHARLES WEIR.

This certificate was voluntarily subscribed, and acknowledged in our presence, this fourth day of July, 1788.

her
ALICE × WEIR.
mark

BALTIMORE, July 4, 1788. JOHN LINOILD.

(No. 18.)

I certify, that Mr. Fitch came to our shop to get John Frymiller, an apprentice of Mr. Raborg's, to swear about something concerning a *steamboat* that Mr. Rumsey erected, for which he gave him, to the best of my knowledge, half a dollar, and treated him well, as the said Frymiller said: and after he had been gone the best part of the afternoon, he returned to the shop again, when he appeared to me to be somewhat in liquor, and said he would not care to swear in the same manner oftener, if he could be always so treated.

BALTIMORE, July 4, 1788. CHRISTOPHER BRUDENHART.

(No. 19.)

I also recollect well of John Frymiller being groggy, when he returned from the magistrate in the evening, where he had been to swear for Mr. Fitch, as per his pamphlet, No. 19, page 26. Given under my hand, this fourth day of July, one thousand seven hundred and eighty-eight.

CHRISTOPHER RABORG

[Dr. Thornton, the first Superintendent of the Patent Office, became associated with Mr. Fitch, and wrote a small pamphlet on the Origin of Steamboats. As it contains curious information, it is worth preserving.]

SHORT ACCOUNT

OF THE

ORIGIN OF STEAMBOATS,

WRITTEN IN 1810,

AND NOW COMMITTED TO THE PRESS,

BY

W. THORNTON,

OF THE CITY OF WASHINGTON.

WASHINGTON CITY:
PRINTED BY RAPINE AND ELLIOT, CAPITOL HILL.
1814.

ORIGIN OF STEAMBOATS.

City of Washington, Jan. 1, 1810.

Finding that Mr. Robert Fulton, whose genius and talents I highly respect, has been by some considered as the inventor of the steamboat, I think it a duty to the memory of the late John Fitch, to set forth, with as much brevity as possible, the fallacy of this opinion; and to show, moreover, that if Mr. Fulton has any claim whatever to originality in his steamboat, it must be exceedingly limited.

In the year 1788, the late John Fitch applied for and obtained, a patent for the application of steam to navigation, in the States of Pennsylvania, New York, New Jersey, Delaware, &c., and soon after, the late Mr. James Rumsey conceiving he had made some discoveries in perfecting the same, applied to the State of Pennsylvania for a patent; but a company formed by John Fitch, under his State patents, of which the author of this was one of the principal shareholders, conceiving that the patent of Fitch was not for any peculiar mode of applying the steam to navigation, but that it extended to all known modes of propelling boats or vessels, contested before the assembly of Pennsylvania, and also before the assembly of Delaware, the mode proposed by Mr. Rumsey, and contended that the mode he proposed, viz. by drawing up the water into a tube, and forcing the same water out at the stern of the vessel or boat, which was derived from Dr. Franklin's works, (the Doctor being one of his company) was a mode they (Fitch's company) had a right to, for the plan was originally published in latin, about fifty years before, in the works of Bernoulli the younger, and two of Fitch's company and I appeared without counsel and pleaded our own cause in the assembly of Pennsylvania, (the Hon. Messrs. Findley and Smiley, of Congress, were then sitting members of the assembly,) and after a week's patient hearing against the most learned counsel of Pennsylvania, we obtained a decision in our favor, and afterwards also in Delaware. We believed, and contended that our claim of propelling boats by steam, included all the modes of propelling vessels and boats then known, and that the patent was for the application of steam, as an agent to the propelling powers, and the decisions of the legislatures were in favor of this construction, as Mr. Rumsey's company (of which the late Messrs. Bingham, Myers, Fisher, and many other worthy gentlemen were members,) were excluded from the right of using steamboats on any principle. We worked incessantly at the boat, to bring it to perfection, and some account of our labors may be seen in the travels of Brissot de Warville in this country, and under the disadvantages of never having seen a steam engine, on the principles contemplated, of not having a single engineer in our company or pay, we made engineers of common blacksmiths, and after expending many thousand dollars, the boat did not exceed three miles an hour. Finding great unwillingness in many to proceed, I proposed to the company to give up to any one, the half of my shares, who would, at his own expense, make a boat go at the rate of eight miles an hour in dead water, in eighteen months, or forfeit all the expenditures on failing; or I would engage with any others, to accept these terms. Each relinquished one half his shares, by making the forty shares eighty, and holding only as many of the new shares as he held of the old ones, and then subscribed as far as he thought proper, to enter on the terms by which many relinquished one half. I was among the number who proceeded, and in less than twelve months we were ready for the experiment. The day was appointed, and the experiment made in the following manner: A mile was measured in Front street, (or Water street) Philadelphia, and the bounds projected at right angles, as exactly as could be, to the wharves, where a flag was placed at each end, and also a stop watch. The boat was ordered under way at dead water, or when the tide was found to be without movement; as the boat passed one flag, it was struck, and at the same instant the watches were set off; as the boat reached the other flag, it was also struck, and the watches instantly stopped. Every precaution was taken before witnesses, the time was shown to all, the experiment declared to be fairly made, and the boat was found to go at the rate of eight miles an hour, or one mile within the eighth of an hour; on which the shares were signed over with great satisfaction, by the rest of the company. It afterwards went eighty miles in a day!* The governor and council of Pennsylvania were so highly gratified with our labors, that without their intentions being previously known to us, governor Mifflin, attended by the council in procession, presented to the company, and placed in the boat, a superb silk flag, prepared expressly, and containing the arms of Pennsylvania,† and this flag we possessed till Mr. Fitch was sent to France by the company, at the request of Aaron Vail, Esq., our consul at L'Orient, who being one of the company, was solicitous to have steamboats built in France. John Fitch took the flag, unknown to the company, and presented it to the na-

* Yet Mr. Fulton asserts that no successful experiments were ever made with steamboats before his!

† Perhaps I here make a mistake; for in the patent taken out by Messrs. Fitch and Voght, for the company, I find the flag of the United States represented. The archives of the state will show it, if necessary.

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tional convention. Mr. Vail finding the workmen all put into requisition, and that none could be obtained to build the boats, paid the expenses of Mr. Fitch, who returned to the United States; and Mr. Vail afterwards subjected to the examination of Mr. Fulton, when in France, the papers and designs of the steamboat appertaining to the company.

Finding that the works on board the first boat were not strong enough, we built another of twenty-five tons burthen, rigged schooner fashion, intended to go to New Orleans and mount the Mississippi. When the principal parts of the work were prepared, and ready to put on board, the author of this, thinking no mistakes could be made by the company, went to the West Indies on the 16th of October, 1790, to visit his mother for the last time, and expected to find on his return, the boat ascending the Mississippi at the rate of at least four miles an hour; but a spirit of innovation having seized some of the company, and their attempts to simplify the machine having ruined it, their unsuccessful endeavors to make it work, subjected them to debts which obliged them to sacrifice both boats and all the machinery; and on my return, after a two years' absence, I found, to my inexpressible grief, the whole of this very valuable scheme ruined. I had only then to wait till the patent taken out from the United States during my absence, (see No. 1,) for the benefit of the company, by Messrs. Fitch and Voight, in the year 1791, expired, and to take out a patent for these peculiar improvements which I had invented or suggested. Finding Mr. Fulton about to take out a patent, after he had examined every thing in the Patent Office relative to steamboats and steam engines, and not knowing whether he might recollect, among so many, those I had shown him of my own invention, I thought it proper to take a patent for them previous to a sight of his papers, or of any hint of what they contained; and I believe he will do me the justice to say I never saw one of his, nor had a hint of what they were, before my patent from the United States was issued. I find Mr. Fulton's patent rests principally on proportions, though the second section of the law expressly excludes proportions.* He uses Watts' and Boulton's steam engines, and wheels at the sides of the boat, but an engine on the principles of Watts' and Boulton's was used by us, the application of which was since patented; and the use of the wheels at the sides was known to us, and I often urged their use in our first boat, as can be testified by Mr. Oliver Evans; but the objection to them on so small a scale, was their waste of power by the fall of the buckets or paddles on the water, and their lift of water in rising, both of which objections would diminish as the wheel increased in size; but side wheels could not be claimed as a new invention, for their use in navigation had long been known and published to the world by Dr. John Harris, in his Lexicon Technicum, in 1710, just one hundred years ago. If Mr. Fulton should claim the actual application of steam to wheels at the sides of a boat, in opposition to the above declarations, I beg leave to offer, as a caveat against any such claim, the fire ship of Edward Thomason, in the tenth volume of the Repertory of Arts, which was laid before the Lords of the Admiralty in 1796. This contains wheels at the sides, operated on by a steam engine, and was intended to possess the power of moving given distances in all directions, according to the intention of the director, so that without any person being on board, it would conduct itself into an enemy's port, and by clockwork, at a given moment explode the combustibles; which plan, I also presume, might suggest to any person of even less original genius than Mr. Fulton, the mode of letting off torpedos, which were invented during the war for independence, by the late Major Bushnell, of Connecticut.

Mr. Fulton's have never exceeded five miles an hour in dead water, and he declared it impossible to make one exceed that velocity, and offered me $150,000 if I would make one that would exceed it. I agreed to his proposal at once, but he declined to write the terms. Our boat went at the rate of eight miles an hour, in the presence of many witnesses still living, and to comply with terms as before stated, which were completely and satisfactorily fulfilled; and yet he has nominally an exclusive privilege for navigating the waters of the State of New York; but not satisfied with this apparent violation of the rights of his fellow-citizens, he took out a patent from the United States, on the 11th of February, 1809, which act the legislature of New York must surely admit, supersedes their own, if they even thought its validity was before indisputable; and if Messrs. Livingston and Fulton attempt to shelter themselves under the expression of the seventh section of the patent law of 1793, by asserting that the provision only includes the grants of exclusive rights, by States, prior to the adoption of the present form of government, others may surely, on reversing the case, assert that the silence of the law is a clear proof that such a case was not considered as worthy of attention, because it could not be supposed to exist, being repugnant to common sense.

This silence precludes any construction favorable to the parties, and by making provision for the constitutional and general act, they are by a liberal and plain conclusion, excluded ipso facto from the prior advantage of the state act, even if it were valid, and that validity founded on proofs that these gentlemen were the inventors of the application of steam to navigation, or had made any essential improvements therein; but in the present circumstances to attempt an exclusive monopoly of these waters, is not merely to attempt to deprive others of natural and inherent rights; but without a shadow of reason to attempt also to deprive them of acquired rights under the general government, and as if the power and influence of individuals, which seem to have hitherto prevented an interference in vast monopoly, had encouraged to further acquirements of the rights of their fellow-citizens; and being discontented with the wise and equitable provisions of the Congress, in which all other citizens have rested satisfied, they have exhibited an avaricious

* Since examined, I find his boat is exactly in the proportion of the boat we used, and which was made known to him by Mr. Aaron Vail, viz. 8 feet wide, by 60 feet long; Mr. Fulton's 20 feet wide and 150 feet long; in both cases nearly 7½ times the length of the breadth. Other proportions may answer as well, but this is given to show whence he derived his original ideas.

desire of obtaining an universal monopoly of the waters of the union by addressing the different legislatures of the states; and were even in Virginia on the point of succeeding, and the final question about to be put, when my letter (No. 2,) was handed to the Speaker of the House of Representatives, and the bill was immediately negatived. So bold and unprecedented an attempt to infringe the privileges of the citizens at large, if successful, would probably have terminated in soliciting the Congress to grant to a combination of rich merchants, the monopoly of the seas by the promise of low freights.

The law already passed in the State of New York, in favor of those gentlemen, shews that in the most enlightened assemblies of men, there are cases which being brought forward by persons of high character, to whom no suspicion of incorrectness can possibly attach, are hurried through the house without doubting their legality, or seeing any injustice in their consequences, especially when the minds of the leading members are deeply abstracted or absorbed in the contemplation of important affairs. If those gentlemen had successfully pursued their monopolizing system, and had obtained exclusive rights to navigate all the valuable waters in the union, of what consequence would a patent obtained in a legal and regular way from the United States have been, and that for only 14 years, while excluded by those gentlemen for 30 years from every valuable water, and this too without any plea whatever? Such grants, it is true, would be deemed so illegal, so unjust, so unconstitutional and oppressive, that every person would be willing to contend for, rather than abandon his rights; but there are few men, especially those who live by their wits or invention, so powerfully supported as Mr. Fulton has been, or who would voluntarily enter into suits, that by protraction, would perhaps, only be their death or terminate in their ruin.

WILLIAM THORNTON.

[No. 1.]

To the Honorable, the Secretary of State, the Secretary of War, and the Attorney General.

The petition of *John Fitch*, of the city of Philadelphia, humbly sheweth,

That your petitioner in the spring of the year, one thousand seven hundred and eighty-five, conceived the idea of applying steam to the purposes of propelling vessels through the water; that fully satisfied in his own mind; of the practicability of such a scheme, of its great immediate utility, and the important advantages which would in future result therefrom, not only to America, but the world at large, if the scheme should be carried into effectual operation, he divested himself of every other occupation, and undertook the arduous task, not doubting that when perfected, he should be amply rewarded. In his first attempts to procure assistance from Congress, and the Legislatures of many of the States, from the peculiar situation of their finances and the seeming impossibility of the success of his scheme, he met with no relief. Not entirely discouraged by those disappointments, he continued his application to his project, and prayed several of the states for an exclusive right to the use of fire and steam to navigation: that New Jersey, New York, Pennsylvania, Delaware and Virginia, granted him an exclusive right, agreeably to the prayer of his petition for fourteen years.

That the impracticability of procuring experienced workmen in America, your petitioner's total ignorance of the construction of a steam engine, together with the necessary deviation from the form described in books in order to accommodate its weight and bulk, to the narrow limits of a vessel, have caused him not only to expend about eight thousand dollars in successive experiments, but nearly four years of some of his grants have expired before he has been able to bring his engine to such a degree of perfection as to be carried into use.

That having at length fully succeeded in his scheme, proofs of which he is prepared to offer, he trusts he now comes forward, not as an imaginary projector, but as a man, who, contrary to the popular expectation, has really accomplished a design which on examination, will clearly evince the many and important advantages which must result therefrom to the United States, some of which your petitioner begs leave to enumerate.

The western waters of the United States, which have hitherto been navigated with great difficulty and expense, may now be ascended with safety, conveniency and great velocity; consequently by these means, an immediate increased value will be given to the Western Territory; all the internal waters of the United States, will be rendered much more convenient and safe, and the carriage on them much more expeditious; that from these advantages will result a great saving in the labor of men and horses, as well as expense to the traveller.

Your petitioner also conceives that the introduction of a complete steam engine, formed upon the newest and best principles into such a country as America, where labor is high, would entitle him to public countenance and encouragement, independant of its use in navigation; he begs leave to say, that the great length of time, and vast sum of money expended in bringing the scheme to perfection, have been wholly occasioned by his total ignorance of the improved state of steam engines, a perfect knowledge of which has not been acquired without an infinite number of fruitless experiments; for not a person could be found who was acquainted with the minutiæ of Bolton and Watt's new engine; and whether your petitioner's engine is similar or not to those in England, he is to this moment totally ignorant; but is happy to say, that he is now able to make a complete steam engine, which in its effects he believes, is equal to the best in Europe, the construction of which he has never kept a secret.

That on his first undertaking the scheme, he knew there were a great number of ways of applying the power of steam to the propelling of vessels through the water, perhaps all equally effective; but this formed no part of his consideration, knowing that if he could bring his steam engine to work in a boat he would be under no difficulty in applying its force; therefore, he trusts no interference with him in propelling boats by steam under any pretence of a different mode of application will be permitted; for should that be the case, the employment of his time, and the amazing expense attending the perfecting of his scheme, would, whilst they gave the world a valuable discovery, and to America, peculiar and important advantages, eventuate in the total ruin of your petitioner; for a thousand different modes may be applied by subsequent navigators, all of them benefitting by the expense and labor of your petitioner, and thus sharing with him those profits which they never earned; such a consequence, he is confident will not be permitted by your honorable body.

Your petitioner, therefore, prays that your honors will take the subject of his petition into consideration, and by granting him an exclusive right to the use of the steam navigation for a limited time, do him that justice which he conceives he merits, and which he trusts will redound to the honor, and add to the true interest of America; and your petitioner as in duty bound shall ever pray.

JOHN FITCH.

New York, 22d June, 1790.

[No. 2.]

DEPARTMENT OF STATE,
PATENT OFFICE, 1810.

SIR:—I address you with extreme reluctance on the subject which affects very nearly the interests of many of my fellow-citizens; but being called upon by them, I consider it as a duty to represent to you and through you, to the honorable body over which you preside, that they view with very great concern an attempt to obtain from the legislature of your state, an exclusive right to navigate with steamboats the waters therein for a very long period; which, if granted, would effectually deprive many ingenious inventors and mechanics, of the benefits expected from their various inventions and improvements in steamboats, for which they have taken patents from the United States, under an impression, that the states had ceded by the constitution to the Congress, the right to grant patents or exclusive privileges for limited times to authors or inventors, thereby to promote the sciences and arts; on the expiration of which limitations their several inventions become the property of every citizen of the United States, by which tacit contract the individual is for a time benefitted, and the public forever after. But if the honorable, the legislature of your state, grant the privileges now desired, the example may lead to dangerous and oppressive consequences.

This is submitted to your consideration, with the highest respect and deference.

WILLIAM THORNTON.

To the Honorable, the Speaker of the House of Representatives of Virginia.

V.

ABORIGINAL ARTS.

GOLDSMITHING AMONG THE AZTECS.
SPINNING AND WEAVING BY AZTECS.
SPINNING AND WEAVING BY MODERN INDIANS.
REMARKS ON SPINNING.

ABORIGINAL ARTS.

THERE is a peculiar propriety, it is believed, in preserving in the reports of this bureau, remarkable relics of aboriginal inventions. Our government occasionally employs artists to paint the portraits of Indian Chiefs—works of transient interest and value. There can, therefore, be little ground on which to rear objections to the recording a few illustrations of the arts of the Aztecs, presenting as they do, vivid examples of ancient mechanical and industrial effort. In the present section will be found four uncouth figures—copies of old native drawings—sent to Spain by Antonio de Mendoza, the successor of Cortés, and first viceroy of New Spain, and copied into Lord Kingsborough's rare volumes on the Antiquities of Mexico. Than such pictures, few pages of history are more instructive, or impart a better insight into the character and condition of the half civilized races whom Cortés and Pizarro subdued.

Aztec Goldsmith at work—From Mendoza's collection.

In this figure the artist has represented a workman in the act of soldering or annealing a piece of plate. Except the rude style in which the native limners portrayed the human figure, the cut is a fac-simile of Pharaonic profiles of the same class of workmen, and of modern goldsmiths of Africa, Hindostan, Java, Sumatra, Ceylon, and Asia generally. The small portable furnace, blow-pipe, position of the artist, scantiness of apparel, and the ground his workbench, are common to all; the only observable difference is in the apron (suspended, too, by long shoulder straps) of the American, who, in this respect, seems to have advanced beyond his brethren of the other hemisphere.

Had the draughtsman possessed the skill of a modern artist, and painted the tools and processes used in fusing the metal, of spreading it out into plates, working it into shape, and chasing in the ornaments; of drawing wire, and fabricating the famous old Panama chains, &c., &c., many other problems of Aztec economy and art would have been solved.

The smiths of Mexico, Central America, and Peru, were expert in the use of the blowpipe; and this is not to be wondered at, if, as early Spanish writers report, the bellows was unknown among them. In specimens of their work extant, the soldering rivals any thing executed in modern workshops; seams often challenge, and sometimes defy the keenest scrutiny to detect them. Native smiths still use the pipe.

Every enlightened workman in metals, must feel interested in thus beholding an ancient red brother in the actual use of the blowpipe, to say nothing of the illustration the figure affords of the state of the arts in anti-Columbian epochs, and of ancient life on this part of the planet.

The use of the blowpipe has been inferred from metalline remains discovered in sepulchral tumuli of the Mississippi valley. In Caleb Atwater's Antiquities of the West—Columbus 1833, p. 92–3,—mention is made of sixty copper beads, found in one of the mounds at Grave creek, near Wheeling. "They were made of a coarse wire, which appeared to have been hammered out, not drawn, and were cut off at unequal lengths. *They were soldered together* in an awkward manner, the centre of some of them uniting with the edges of the others. They were encrusted with verdigrise, but the inside of them was pure copper. This fact shows that the ancient inhabitants were not wholly unacquainted with the use of metals." As it is admitted that *brass* was not known to the mound builders, an analysis of the alloy that constituted the brazen solder alluded to above, would be a positive addition to the little knowledge we have gleaned of these remote native artisans and of their arts.

SPINNING.

No matter how far man is separated from his fellows, either on the earth's surface, or by time, the general uniformity of his organization is stamped on all his normal devices. Primitive inventions are universally allied. Under similar circumstances and conditions, the same means are hit upon to reach the same ends. Kindred trains of thought, of resources and results, characterize the origin and early progress of the most essential arts everywhere: beginning in the same wants, they suggest the same ideas, which are carried out in substantially the same manner.

Still, when a primitive people is found shut out from communion with others; isolated from the rest of the world, and deriving no thoughts from it—some shades of difference, more or less strongly defined, often mark devices discovered by them in common with others; and this, whether occupiers of small islands or wide spread continents. But after all, this is nothing more than what may be named a variety *of expression:* the same general idea being differently brought out, just as in speech, utterance is given to the same thoughts after various idioms. All arts and all machines are but dialects of one language—reasonings and conclusions represented in tangible forms and figures—a universal speech, and understood by all men.

Of the diversity in the unfolding of a primitive and common suggestion, a more interesting example cannot well be adduced, than the phases in which the

fabrication of thread has been disclosed on this half of the globe. They appear so different from others, and so peculiar, if not unique, that it may safely be said, if the first spinsters were exotics, their mode of spinning was indigenous; however difficult, if not impossible it may be to reconcile the one with the other.

Spinning lies at the threshold of human culture. It was the first, or among the first born of the arts, and was doubtless the offspring of female cogitation. Throughout all ages of the past, it was under the peculiar province of the sex. In it, queens and even goddesses sought to excel: one of the earliest of useful efforts, it was one of the best. Till it was introduced man was a houseless wanderer, and where it is not, he is still a vagabond, roaming the forest. Home, and its softenings and soothing influences, were unknown, till women began to twirl the spindle; till then, the fair fount of the arts was unopened, unthought of, undreamt of: an universal acquirement, it is one in which little variations, in details, could be looked for among uncultivated tribes. It is, however, singular that the thread-making idea has been less skilfully developed by the red race, than perhaps any other of their mechanical conceptions; this is remarkable in people so far advanced as the Mexicans, Peruvians, and others were.

The distaff is identified with spinning in the old world, from the earliest times. It dates behind, far behind, historic, and was quite a common thing in heroic and mythic epochs. It pervades the most ancient of legends, and plays a part in the remotest of myths. No other instrument of domestic economy is clearer seen through the semi-historic mists that enshroud the infancy of human career; few others could be named as belonging to lower strata of time. Common in the other hemisphere through unknown periods, and yet utterly a stranger to this.

Of the province assigned to the fates, Clotho held the distaff, while Lachesis twirled the spindle, and Atropos determined the length of the thread. Then there was Hercules, who was playfully rapped over the head by Omphale, for his awkwardness in holding it. Sardanapalus, too, endeavored to rival the son of Jupiter, by spinning with it among his maids. Ancient Egyptian spindles and distaffs have been recovered from the tombs; and how common they both were among the Hebrews, appears in Solomon's portrait of a virtuous woman. "She seeketh wool and flax—she layeth her hands to the spindle, and her hands hold the distaff." Both spindle and distaff were frequently dedicated to Minerva, the patroness of spinning, and of the arts connected with it. The goddess was herself rudely sculptured with them in the Trojan Palladium.

A glance at these classic implements, before introducing the primitive American apparatus, will better enable one to perceive the difference existing between them, more correctly to appreciate both, and to judge how far one is allied to, or could have been derived from the other.

Distaff and Spindle—Ancient Greek and Roman.

This figure is from a series of bas-reliefs representing the arts of Minerva, upon a frieze of the Forum Palladium, at Rome. It shows the operation of spinning, at the moment when the spinner has drawn out a sufficient length of thread from the distaff, and just previous to the act of taking it out of the slit on the top of the spindle, to wind it on the latter. It is said by classic writers, that the spindle was always when in use, accompanied by the distaff, as "an indisputable part of the apparatus." The following particulars are gathered from Homer, Herodotus, Ovid, Horace, Catullus, Pliny and others. The spindle was a stick, ten or twelve inches long, having at the top a slit or notch, by which to fix the thread at the commencement; the lower end was passed through, and attached to a small but heavy disc or whorl, made of wood, stone or metal. The weight of this, and of the spindle, kept the thread at a proper tension, and the momentum while turning round, kept twisting the yarn or thread in the interim of repeating the operation with the fingers. When from the length of the thread, the spindle approached the ground, or descended below the reach of the fingers, the thread was wound on the spindle, except a short piece left for insertion in the slit, preparatory to the formation of another length. The distaff was about three times the length of the spindle, and commonly made of a reed, with an expansion near the top, over which the prepared flax or wool was placed, and secured by a ribbon or tape; the fibres being left sufficiently loose to be easily drawn out by the fingers and thumb of the spinner. Distaffs, as well as spindles, of gold and of ivory, were ascribed to goddesses, and were really presented to distinguished females.

It was quite common for ancient females to keep their spindles whirling while on their way to the fountain for water, or making short visits, &c. Some striking examples have been recorded by historians, and among them, the following one by Herodotus:—As Darius, king of Persia, was sitting publicly in one of the streets of Sardis, he observed a young woman of great elegance and beauty, bearing a vessel on her head, leading a horse by a bridle fastened round her arm, and at the same time spinning some thread. Darius viewed her as she passed with attentive curiosity, observing that her employments were not those of a Persian, Lydian, nor indeed of any Asiatic female. Prompted by what he had seen, he sent some of his attendants to observe what she did with the horse; they accordingly followed her. When she came to the river, she gave the horse some water and then filled her pitcher; having done this, she returned by the way she came with the pitcher of water on her head, the horse fastened by a bridle to her arm, and as before, employed in spinning.

In the rural districts of old Rome, women were forbidden to spin while travelling on foot. The prohibition arose from superstitious motives; but the practice has come down to our times, being found more or less common in Spain, Portugal, Hungary, Italy, Greece, and other parts of Europe; as also over the greater part of Asia. The shank of the distaff on such occasions being secured by a sheath or strap to the person; or, as in the following figure of a modern spinner, grasped under the left arm.

Distaff and Spindle—Modern Asiatic and European.

How differently the idea has been worked out by the ancient dwellers on this hemisphere, will appear in the two next illustrations. Coarse and uncouth they are; yet of unusual interest and value in an historical view of a people who at the conquest stood at the head of the aborigines; but whose nationality and power have been broken, and whose arts have all but vanished before those introduced by the whites.

Aztec girl spinning—From Mendoza's collection.

The figure on the foot of the preceding page represents a girl six years old, learning to spin in the presence of her mother, the portrait of whom is omitted. She is in the act of winding on the spindle the length of thread just spun. The spindle differs but little from those of the eastern world, its lower end being furnished with a conical weight or fly to promote rotation, and as it would seem for its pointed extremity to rest like a pivot in some small cavity while revolving; for the spindle when in use, was not raised from the ground—the reverse of the eastern practice, in which the motion ceased the moment the pivot touched it.

The basket-like base on which the fly rests, is the Mexican symbol of the ground, though possibly it may here represent an implement or utensil also. The bunch of cotton to be spun, after being suitably prepared, was held in the left hand, and the length of thread formed at one operation determined by the distance the bunch could be drawn away from the spindle, this being also the converse of the Asiatic and European practice, in which the distaff and cotton on it are at rest—the length of the thread depending on the descent of the spindle from them. We know that domestic industry was strictly enforced by the Mexicans, particularly on girls; and of this, these cuts are remarkable illustrations.

Aztec woman spinning—From Mendoza's collection.

In this, a female adult (as the head dress symbolizes) is at work, and portrayed at the moment when a full length of thread has been twisted, or in the act of finishing it. To this spindle, *two* conical weights are attached, unless the under one was fixed and had a cavity on the top to admit the point of the upper one to play in it. The process differs but little from that of the present Pimos and Maricopas tribes, as mentioned on a succeeding page, except in the hollow in which the spindle turns. It is obvious this practice is incompatible with walking; locomotion can only be associated with a spindle suspended by the thread, and whirling free above the ground. In this absence of the distaff, and especially in twirling the spindle like a top *on the floor*, the process can never be viewed as one derived from abroad; but rather as the sole result of native thought and primitive resource. No people, civilized or savage, of the eastern hemisphere, are known to have thus used and embarassed the movements of the spindle. The idea and the practice, appear to be purely American. No ancient American spinner is represented at work, either seated or standing—much less when walking.

For the following illustration and description, the office is indebted to Mr. Squier, late United States Chargé to Nicaragua. It is interesting as showing how little the old native process has been changed.

The common foot wheel is extensively used in spinning cotton in Nicaragua, but the primitive contrivance in use before the conquest, is not yet en-

tirely supplanted. It consists of a spindle of hard wood, sixteen or eighteen inches in length, which passes through and is fixed to a disc of heavy wood that serves as a fly, by adding momentum to the whirling spindle. The lower end of the spindle is rounded or rudely pointed, and when in use, the instrument is placed in a calabash or clean iron kettle.

Modern Spinning Apparatus of Central American Indians.

The modus operandi is as follows:—The spinster is seated in a stool with a bunch of loose cotton already prepared, in her lap. From this she twists a thread with her fingers, and attaches the end to the spindle at the top, giving it an energetic twirl that keeps it going for some time. Meanwhile she disengages and draws out the cotton from her lap with both hands. The length of thread spun (from two to three feet) is then wound around the spindle, which is again set in motion, and another length added in like manner.

In the accompanying sketch *a* is the cotton, *b* the spindle, *c* the thread already twisted, *d* the disc or fly, and *f* the calabash. When the spindle is not in motion the calabash prevents it from falling over, the fly resting against the sides

In the regions of the Gila and Colorada the natives have been little disturbed by white people. The Spaniards never extended their iron sway over them, and like the Americans of Peru, they have been supposed to retain many of the customs and arts of their forefathers. This is to some extent true. The country soon after the conquest, was reported to be occupied by a civilized people, one who followed agriculture and dwelt in stone houses. Colonel Emory, in his Notes of a Military Reconnoisance from Fort Leavenworth in Missouri, to San Diego in California, including part of the Arkansas, Del Norte, and Gila Rivers, [Ex. Doc. No. 41. Washington, 1848,] met with remains of stone and adobe houses, scattered over extensive tracts of ground—sometimes continued over ten, fifteen and even twenty miles. The Pecos tribe, he observes, have preserved alive till within a few years, the sacred fire that glowed on the ancient altars; nor is it certain that it is not yet preserved, for a few Indians took it with them to the Pueblos of Zuni. The name of Montezuma is said to be as familiar to those Indians, to the Apaches, Navajos, and others, as that of our Saviour or Washington is to us.

Turning from some old ruins towards the Pimos village—observes Colonel Emory—we urged our guide to go fast, as we wished to see as much of his people as the day would permit. We were at once impressed with the beauty, order and disposition of the arrangements for irrigating and draining the land. Corn, wheat and cotton are the crops of this peaceful and intelligent race of people. All the crops have been gathered in, and the stubbles show they have been luxuriant. The cotton has been picked and stacked for drying on the tops of sheds. The fields are sub-divided by ridges of earth into rectangles of about 200 × 100 feet for the convenience of irrigating. The fences are stakes wattled with willow and mezguite, and in this particular set an example of economy in agriculture, worthy to be followed by Mexicans, who never use fences at all.

The thatched houses of the Pimos are dome shaped, and of wicker work, about 6 feet high, and from 20 to 50 feet in diameter. In front is usually a large arbor, on the top of which cotton in the pod is piled for drying.

A Pimos spinster was observed at work. "Her apparatus was more simple than the preceding figures, but closely allied to them; in fact the same, with the exception of the calabash or basket, for which a more ready substitute, one always ready, was adopted. A woman was seated on the ground under the shade of one of the cotton sheds. Her left leg was tucked under her seat, and her foot turned sole upwards. Between her big toe and the next, was a spindle, about 18 inches long, with a single fly of four or six inches. Ever and anon, she gave it a twist in a dexterous manner, and at its end was drawn a coarse cotton thread. This was their spinning jenny." The application of the foot-fingers is akin to that of the wives and daughters of Hindoo weavers. The axles of their light cane reels are thus held when winding off the thread. The foot is however in front of its owner, and in a natural position, nor does the stick grasped by the toes revolve.

The Pimos and Maricopas are in their habits, agriculture, religion and manufactures, the same.

Indians Spinning Coarse Thread.

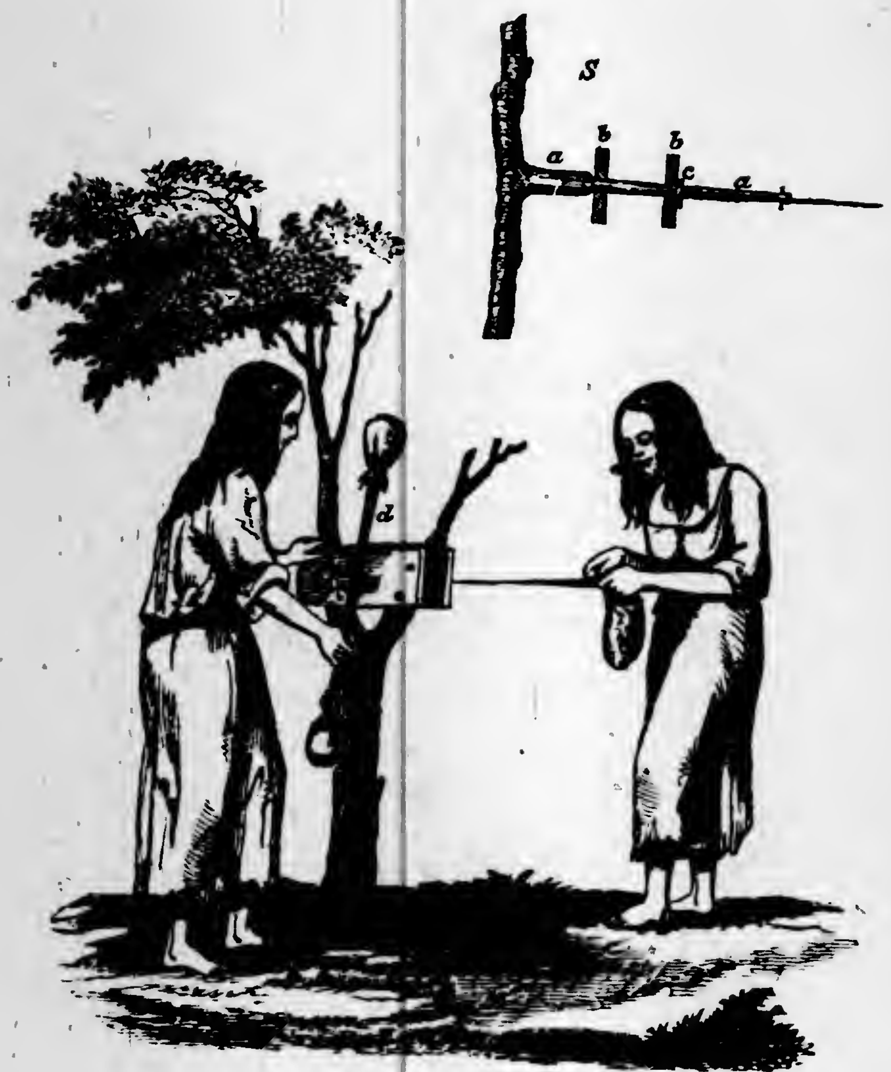
A process of undoubted antiquity, and occasionally followed by modern Indians, is shown on page 380. The spinner holds in the left hand, and horizontally, a short piece of hollow reed or cane, and within it the spindle is twirled by the fingers and thumb of the right hand. Sometimes a cross stick or handle is attached, as represented in the figure. A second person performs the part of a distaff, which, as the thread lengthens, recedes from the spinner, or the spinner from it; a section of this primitive apparatus is separately portrayed.

Mr. Van,—a delegate now in Washington from the Cherokee nation, to obtain a settlement of claims on the United States, for their lands in Georgia, Alabama, &c.,—states that the large old spinning wheel has, to his knowledge, been in the possession of the Cherokees, nearly fifty years. His mother, a Creek, and over a hundred years of age, he believes, used to spin with it in her youth. Mr. Van has seen Indians twist coarse thread with apparatus same as the above; an apparatus which, in all probability, formed one of the early contrivances that slowly led to the whirling spindle in both hemispheres.

For the next two illustrations of spinning by the Navajoes, Camanches, and other tribes of New Mexico, the office is indebted to Judge Peters, of Santa Fé, N. M. (See his letter in sec. VII.)

A Camanche Spinning.

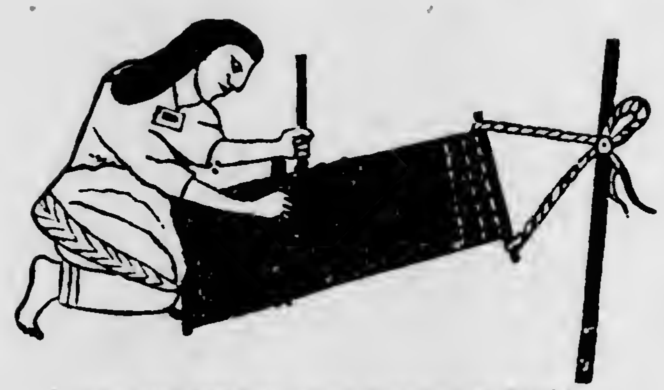
This is another phase, in which the thread-making idea has manifested itself among the red race, and an interesting one it is. The spinner has a small stick, which she holds horizontally in one hand, and on which she winds thread, as on a spindle, as fast as it is spun. The bunch of cotton is itself twirled round, by means of a short and small rod, passed through the lower part, with its ends projecting. A pebble is commonly fastened to the middle of this stick—see *d*—and serves as a fly to keep up the motion, and to assist by its weight, in drawing out the thread. To keep the stone and stick in their place, a piece of yarn is wound loosely round the bunch. The length of thread is seldom over six or eight inches, before being wound up on the stick. In this singular process, the classical mode is completely reversed—the spindle, or that which corresponds to it, is held at rest, and the distaff put in motion, in which respect the operation is unique. The idea of increasing the momentum of the whirling mass, by the introduction of a weight into its centre, is here realized.



Navajoes Spinning.

Two pieces of board, or shingles, are pinned to opposite sides of the fork of a small tree or stump. A spindle (being a smooth rod ten or twelve inches in length,) is passed through, and made to turn in them, as in two journals. See the section S, where *a*, *a*, is the spindle, *b*, *b*, the boards, and *c*, a pin to keep the spindle in its place. To whirl the spindle, a cross stick *d*, is tied to the large end, as represented. Sometimes a stone is folded in a rag, and fastened to each end of the cross stick, and answers the purpose of a rude fly wheel. When a suitable stick, having a branch at right angles, can be procured, the cross stick and spindle are of one piece, as at S. A notch is made at the small end of the spindle, where the thread unites to it, and thus, while one girl turns the spindle, another, with a bunch of loose cotton, supplies it, and as the thread lengthens, gradually draws backwards. As soon as a full length is twisted, it is wound round the spindle, and another length added, and so on 'till the spindle is fully charged. The thread is then wound off into a hank, and the spindle set to working again.

These illustrations of primitive art possess a deeper interest than their relation to a few Indian tribes, and a more extensive one; they are types of thought, more or less common to the species, to barbarians and semi-civilized [illegible] times: such as we ourselves would be led to adopt, were we thrown upon our own resources, without any knowledge or recollections of the subject.



Aztec girl weaving—From Mendoza's collection.

It is difficult to determine from this figure, whether the shuttle was developed in ancient Mexico. It is not represented, and appears not to have been attained any more than the distaff. The loom is like those now used by American Indians. Col. Emory, after speaking of the Pimos spinning, says: "Led on by this primitive display, I asked for their loom by pointing to the thread, and then to the blankets, girded about the woman's loins. A fellow stretched in the dust sunning himself, rose up leisurely and untied a bundle, which I had supposed to be a bow and arrow. This little package with four stakes in the ground was his loom: he stretched his cloth and commenced the process of weaving; he had no shuttle, the warp being passed across the woof, a thread at a time, by a long wooden needle. One of the rods in the preceding figure, was doubtless designed to represent a needle, and used in the same way."

If the figures here introduced, truly indicate the progress made by the Aztecs, in spinning and weaving, their advance was very moderate, and though very creditable work might be made with the weaving apparatus by individual skill and patience, it would seem that few or no attempts had been made to render it more facile and efficient. The same remark is, however, applicable to the loom of Asia and Africa. It is worth observing, that the dress of females pictured above, indicates a decided improvement on that of less civilized tribes. Aztec women and girls wore pantalettes and a species of tunic, with short sleeves and ornamental borders; not unlike Chinese female costume, save in the brevity of the sleeves. Amulets or keepsakes suspended over the neck, and resting on the bosom, seem also to have been common.

Modern Peruvian Indians spin without the distaff, and their loom is precisely like the ancient one just figured; the shuttle, or what answers the purpose of one, being a long thorn needle which is passed through the woof, thread by thread. Every piece woven is of the precise width wanted, whether for garments, coca bags, or aught else—no waste by cutting. Ancient specimens of cloth of excellent execution, have been found in tombs. The length of the needles varies with the width of the piece to be wove.

That very fine fabrics were produced in old Mexico, and by implements, little if any better than those here figured, is doubtless true. The highly colored accounts by the conquerors, are believed to have been no more so, than what the fineness of goods which they saw warranted. Indeed some of the richest of modern shawls and dresses, are turned out of looms of Persia, Egypt and Hindostan, but one degree advanced beyond those of the Aztecs. Personal tact and skill, are everything with semi-civilized artizans. The ancient spindle and loom of the east, singularly enough, are still preserved and used for special purposes in modern Rome, precisely as they were thirty or forty centuries ago. A recent writer on the Pallium, an ecclesiastical robe of lamb's wool, says, there stands about a mile outside the Porta Pia, on the road to Tivoli, an old convent of nuns attached to the still more ancient church of St. Agnes. These nuns are poor, and rarely do any of Rome's high-born damsels enter the cloister of this lonely and neglected sisterhood. They have got a small paddock attendant to the monastery, and therein keep a couple of sacred lambs, not necessarily of the Merino breed; but still proud and happy ministrants of their wool for the texture of this noble decoration. The sisters spin it, not by any new fangled jennies, but on the old patriarchal spindle, and weave it in a loom of which the pattern might date from the days of Penelope.

Concluding remarks on Spinning.—To the substitution of circular for straight motions, and of continuous for alternating ones, may be attributed nearly all the conveniences and elegances of civilized life. It is not too much to assert, that the present advanced state of science and the arts, is due to revolving mechanism. We may speak of the wonders that steam and other motive agents have wrought; but what could they have done without this means of employing them? The application of rotary in place of other movements, is conspicuous in modern machinery, from that which propels steam ships through the water, and locomotives over land, to that which is employed in the manufacture of pins and pointing of needles. It is by this, that the irregular motion of the ancient flail and primeval sieve, has become uniform in thrashing, bolting, and winnowing machines—hence, our circular saws, shears and slitting mills—the abolition of the old mode of spreading out metal into sheets with the hammer, by the more expeditious one of passing it through rollers or flatting mills—and hence, revolving oars or paddle wheels for the propulsion of vessels—the process of inking type with rollers in place of hand-rollers—rotary and power printing presses—and revolving machines for planing iron and other metals, instead of the ancient practice of chipping off superfluous portions with chisels, and the tedious operation of smoothing the surfaces with files. But in few things is the effect of this change of motion more conspicuous than in the modern apparatus for preparing, spinning, and weaving vegetable and other fibres into fabrics for clothing. The simple application of rotary motions to these operations has revolutionized the domestic economy of the world, and has increased the general comforts of our race a hundred fold.

The birth of the arts here, and not least among them that of the humble one of spinning, is related to a problem of American ethnology of great and increasing interest—the early occupancy or first peopling of this half of the earth. Were there through countless ages, no eyes and hearts here to respond to the smiling heavens—none to taste the teeming fruits and inhale the aroma of flowers—was the placid atmosphere never rippled by the prattle and laughter of children—nor the song of a bird, nor the movements of a quadruped arrested by the sight of one of the race ordained to rule over them; until a few straggling members of that race arrived (perhaps casually) from abroad, to claim the splendid heritage? If the red man was not indigenous to the soil—to the manor born—if the first settlers were aliens, how natural the desire to know who they were? whence they came? and how? and when? and over what spots the first pre-emption rights extended? To ask—have they left no memorials in the languages that have come down; in legends, manners, customs, traditions, religious observances and rites—no sign manual in arts—in utensil, arms, and other relics extant. Have they left not 'their

marks' in earthworks—those most lasting of records—in quarries and entrenchments,—in mines, tumuli and mounds?

It is reasonable to suppose—and difficult to suppose otherwise—that if no human form was ever reflected from the surfaces of the lakes and rivers of this vast expanse, no human voice heard in its glades and forests, the imprint of no human foot left on the sands, until colonized from another continent, the arts of that continent must have been considerably advanced ere the means of transport or inducements to emigrate were evolved: and under any circumstances a knowledge of the most essential would be brought over. Of these, such as related to the domestic habits and occupations of women would be prominent, and spinning among the foremost. When once introduced, this could not have become lost—indispensable as it is to the savage and semi-savage condition—while the original process or processes, whencesoever derived, unless superseded by better, would be continued in vogue by them and their posterity.

Now, if the first mothers of the American race emigrated from any of the early advanced sections, or outskirts of Eastern civilization, they brought the distaff and spindle whirling free in air, with them: yet nothing of the kind was found at the conquest. It cannot of course be imagined that they, or their descendants, could have been induced to throw the former away, and embarrass the movements of the latter in a calabash or basket. Efficient previous practice, and acquired habits and expertness, could never have been laid aside for such rude and laborious, and unproductive substitutes.

We know that the distaff and spindle have never been lost when once known in the old world: neither civil commotions, political revolutions, nor duration of time affected them—witness Egypt, Assyria, Greece, Italy, Carthage, Persia, Scythia, Asia-Minor, and all the great and small theatres of past history. The laws, learning, science, arts, and even races which once flourished in those countries, have mostly vanished, but women still spin there as they did from thirty to forty centuries ago—and so it is here also; the principal mechanical devices of the old Mexicans, Nicaraguans, Peruvians, Chilians, &c., are no longer known; the means by which the stone architecture, the basaltic and porphyritic sculptures of Cusco, Uxmal, Copan, Palenque, and numerous other Aztec remains scattered over the continent, were achieved, are a puzzle, yet the household labors of Indian females in those lands remain unchanged; they spin and weave with the same apparatus and embroider as did their kindred in and before the times of Atabalipa and Montezuma.

Admitting that repeated emigrations hither took place at periods remote as, or even behind that of the Illiad and up to the 12th century of our era—that arrivals, designed or fortuitous, thus occurred, and on both or either of the Atlantic and Pacific coasts—we might still more confidently expect to find the distaff and spindle of the other hemisphere domiciled in this. If they came at all they came in hands practised in their use and tenacious of their worth. But no—from the Cape of storms at the South to the limits of human abodes at the North, instead of them the most awkward contrivances prevailed when the white faces came, and such still are found to prevail. The inference would therefore seem to be that the first colonists and their successors for many ages came before spinning was known in their native homes, or at least before the distaff had been added to the spindle, and that the art as practised by the Aztecs and their successors in Central America at the present day, is purely of aboriginal development—is of remote antiquity, and had not before the conquest come in contact with the better processes of the other hemisphere.

Of the three epochs of human condition indicated by the materials of which implements and weapons have been made—stone, bronze and iron—it is uncertain whether the distaff was ever developed under the first—the probabilities are that it was not. In the remote periods in which it is mentioned, some of those who possessed it had progressed far into the second, and some had entered on the third. The great mass of the occupants of this continent at the conquest were found toiling in the cycle of stone; while the Mexicans and Peruvians, the most advanced of Red nations, had discovered and applied the properties of copper and some of its alloys: they had entered on the second, but had not progressed far in it. Had they possessed bronze weapons equal to those of the heroic ages, they might yet have preserved, in a measure, their independence and nationalities.

Clothing is second only to food, and clothing is woven thread. The magnitude and all but paramount importance of the manufacture of thread—including that made of flax, silk, cotton, worsted and other fibrous bodies—afford matter for great surprise. Compare the products of the distaff and spindle of old with that of our mills, and how difficult to realize the change which modern mechanism has wrought! The yearly amount—the lineal extent—of thread now made, who can measure it? It would reach from our planet to neighboring ones, and in time will suffice for a net-work to include the farthest in the system. Turn from the wood cut illustrations here given of ancient, and not yet obsolete, processes to modern manufactories, and it would seem that while Grecian Helens, Syrian Naahmahs, or Mexican Penelopes were preparing an annual supply of clews for their families, the myriads of spindles now twirling by steam and water, produce enough to use the Asteroids as balls on which to wind it, and as bobbins from which to reel it. Even a century ago, a single mill driven by water, is said to have spun or twisted 73,726 yards of silk—i. e.—between 40 and 50 miles at each revolution of the motive axle.

VI.

EARLY MACHINERY IN AMERICA.

To preserve the original forms and features of machines which have been among the foremost in changing the primitive wild aspect of the continent—of opening it to civilization's career,—is not simply a matter of passing interest, but one of present duty, and of future recompense; for when an account of the chief agents employed in working out the great things already achieved, and others yet greater in prospect, comes to be written, the principal materials will be looked for, and should be found, in reports of this bureau. As a part of American history, this ought to be done, because the true annals of a people, their most reliable, unmistakeable, unpervertible, durable and natural archives, are THEIR ARTS—their contributions to practical and productive knowledge; ideas they disclose and apply, to extend and refine the realities of life, compelling nature to yield up new treasures, detecting in matter new properties, employing it in new combinations, moulding it in new forms, putting it to new uses, and drawing from it novel and beneficent results;—all other knowledge of them might be lost, yet in these their genius, industry, morals, enterprise, and position in the scale of nations, would be seen and acknowledged.

We are careful, and justly so, to collect reminiscences of patriotic men of the revolution,—why not the venerable machines of that day, also; since the industrial arts themselves, were then on the eve of a change, more radical than at any previous epoch, and as marked, extensive, and fraught with blessings to the world at large, as those relating to the civil and political rights of man.

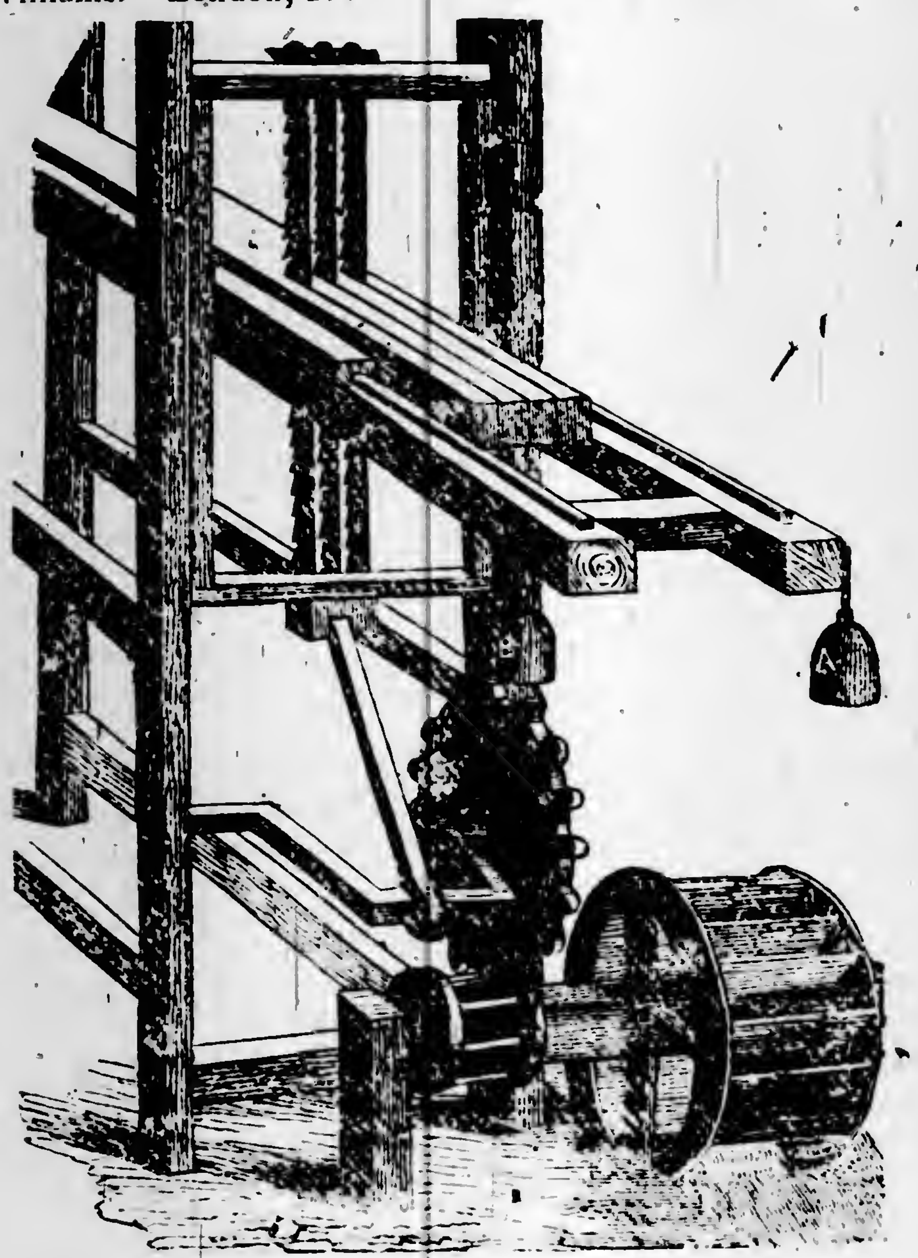
By putting on file our early mechanisms, we shall have in them, so many data or starting points, from which to measure subsequent advances—to mark off the distances we and our successors may leave them behind.

SAW MILL.

Who ever thinks of what this instrument has done for society—of the value of its services from the times of Colonial struggles to those of independence and of empire! How few call to mind the part it now plays, and the impetus it imparts in every upward movement! An invention almost contemporary with the infancy of civilization, it is among the favored few that in one form or another, are ordained to accompany man throughout his destined career.

The axe produces the log hut, but not till the saw mill is introduced, do framed dwellings and villages arise; it is civilization's pioneer machine; the precursor of the carpenter, wheelwright and turner, the painter, joiner, and legions of other professions. Progress is unknown where it is not. Its comparative absence in the Southern continent, is not the least cause of the trifling advancement made there during three centuries and a half. Surrounded by forests of the most valuable and variegated timber, with water-power in mountain streams, equally neglected, the masses of the people live in shanties and mud hovels, not more commodious than those of the aborigines, nor more durable than the annual structures of birds. Wherever man has not fixed and comfortable homes, he is, as regards civilization, stationary; improvement under such circumstances, has never taken place, nor can it.

The modern saw mill, driven by steam, differs from those set up by the pilgrims at the East, and by the first planters at the South. An original portrait is given in an old tract, entitled—"Virginia's Discovery of silk worms, with their benefit, and the implanting of Mulberry trees. Also the dressing and keeping of vines, for the rich trade of making wines there. Together with the making of the saw mill very useful in Virginia, for cutting of timber and clapboards to build withall, and its conversion to other as profitable uses." By Ed. Williams. London, 1650.



An Explication of the saw mill, an Engine wherewith by force of a wheel in the water, to cut timber with great speed.

"This engine is very common in Norway and mountains of Sweden, wherewith they cut great quantity of Dealbords; which engine is very necessary to be in a great Towne or Forrest, to cut Timber, whether into planks or otherwise. This heer is not altogether like those of Norway; for they make the piece of Timber approch the sawes on certaine wheels with teeth; but because of reparations which those tooth'd wheels are often subject unto. I will omit that use; and in stead thereof, put two weights, about 2. or 300. pound weight apiece; whereof one is marked A, the other B. The cords wherewith the sayd weights doe hang, to be fastened at the end of the 2. peeces of moving wood, which slide on two other peeces of fixed wood, by the meanes of certaine small pulleys, which should be within the house, and so the sayd weights should always draw the sayd peeces of moving wood, which advancing alway towards the sawes rising and falling, shall quickly be cut into 4, 5, or 6 peeces, as you shall please to put on saws, and placed at what distance you will have for the thicknesse of the planks or bords ye will cut; and when a peece is cut, then let one with a Lever turne a Rowler, whereto shall be fastened a strong cord which shall bring backe the sayd peece of wood, and lift again the weights; and after put aside the peece already cut, to take againe the sawes against another peece of wood. Which once done, the ingenious Artist may easily convert the same to an instrument of threshing wheat, breaking of hemp or flax, and other as profitable uses."

The idea of a thrashing mill here thrown out, nearly a century before Jethro Tull alarmed his superstitious neighbors by "wickedly constructing a machine for beating out corn without manual labor," will be new to many writers on agriculture.

The ancients used marble to an enormous extent, and according to Ausonius, mills driven by contributaries of the river Moselle, were employed in sawing it into slabs. But history has hitherto afforded no indications of timber having been slit into boards by water power, so early.

At the close of some general remarks on "Incomparable Virginia," "this ornament of the new world which nature has regarded with a more indulgent eye than she hath cast upon many other countreys,—whatever China, Persia, Japan, Cyprus, Candy, Sicily, Greece, the South of Italy, Spaine, and the opposite parts of Africa, to all which she is parallel, may boast of, will be produced in this happy country." "Duly considered for exactnesse of temperature, goodness of soyle, variety of staples, and capability of receiving whatever is produced in any other part of the world, Virginia gives the right hand of preheminence to no province under Heaven; she may, with as great justice as any country the Sunne honours with his eye-beames, entitle herself to an affinity with Eden, to an absolute perfection above all but Paradize," &c., &c.

The writer inserts a list of staples and prices, interesting and worth preserving:—

A valuation of the commodities growing, and to be had in Virginia: valued in the year 1621.

And since those times improved in all more or less, in some $\frac{1}{3}$, in others $\frac{1}{2}$, in many double, and in some treble.

Iron, ten pounds the Tun.

Silke Coddes, two shillings six pence the pound.

Raw Silke, 13s. 4d. the pound, now at 25s. and 28 per pound.

Silke grasse to be used for cordage, 6d. the pound; but we hope it will serve for many better uses, and so yeeld a far greater rate, whereof there can never be too much planted. Of this Q. Elizabeth had a silke Gowne made.

Hemp, from 10s. to 22s. the hundred.

Flax, from 22s. to 30s. the hundred.

Cordage, from 20s. to 24s. the hundred.

Cotton wooll, 8d. the pound.

Hard pitch, 5s. the hundred.

Tarre, 5s. the hundred.

Turpentine, 12s. the hundred.

Rozen, 5s. the hundred.

Madder crop, 40s. the hundred; coarse madder, 25s. the hundred.

Woad, from 12s. to 20 the hundred.

Annice seeds, 40s. the hundred.

Powder, Sugar, Panels, Muscavadoes and whites, 25s. 40. and 3l. the hundred.

Sturgeon and Caveare, as it is in goodnesse.

Salt, 30s. the weight.

Mastick, 3s. the pound.

Salsa Perilla, wild, 5l. the hundred.

Salsa Perilla, domestick, 10l. the hundred.

Red earth allenagra, 3s. the hundred.

Red allum, called Carthagena allum, 10s. the hundred.

Roach allum, called Romish allum, 10s. the hundred.

Berry graine, 2s. 6d. the pound; the powder of graine, 9s. the pound; it groweth on trees like Holly berries.

Masts for shipping, from 10s. to 3l. a peace.

Pot-ashes, from 12s. the hundred, to 14. Now 40. and 35s. the hundred.

Sope-ashes, from 6s. to 8s. the hundred.

Clapboard watered, 30s. the hundred.

Pipe Staves, 4l. the thousand.

Rape-seed oyle, 10l. the tun; the cakes of it feed kine fat in the Winter.

Oyle of Walnuts, 12l. the tun.

Linseed oyle, 10l. the tun.

Saffron, 20s. the pound.

Honey, 2s. the gallon.

Waxe, 4l. the hundred.

Shomacke, 7s. the hundred, whereof great plenty in Virginia, and good quantity will be vented in England.

Fustick yong, 8s. the hundred.

Fustick old, 6s. the hundred, according to the sample.

Sweet Gums, Roots, Woods, Berries for Dies and Drugs, send of all sorts as much as you can, every sort by it selve, there being great quantities of those things in Virginia, which after proof made, may be heere valued to their worth. And particularly, we have great hope of the Pocoon root, that it will prove better than madder.

Sables, from 8s. the payre, to 20s. a payre.

Otter skins, from 3s. to 5s. a piece.

Luzernes, from 2s. to 10. a piece.

Martins, the best, 4s. a piece.

Wild cats, 18d. a piece.

Fox skins, 6d. a piece.

Muske Rats skins, 2s. a dozen.

Bever skins that are full growne, in season, are worth 7s. a piece.

Bever skins, not in season, to allow two skins for one, and of the lesser, three for one.

Old Bever skins in Mantles, gloves or caps, the more worne, the better, so they be full of fur, the pound weight is 6s.

The new Bevers skins are not to be bought by the pound, because they are thicke and heavy leather, and not so good for use as the old."

VII.

COMMUNICATIONS.

Dyeing, Spinning and Weaving, by the Camanches, Apaches, Navajoes, &c.—In a letter from Judge Peters, of Santa Fé, N. M.

Thomas Ewbank, Esq., *Commissioner of Patents,*

Dear Sir:—Fully appreciating the heartiness and zeal, with which you direct your researches into the various branches of inquiry and learning connected with your important bureau, I with great pleasure, but with diffidence, accede to your request, and give you such information with regard to the manufactures of wool and cotton, as I have acquired in my rambles among our western Indians; and more especially, among the Navajoes, Camanches and Apaches of Western Texas and Southern New Mexico. I have not been further west than Paso del Norte, in Texas—nor further north than Sonora, in New Mexico, and the surrounding country.

It is known to every observing traveller in those parts of our country—now no longer remote—that the brilliancy and durability of the various shades of primitive colors, and the few semi-colors that those Indians dye their wool in, are probably not equalled by the learned and scientific chemists of Europe, and our own country—an important fact, that seems not to have excited the curiosity of our otherwise enquiring countrymen. Should I be able, through your instrumentality, to bring to the public notice, such facts as well lead to enquiry and investigation, I should consider myself as having contributed somewhat to our national advancement in one branch of the arts at least, and that one of the most important.

The Camanche, Navajoe, and Apache Indians, present the curious spectacle of marauding bands of well mounted men; seemingly always committing predatory incursions upon their civilized neighbors, the Texans and Mexicans, apparently constantly on the alert for evil, and yet, possessing great skill in the more peaceful and benevolent habits of the herdsman and shepherd.

The depredations of the immense number of sheep, almost daily chronicled in our gazettes, are not made to appease hunger only; but to add to the already immense flocks that overspread, as I have been told by them, the region of country lying west of the Sierra Madre, and east of California—a region as yet totally unexplored and unknown.

In the spring and summer of 1843, in company with an old friend—one of the Creeks who had emigrated west of the Mississippi soon after the treaty with them in 1832—I travelled westward. My guide and companion had acquired a good knowledge of the language and habits of the Camanches, Navajoes and Apaches, and had probably not altogether abstained from joining them occasionally in their irruptions upon the settlements of their timid neighbors of Chihuahua and Sonoro. I found him "as one having authority," and of course, very useful, both in the protection he afforded me, and the information he enabled me to acquire.

Among the first objects of interest to me, next to the matchless feats of horsemanship they perform, and which have so often been written of—was the number and variety of articles wrought by them, both useful and ornamental, and which might well vie with the skill of more civilized artizans. Among these were the beautiful fabrics composed of wool, and a kind of grass cloth, and some few of cotton. The object, however, of greatest interest to me, was the art of imparting to wool, &c. the beautiful colors I had often before admired, and to this I gave most attention. Like other Indians, I found them unwilling to impart knowledge voluntarily, and I had in my previous and long intercourse with the western tribes, early learned not to make inquiries that might excite their special attention to my designs. Our Indians are not disposed to impart to their white brethren, unless their citizens, any thing that might be useful out of their own country, in which particular, they are not unlike the Chinese, so that with the exceptions of their modes of dying and spinning, I will not now attempt to give you any certain account. The information I derived, and minutes made at the time, will now only enable me to give you the modus operandi of extracting their dyes, without being able to give you the names of the ingredients. The specimens I had been enabled to collect have become dried up, and many have been lost by crumbling, and I was not enabled to procure seeds or other means of re-producing the plant, and am not sufficiently a botanist to give you a technical description of them. I can give you the facts only, but these are of sufficient importance to awaken curiosity, and lead to the investigations of secrets by those more intimately connected with the subject treated of, and I think of sufficient importance to have that enquiry efficiently made under governmental auspices.

I may be mistaken, but to my apprehension, if Congress were to appropriate a sum of money sufficient to induce intelligent and competent persons to spend a year or two among the Camanches and Navajoes, and thus enable them to acquire an accurate knowledge of the plants used as dyes—procure seeds and plants—and obtain such practical information in their art of dying as would enable our manufacturers to acquire that art, it would be legitimately advancing the general welfare of our country in a greater degree than it does by applying to many uses the public treasure so often contributed.

The colors most admired by the Camanches and Navajoes are crimson, blue, purple and green; consequently these colors are the most common among them in all their shades; and though in their weavings they blend these with brown, yellow and other colors, with singular judgment and taste, yet it is the brilliancy of those that you most admire.

All their primitive colors are the products of the prairie and mountain flowers, and their semi-colors are composed of these and the inner bark and roots of but few other plants combined in such proportions as the hue intended to be produced. They have no mineral dyes that I am aware of. Many of these flowers are small, indeed most of them; and the plants of low size, and begin to bloom in February, March and April, and continue till summer. During the blooming, the flowers are gathered early in the morning, with the dew upon them, and dried of the dew under a shade. The leaves are carefully picked off, the stems and such as have their petals covered with pollen of another color—*e. g.*—such as are purple or scarlet with petals of yellow or white pollen, are carefully separated from it. Particular flowers only are selected; all flowers of purple color not used to dye purple, and so of every other color, but such only as are known to make an indelible dye.

When the desired quantity of leaves are collected they are carefully and cleanly bruised and into them a small quantity of ley (I shall hereafter describe it) is put, but only enough to make a thick paste—which has the property of loosening the dye from the fabrics, and facilitating its extraction. A small bag shaped like a money purse, and but little larger, made of new dog skin, deer or wolf skin, tanned by the Indians in a manner peculiar to them, is used to compress the juice from the pulp. This bag, a foot or eighteen inches long and three or four inches wide, is half filled with the pulp. Two small handles of wood are stuck through the ends of the bag, about the length of a corkscrew handle, and used to grasp a firm hold, and as levers by which the bag is twisted until the juice is extracted through the pores of the skin, which are very open.

Whether extracted or not for immediate use, the dye is carefully bottled, in glass if it can be procured, or in small bladders, if glass is not to be had. I say small bladders, because if put away in large quantities, the dye sometimes spoils, they say, and produces dingy colors. When put away for future use the light is carefully excluded by overwrapping with skins, or any thing else, and generally buried in the ground under a shelter in which fire is not used, so as to exclude heat. The dyes however, are generally used soon as extracted, as during the winter the women prepare their best wool, and have it ready in the spring and summer for the process of dying.

The pulp after compression is put into a small quantity of the same ley above spoken of, and permitted to remain several hours to extract any remaining dye that might be in it, and undergo the same squeezing process until no dye remains.

The ley is made with care of the ashes after burning, of the green wood of a shrub very similar to the *Auralia Spinosa*, if it be not the same of a stunted growth. So careful are they of procuring this ash unadulterated, that they have dry parcels of it laid by with which to ignite the green wood, that the ashes may not be commingled with those of other woods. The ley is usually made in a large gourd, well cleaned and dried, with the butt end cut off, and a small hole bored through the point of the neck to drip from. The gourd is three quarters filled with the ashes considerably compressed in it, and by a bale or handle suspended from a bar containing several of them. Each is then filled with rain or pure river water: the point is stopped, and the water allowed to remain on the ashes for a day and night, and then permitted to drip into the vessel placed to catch the ley.

This ley is a little colored, and is clarified by the same process of filtration through clean white sand, or sand that has been used for the same purpose before—when clarified, the ley is used as before stated, and especially to set the colors, which seems to be the principal use of it. It has no caustic quality

after filtration, but an astringency peculiar to itself—rather a pungent than burning quality. It is sometimes used to dilute the darker dyes and produce lighter shades.

The wool to be dyed is washed in warm water until perfectly cleansed of the natural oil—using the root of a plant very abundant in Texas and southern New Mexico, as well as most of the southern States, of a very saponaceous quality, and known as the soap plant. In all their best fabrics—blankets, belts, leggings, &c., made of wool, their finest fleeces are used, and it is not unknown to many of our army officers and others, that the Navajoes give great attention to their management of sheep, and often produce fleeces almost or quite equal to the merino in fineness and softness of texture, by their skilful crosses and selections made after long and minute observations and care. A Camanche and Navajoe are as much delighted with the possession of a superior ram and ewe as of a fine horse, to the breeding of which they also give much attention. Von Thaer would not be more so with the possession of his finest buck. All their wool is dyed before spinning, and this is done by submerging it in the dye and letting it remain ten or fifteen days, the dye-pot being left covered: but during this soaking the wool is turned over once every day. Sometimes the lighter shades are imparted to the wool by soaking a shorter time—they say this produces a clearer tint. If not dark enough, the same process is repeated with fresh dye. I have been told by my guide, that the Camanches fumigate the wool after dying, over a smoke of the above described wood, to deepen the color, but I never saw it done.

Their green color is produced from the leaves of several plants, the juice of which is expressed in the same manner as from the flowers, and used in the same manner.

Their brown color is made from the inner bark, roots and nuts of the walnut and of other trees, much in the same manner as our farmer's wives now dye their wool for home-made jeans.

After the dying is finished, the wool is dried in the shade, and when well dried, exposed to the sun for a few hours; the dying is then complete, and the wool ready for spinning, except sometimes, perhaps, not always, they oil the wool slightly, and diffuse the dampness through it by rubbing and rolling it in the hands. I do not know the precise object of this, but they say it works better. This does not impair the color, for washing restores them to their first brightness.

It seems to be the peculiar quality of the *set* that gives the lasting brilliancy of the color. I have seen the Camanche blankets, after being used for months, and abused by being put under the saddle, saturated with sweat, rained upon, slept in upon the naked earth, and when carefully washed, present the colors again, as bright as newly dyed silk.

THE SPINNING

Is what you would call twisting the thread; this is done altogether by the fingers, and somewhat similar to the ancient distaff, though reversing the order of operation. The distaff was used to wrap the raw material upon, and the spool or quill was used not only to wind the thread upon, but as the spindle to twist it. The Camanches reverse this order, and use the raw material for the spindle, and the spool only to wind the thread upon. See figure in Section VII. They use no distaff.

In spinning, a small portion of wool only is used at a time—a mess, say, of a quarter pound weight, and shaped like an egg, say four or five inches long, and two or three in diameter, is wrapped around with a string sufficiently tight to keep it together, but loose enough at the point to permit the wool to be drawn out for spinning the thread—a small stone, of an ounce or so in weight, is tied on the middle of a stick of about six inches in length, and inserted in the lower part of the bunch. This is to add weight to it without increasing the size, and is used as dead weight, to increase and continue the velocity when twirled round by the fingers.

The spinning is begun by first twisting a thread of five or six inches in length, which is wound around a stick of ten or so inches long, and half an inch in diameter, which is held in the left hand, and serves for the spool to wind the thread upon. After the thread is commenced, the spinning proper begins, and is then continued, by constantly keeping the bunch of wool swiftly rotating horizontally, by twirling it with the thumb and middle fingers; at the moment the twirl is given, a slight jerk downwards is made, to draw out the wool, and a simultaneous slight yielding of the left hand, to prevent the thread separating from the mass until the twist is given it, and when sufficiently spun, is wound upon the spool. They usually spin three or four or six inches at a time—and wind up every time. The thread is usually twisted hard, and always doubled before weaving. I have seen thread spun altogether by the fingers, and the spinning and weaving is by no means confined to the women; men are often engaged in it, and exhibit much taste and skill in devising the patterns, as well as blending the colors. After small parcels of the wool are well loosened by picking and straightening with the fingers, it is tied loosely together with a string, to prevent the bunch falling apart; or it is often put in a small bag, of four or six inches diameter, and drawn together at the mouth, leaving portions of the wool protruding from it in a point, to facilitate its being drawn out to form the thread. A weight of an ounce or two—usually a flat stone, is tied in the middle of a stick of six inches in length, and half an inch in diameter, and is enclosed within the wool, or the bag, near the bottom of it, and acts as a dead weight to facilitate the momentum when turning round. The ends of the stick project from the mass of wool like two handles, and are used to twirl it with the fingers.

The thread is usually about the fineness of our good Osnaburg, and spun sufficiently hard to twist readily when doubled, and makes the doubled thread not very hard. After the spinning is finished, and previous to weaving, the thread is measured, by *hanking* it over two pins a certain distance apart. This is only to ascertain the length of the thread required, and is then formed into a ball.

The Navajoes have another and a more artistic manner of spinning, for which it has been thought they were indebted to white instructors, but which they indignantly deny. Two boards, of two or three feet in length, and three to six inches in width, as may be procured, are pinned on opposite sides of the crotch of a tree of convenient height, or of two posts set in the ground near each other, or two trees growing near together. Two holes are bored in the boards, one opposite the other, and about one and a half inch in diameter. A limb of any kind of tree with a branch diverging at right angles, is procured. The larger limb is cut off about eighteen inches each way from the branch, so as to be about three feet long. The branch is trimmed off to fit the holes, and constitutes the spindle. The limb is used as the handle, and

as a fly to continue the momentum. The whole apparatus is unique, simple and efficient, and I would say an original one.

The spinning is commenced like the first process, by twisting with the fingers a short thread, then fastening it to the point of the spindle. The spinner has already prepared, by picking with her fingers, a quantity of wool which she has in her basket or bag, tied around her waist, or in a bundle like the one described in the previous process. A person twirls around the handle or fly, and the spinner keeps moving backwards as the thread is formed. The process is much the same as that by which our rope makers spin hemp by hand. A thread of six or eight feet in length, is spun before being wound up.

The Indian never spins until he or she has a specific work to perform. The size, plan, configuration, and every other requisite, is first determined. The quantity of thread required for any piece of work, is from long habit, pretty accurately known. I think I have said already, that all their weaving is done with a double and twisted thread. They waste no thread. They usually spin a small quantity and weave, and then spin again, and so on, until the work is completed. The process is the same for cotton, wool, grass, &c.

Weaving is the most elaborate of their arts, and they make beautiful work. Their blankets, or I should call them shawls, are often rich, strong and showy. Some have a resemblance to the Persian shawl. They frequently sell in Mexico for three hundred dollars, and I have seen them sell in New Orleans for two hundred dollars. I have one in my possession, taken by Gen. Houston at the battle of San Jacinto, which cost three hundred dollars. They are usually impervious to water, very heavy, and are rather plaited together than woven. The time occupied in making one of these, is from four to six, and sometimes eight months.

Very respectfully,

J. HENRY PETERS.

WASHINGTON, January, 1851.

Memorandum of Navajo Blankets, by R. H. WEIGHTMAN, *of Santa Fé, Senator elect of New Mexico.*

NAVAJO INDIAN BLANKET.

The Navajo Indians live west of the Rio del Norte, about the base of the Rocky Mountains, between parallels of latitude 32° and 35°. They are far advanced in the arts of peace—cultivate the soil, raising wheat, maize, melons, fruits, beans, &c. They own large flocks and herds, and in the cultivation of breeds by judicious crossing, are said to have made some progress.

They are *Manufacturists.* The blankets made by them are of wool, and dyed in bands of black and blue (fast colors.) The red bands are made of the English red Indian cloth, unravelled and worked up anew. These blankets hold water. A bucket of water may be carried in one of them for miles.

They are skilful diplomatists—the proof of which is that since 1846 they have negotiated with the American authorities four or five treaties of peace, of which they have availed themselves only during their cropping season, carrying on hostilities at all other times. These hostilities are carried on by them to gratify the feeling of avarice—to add to their wealth. They have driven off from New Mexico since 1846 stock to the value of at least $500,000 (half a million.)

A specimen of their blankets (one of the coarse sort) is at the house of Mr. R. S. Coxe, Esq., F street, between 6th and 7th.

R. H. WEIGHTMAN.

Washington, Jan. 7, 1851.

TYPE FOUNDING.

Of contributions by inventors and artizans to the great work of mental development, there are three that have been conspicuous in bringing out the modern outburst of thought. But for them the genius of refinement had never made the progress she has; nor without them could she advance a single step further. Successfully employed in hastening a present, they are securing the future elevation of our race. Preventing retrogation in intelligence, they add daily to the general stock, and are posting it up for the use of our successors. United, they have revealed a potency unknown to the ancients:—They are metallic types, paper and the printing press;—a triad of achievements in mechanical science unrivalled in importance and value. While water, wind, steam, electricity and the gases, serve to animate material mechanisms, these are the elements of a higher and mightier prime mover; one destined to agitate and expand the intellect of the world; to extend and perpetuate the peaceful reign of science and arts over the earth.

Type Founding in the United States, by George Bruce, *Esq., of New York.*

Type founding is not a business of great industrial importance, but is valuable as being the fundamental branch of the letterpress printing business, and interesting as the great discovery of the 15th century, by which books, which were before possessed by the rich only, were brought within the reach of people of moderate means, encouraging the learned, and promoting the arts and sciences, through the cheap diffusion of knowledge.

As soon as type founding had been brought to a moderate degree of perfection, by forming copper matrices from steel punches, and a variety of sizes of type had been introduced, it must have been separated from the business of the printing office and made a distinct art; for the same moulds and matrices, with the constant employment of a few workmen, could supply all the type that was required for many printing offices, and thus save the expense of separate moulds and matrices for each one. It would indeed require a demand from many printing offices to furnish the business necessary for a single type foundry and to keep it in activity.

In the year 1683, as Joseph Moxon states in his Mechanical Exercises, the number of different bodies of type cast in England was ten: the smallest having 184 lines in a foot, and the largest 17½. Each of these sizes or bodies required about 250 matrices. In 1789 the number of sizes or bodies in the British type foundries, amounted to upwards of twenty, of which the smallest, called Diamond, had 202 lines in a foot, and the largest, called 12-lines Pica, had six lines. Four foundries at that time furnished all the types used in Great Britian and Ireland, in all their colonies, and in the United States, which had become then independent. It is not probable that these foundries employed more than fifty casters and a hundred other persons, or altogether 150 persons. This must seem a very small number, though probably overrated. A caster's work is stated at from 3,000 to 4,000 letters in a day. Take the highest number, and supposing it to be of the body called Long Primer, having 90 lines in a foot, it will amount to 10 lbs., and in a week to 60 lbs. Ten such casters would produce 600 lbs. in a week; a quantity quite sufficient to print the largest newspaper published at that time, and to last twenty years, if used only for a weekly issue of 1,000 impressions.

The number of Printing offices in the United States, when independence was declared, could hardly have exceeded fifty, of which 37 published newspapers; and the annual importation of types could be supplied by the work of two casters. This constituted the difficulty of introducing type founding; the demand was necessarily too small for the proper maintenance of one, even if all the printers had united in support of a domestic establishment. Hence every attempt to establish before the revolution, and there were several, failed, as might have been foreseen. In 1790, the number of newspapers was 70, and some of them were published daily. The population and prosperity of the country after the revolution became actively progressive; and in 1796, when the exports of the year amounted to $60,000,000, the duties on imports were raised to 15 per cent. ad valorem, the inhabitants numbered 4,500,000, and the printing offices had increased to 150, the favorable moment at length arrived.

Type founding, unconnected with any other branch, was then commenced in Philadelphia, by Archibald Binny and James Ronaldson, natives of the city of Edinburg, where Binny had carried on the same business. Their assortment was not extensive, but it embraced the essential fonts, Brevier, Bourgeois, Long Primer, Small Pica, Pica, and Two-line letters. They were obliging and attentive, and in twenty years made a fortune. They improved their foundry according to the increase of printing and the consequent demands of the trade, extending their assortment from Pearl of 180 lines in a foot to 12-line Pica, having six lines. They made an important improvement in the type mould, by which a caster could cast 6,000 letters in a day with as much ease as he before could cast 4,000.

According to Holmes' American Annals, about 200 newspapers were printed in the United States, in the year 1801, of which 17 were issued daily, 7 three times a week, 30 twice a week, and 146 weekly. There must also have been at the same time as many as 60 offices engaged in miscellaneous printing. The whole business had increased three-fold in eleven years. Another type foundry was put in successful operation in Baltimore, about 1805, by Samuel Lower & Co. It had in it some moulds and matrices which had been used by Christopher Lower, who printed in Germantown near Philadelphia, and cast his own types, in 1740. He printed with German characters; but now the foundry was revived with excellent Roman and Italic letters, and among other extraordinary things it had the size called Diamond, with a smaller face than had ever been cast before. It was the smallest type in the world.

The demand for type was very brisk till the war of 1812 commenced, and the foundries were generally three or four months in arrears in their execution of orders. The names of the newspapers published in the United States, in April, 1810, are given in Thomas's History of Printing, and amount to 359, of which 27 were daily papers; 38 were printed twice, 15 three times, and 279 once in a week. Add those required for general printing, and the whole number of offices could not be less than 500, being an increase of 240 in nine years, and some of them using several thousand pounds of type for book printing.

In 1811, Elihu White established a Type foundry in New York. He had been long engaged, in connection with Mr. Wing, in the manufacture of printing types, at Hartford, Connecticut, upon a plan of their own invention, by which 20 or 30 letters were cast at once, and had brought it to a useful degree of perfection; but now, abandoning the invention, he adopted the old plan of casting, and having a good assortment of faces, and bodies, his removal to New York was a great convenience to its printers, and they gave him a very satisfactory support. But the principal business in type founding still continued for some years to be done in Philadelphia.

In 1813, another type foundry was begun in the city of New York, by D. & G. Bruce, principally to cast types for their own use. They had carried on book printing for seven years, and had now become acquainted with the stereotype art—Mr. David Bruce, having visited England, in 1812, and acquired it by purchase and actual labor. For ordinary printing, it was customary to level off the body of the type at the face end, or shoulder, as it is usually called, which unfitted it for making a strong stereotype plate in the most approved way: hence, the necessity for casting type expressly for stereotype. Their first font was Bourgeois, with which, they cast two sets of plates of the New Testament, the common school Testament, and sold one of these to Matthew Carey, of Philadelphia, retaining the other for their own business. But these were not completed till 1814. In 1815, they cast the plates of the 12mo. School Bible, on Nonpareil type, prepared like the Bourgeois, at their own foundry expressly for stereotyping. They thus gave the first stereotype School Testament and School Bible, to America; but not the first stereotype book. John Watts, of England, also commenced stereotyping in New York, in 1813, and completed the Westminister Catechism that year, a volume of 120 pages, 12mo. David Bruce, invented the planing machine for equalizing the thickness of stereotype plates, which is now used in every stereotype foundry in the United States. The process of stereotyping is, however, entirely different from that of ordinary type founding, and it is, therefore, generally carried on as a separate business, or connected with the composing department of a printing office. Twenty compositors, and two proof-readers, will furnish full employment for one moulder, one caster, and three finishers, who will, among them, complete on an average, 50 pages of octavo per day. There are now sixteen of these stereotype foundries in the city of New York, employing about 400 persons. Probably 600 more may be employed in the stereotype foundries of other cities and towns of the United States. Altogether, 1000 persons are employed in stereotyping, and cast daily, what is equal to 2000 octavo pages, in doing which, in addition to imported antimony and tin, they use up 3,300lbs. of good American lead.

In 1818, or soon after, a type and stereotype foundry was established in Boston, and another in Cincinnati, principally through the enterprise of the late Elihu White, who having the means of multiplying matrices with facility, took this method for the extension of his business. Others followed his example, and type foundries were established in Albany, Buffalo, Pittsburg,

Louisville and St. Louis, with several additional in New York, Boston, Philadelphia and Baltimore. The business in fact was overdone, and failures and suppressions took place, as competition reduced the prices of types.

The mode of type founding has latterly undergone some important changes, which must no doubt be considered improvements. First among them, is the introduction of machine casting, in which a pump forces the fluid metal into the mould and matrix, and gives a sharper outline to the letter than was formerly given by the most violent throw of the caster. The old practice of casting only a single type at a time remains. The first idea of this machine originated with Wm. M. Johnson, who obtained a patent for it in 1828. Elihu White, put it into use in his type foundry, and persevered in using and trying to improve it as long as he lived; but he did not succeed in removing the greatest fault, which was a hollowness in the body of the type cast by it, that inclined them to sink under the pressure of the printing press. Other machines for casting printing types, have been brought forward within the last ten years, and various modifications and improvements have been made in them, which have at last commended them to general use. By their use three times the quantity of type that was cast by Binney & Ronaldson's improved mould, is now cast in a given time, and nearly five times the quantity that was cast by the common hand mould, fifty years ago. This improvement has passed into Europe, and been adopted by some of the German type founders; but in Britain, it has found no favor, and types there, are still cast in the same kind of mould as was used two hundred years ago, or in the earliest known type founding, at the rate of 4000 letters in a day.

The next improvement to be mentioned, is the application of electrotyping to the formation of matrices, by which a great saving of labor is effected. In old fashioned type founding, the original of each character, is formed on a separate steel punch, which being hardened and tempered, is driven into copper a 16th of an inch or more to form the face of the type, called a matrix. This matrix being adjusted to the mould, which is to form the body of the type, is then ready for casting. If the punch with its matrix be of a very plain or simple character, it will have cost two dollars, and have occupied a day of one workman, though generally, the punch and matrix are made by different workmen. If the punch be of a fancy character, with scrolls and figures in it, requiring tedious engraving with much nicety and mathematical accuracy, it may occupy many days to cut it, and may be worth fifty dollars; but more commonly a fancy or ornamental character costs from five to ten dollars. Our type founders generally adhere to the old way of getting matrices for the fonts, commonly used in printing newspapers and books; but stereotyping is resorted to for many of the ornamental fonts and borders. The French have produced a great variety of fancy types within the last fifteen years, and offer to sell matrices of them for fair prices, but even such matrices without the punches come high. They also sell the type, which being brought to this country, are used by our type foundries, to produce electrotyped matrices, from which similar type can be cast, and thus a very great saving of time and money is effected.

It may seem unfair to the moralist, that the works of a laborious artist should be taken in this way without compensation, and used in competition with him in every market to which our manufactures are admitted. In that view it is a hard case, no doubt. But the type founders are not wilful wrong-doers in this matter. They have been accustomed to think, that when they buy an article, they may use it as they please, there being no law restraining them. They have been educated in this belief, having constantly before them the practice of booksellers, who buy a foreign book, and re-print it in a cheaper style than the original, and then thrust it into every accessible market to the exclusion of the author's sales, and the ruin of his pecuniary prospects. The bookseller, however, while cutting off the author's profits, contributes handsomely to the spread of his fame. This the type founder cannot do; and here, therefore, the parallel ends.

Not foreign articles alone are thus copied by the American type founders. Any article that is saleable, and got up in good taste by one type founder, is instantly electrotyped and cast by others; for there is no law to protect the peculiar property of the original producer, although the art for securing designs, &c. may seem to have a leaning that way. Types cannot have the date of the patent on each one as the law requires for a patented article; and to put the date on the wrapper would only serve to give the notice to the first purchaser. It might seem to be an evasion of the law, and not a fulfilment of its provisions, exposing the patentee to a fine of one hundred dollars upon every complaint, which of course would be made whenever he attempted to assert his patent right.

Perhaps, however, the law was not intended for the protection of printing types, and all this reasoning is useless. But, no doubt, there is a desire to protect every branch of industry, and type founders might be completely protected, by simply permitting them to file an impression of a new article with small expense, as the title page of a book is now filed to secure a copy-right. This is the practice in some parts of Europe, particularly in France and England, where it is called registering.

The demand for printing types in the United States, is continually increasing at a prodigious rate, both for newspaper and miscellaneous printing, and probably the number of printing offices amounts to 4,000. A writer in the New York Tribune, about six months ago, in a sketch of the newspaper press, estimated the whole number published at 2750, of which, nearly 250 were published daily, as follows: New York has 15; Boston, 11; Philadelphia, 8; Cincinnati and Pittsburg, 9; Albany, Nashville and Rochester, each 6; Baltimore, St. Louis, Charleston, Memphis, Buffalo, New Haven, Detroit and Chicago, each 5; Washington, Louisville, Richmond, Norfolk, Troy, Brooklyn, Hartford, Providence, New Bedford and Portland, each 4; Mobile, Savannah, Wheeling, Syracuse, Cleveland and Columbus, each 3; Portsmouth, N. H., Harrisburg, Newark, Oswego, New London, Lowell, Montgomery, Vicksburg, Zanesville, Milwaukie and Wooster, each 2; with some fifty other places which have one each. California is omitted in this enumeration, inadvertently of course, but it had on the 1st of September, at least 13 newspapers, of which 8 were published daily.

The writer in the Tribune estimates, on apparently good information, that the 15 dailies in New York, publish 125,000 papers per diem; the 11 in Boston, 70,000; the 8 in Philadelphia, 75,000; the 5 in Baltimore, 30,000; the 10 in New Orleans, 50,000; and the 201 other dailies, 1200 each. The aggregate makes 590,000 papers for the daily circulation, or 184,080,000 for the annual circulation of the daily papers of the United States. He then assumes that of the 2500 tri-weeklies, semi-weeklies and weeklies, there are 50 which circulate 30,000 each, making 1,500,000 in the aggregate; 50 which circulate 10,000 each, or 500,000 in the aggregate; and the remainder circulate 1000 each, on an average, or 2,400,000 in the aggregate. The whole annual circulation is thus estimated at 412,880,000.

It may be assumed as certain, that with the enlarged size of the present newspapers, each one, on an average, requires 800lbs. of type for its composition, or 2,200,000lbs. for the whole 2750 papers; and if it be also assumed that 1,500,000 impressions are all that can be taken from type on an average of large and small editions, then it will follow that in printing 412,880,000 papers in the year 1850, the type will sustain a wear equal to the destruction of one-tenth of the whole, or 220,000lbs., which may in great part be returned to the foundry, to be re-melted.

There are now four type foundries in Boston, seven in the city of New York, one in Albany, one in Buffalo, three in Philadelphia, one in Baltimore, two in Cincinnati, and one in St. Louis; in all twenty. The seven in New York cast about 2000lbs. of type per day, and employ about 350 persons. The 13 foundries out of the city of New York, are estimated to cast 2400lbs. of type per day, and to employ 450 persons. The aggregate production daily is 4400lbs., by the efforts of 800 persons. The metal used is a mixture of lead, antimony, and tin, in different proportions, suited to the kind of type to be cast, but containing on an average, 75 per cent. of lead. The consumption of lead, therefore, amounts daily to 3300lbs., and yearly to 1,029,600lbs., subject to a deduction for old type returned to the foundries to be re-cast, probably amounting to 20 per cent., or about 205,920lbs., leaving 823,680lbs. for the quantity of new lead consumed per annum.

These foundries not only supply the printers of the United States, but most of the printers in Canada, some in the British West India islands, the Spanish and Danish islands, Mexico and South America. The quality of the American type will bear a favorable comparison with the European, and in cheapness it is unrivalled. The following are the prices at which they have been sold for the last fifty years, given at eight different dates, and naming only the principal and most useful sizes.

Names of Bodies.	1801.	1806.	1811.	1819.	1827.	1831.	1841.	1850.
Pica, . . .	$0.35	$0.44	$0.55	$0.44	$0.42	$0.36	$0.38	$0.30
Small Pica,	.40	.48	.58	.48	.46	.38	.40	.32
Long Primer,	.47	.56	.66	.56	.50	.40	.42	.34
Bourgeois,	.56	.66	.76	.66	.58	.46	.46	.37
Brevier,	.67	.76	.86	.76	.70	.56	.54	.42
Minion,		1.03	1.13	1.00	.88	.70	.66	.48
Nonpareil,	1.12	1.40	1.75	1.40	1.20	.90	.84	.58
Agate,					1.44	1.10	1.08	.72
Pearl,					1.75	1.40	1.40	1.08
Diamond,								1.60

I have thus endeavored to furnish an account of the rise, progress, and present state of type founding in the United States, agreeably to my promise; and although it may appear imperfect, I have not relied on my own recollections, which go back to Binny and Ronaldson's commencement; but have drawn some of the facts carefully, from various and well known sources.

PAPER MAKING IN THE UNITED STATES.

Ivy Mills, Pa., *Dec. 17th*, 1850.

Sir:—Your favor of Nov. 30th, came duly to hand. For want of documents and dates, my report of the rise and progress of the paper manufacture in the United States, must be very meagre, as I have to rely on my limited experience and observation, and on conversations with my father, long ago, to supply this deficiency.

About the year 1725, my grandfather, who was brought up to the paper business in England, came over and settled where I now reside. I have documents to prove that in 1732 he had erected a mill, and was manufacturing paper. The kind of paper then made, was what is called fullers' press-boards, such as are now used by clothiers to press cloth. I believe there was another mill a little north of Philadelphia, and one near Boston, similarly occupied. I believe also, there existed an act of Parliament at that time, prohibiting the manufacture of any other kind of paper in the colonies. As there were few books then published in the colonies, the progress of the paper manufacture was very slow, and so continued until about the dawn of the Revolution. My grandfather manufactured the paper for Dr. Franklin, who was publishing a newspaper in Philadelphia, and who was a frequent visitor at the mill. About the time my grandfather made the paper for the Continental money, he commenced making writing paper, supposed to be the first made in America. From the Revolution, until the year 1820, very little improvement occurred, that was important; very little machinery introduced for facilitating the operation. The mills increased in number in proportion to the increased quantity of newspaper and book publishing. About the year 1810, we began to experience a deficiency of raw material, (rags,) and were obliged to resort to Europe for supplies. These were obtained from all parts of Germany and Italy, and have continued increasing up to the present time. Whether the deficiency at home resulted from a real scarcity of rags, or their low price made it no longer an object to families to preserve them, I cannot say—but such was the fact.

At present we have an additional inducement to import our material. The article of cotton has here almost entirely superseded the use of linen for wearing apparel, and when much worn and reduced to rags, becomes a very tender substance; in fact, scarcely able to support its weight when made into paper. The foreign rags, we suppose average about 80 per cent. of linen, which, when mixed with the domestic cotton, imparts to the paper a strength and firmness, which it could not have without it. The best qualities of writing and printing papers, contain from 30 to 50 per cent. of linen, for which we are entirely depending on foreign countries. But as the use of cotton for clothing is yearly increasing all over the civilized world, we find the proportion of linen in imported rags, decreasing from 5 to 10 per cent. from year to year. We have an excellent substitute for this in our own country, did not its high price prevent its use—raw cotton—which makes a beautiful paper when mixed with the worn-out rags of the same material. In 1837–8, when the price was as low as 6 cents per pound, large quantities were manufactured into paper.

From 1820 to 1830, some efforts were made to introduce machinery from Europe. England and France were before us in its introduction. Several machines were sent out from England—some very imperfect, and the cost too

great for our manufacturers. The patronage then offered was no inducement to our own machinists to construct so expensive a machine; until 1830, about which time, Phelps & Spafford of Windham, Connecticut, made one which answered very well. Soon after, the country was supplied at a reasonable cost, and equal in quality to the best English. Not long afterwards, Howe & Goddard of Worcester, Massachusetts, commenced making them. I have reference only to the Foudrinier—the shaking endless wire-web machines. I believe these two establishments now make all these machines in the United States. The *cylinder* machine, more simple and less costly than the other, is in more general use; but the paper made on it, is not equal in quality. Notwithstanding, it does very well for news, and the various purposes which a coarser article will answer for. These are made in various places throughout the United States.

The interval from 1830 to 1840, was important for the vast improvements made in the manufacture by the application of this kind of machinery for that purpose. Also, by the introduction of the use of chlorine in the form of gas, of chloride of lime, and the alkalies, lime and soda-ash in bleaching, cleansing, and discharging the colors from calicoes, worn out sail, refuse tarred rope, hemp, bagging and cotton waste, the refuse of the cotton mills. These articles which heretofore had been considered only applicable for the manufacture of coarse wrapping papers, have, through the application of this bleaching and cleansing process, entered largely into the composition of news and coarse printing papers, and consequently have risen in value 300 per cent. A few mills possess machinery, and adopt a process by which they are prepared for the finest printing and letter paper. I have seen a beautiful letter paper made of cast off cable rope. Hemp bagging is an excellent material for giving strength, and is in great demand, especially for making the best newspaper. The cost of making paper by machinery, compared with that of making it by the old method, (by hand,) not taking into account the interest on cost, and repair of machinery, is about as one to eight. The present low price resulting from improved machinery; and the low price of printing by steam power has placed newspapers and books in the hands of all; and a great increase of production has followed within the last few years. I have no data by which I could furnish a report of the comparative increase within the last ten or fifteen years. The quantity now made, might be nearly ascertained, if the Deputy Marshals could report the number of *engines* in operation; I suppose 300lbs. of paper would be the average daily produce of each engine—taking into consideration the loss of time and power from a deficiency of water in the summer season. There has been a greater proportional increase of mills in the middle and western states within the last ten years, than in the east. Ten years ago, I suppose 80 per cent. of the supplies for Philadelphia, came from east of the North river; at present, I think there does not come 20 per cent. Formerly, a much greater quantity was sent west of the mountains, and large quantities of rags brought in return. In consequence of the greater number of mills in the west, particularly in Ohio, New Orleans, I am informed, is in a great measure getting supplies there. Formerly, they all went from the Atlantic states.

From the time of the Revolution, the quantity of paper imported has been gradually decreasing; and before the revision of the tariff in 1846, had dwindled to perhaps not more than 2 per cent. of the amount consumed, with the exception of wall papers, of which large quantities were imported and still continue to be from France. Since 1846, there has been an increase of cheap French letter paper, but the amount is small compared with the whole amount of letter paper consumed—probably not more than 3 per cent. There is also a small quantity of ledger and letter paper brought from England; but as the American is quite equal in quality, the importation is gradually diminishing. Within the last two years, great ingenuity has been exercised both in England and in the United States, in trying to make a paper by machinery, to resemble the old fashioned hand made *laid* paper, (yet preferred by many.) To the eye, it is a pretty good imitation, but lacks the toughness, firmness, and surface of the hand made. By an experienced judge, the deception is easily discovered. Notwithstanding, large quantities have been used under the supposition that they were hand made. The reduced price of machine paper, has forced almost all manufacturers to abandon the old method. I believe there are only two mills in operation in the United States, in which it is made by hand, one in Massachusetts, and one of mine. There is a limited quantity of particular kinds, that can be better made by hand, than on a machine. In mine, is made bank note, laid letter, deed parchments, and such as are used for documents, that are much handled, and require great strength and durability. Within the last few years some improvement has been made in the finish of writing and printing papers, by the introduction of iron and paper calenders, for the purpose of giving a smooth surface. The finish of American papers, I think, is now equal to any in the world.

Very respectfully, your ob't sev't,

JAMES M. WILLCOX.

Thos. Ewbank, Esq., *Washington, D. C.*

CHINESE MODE OF REPAIRING CRACKED OR BROKEN VESSELS OF CAST IRON.

Perhaps no device can be named more characteristic of oriental ingenuity—of the most mechanical people of the east—than this. It is one that could only have occurred where ages of experience in the treatment of the metals had elapsed. The idea of an ordinary artisan fusing *iron* with a handful of charcoal, and handling the glowing liquid as if it were but melted wax or tallow, would be considered by our founders as belonging rather to romance than to reality. Every year thousands of vessels, large and small, are with us thrown aside—costly sugar pans of planters, and the more capacious vessels of soap boilers and brewers, as well as culinary cauldrons—that might be restored to soundness by this simple method, and at the most trifling charge.

In 1794–5, Van Braam—the second in command of the Dutch embassy to Pekin, and who afterwards settled in the United States, bringing with him the chain pump and other inventions of the Chinese—was exceedingly struck with the operation—its simplicity and efficiency. He appears to have been the first European who observed it. His account is as follows:

"During our short stay this morning in the village of *Fan-Koun*, I had an opportunity of seeing a tinker execute what I believe is unknown in Europe. He mended and soldered frying-pans of cast iron that were cracked and full of holes, and restored them to their primitive state, so that they became as serviceable as ever. He even took so little pains to effect this, and succeeded so speedily, as to excite my astonishment. It must indeed appear impossible to any one who has not been witness to the process.

All the apparatus of the workman consists in a little box sixteen inches long, six inches wide, and eighteen inches in depth, divided into two parts. The upper contains three drawers, with the necessary ingredients; in the lower is a bellows, which, when a fire is wanted, is adapted to a furnace eight inches long and four inches wide. The crucibles for melting the small pieces of iron intended to serve as solder, are a little larger than the bowl of a common tobacco pipe, and of the same earth of which they are made in Europe; thus the whole business of soldering is executed.

The workman receives the melted matter out of the crucible upon a piece of wet paper, approaches it to one of the holes or cracks in the frying-pan, and applies it there, while his assistant smooths it over by scraping the surface, and afterwards rubs it with a bit of wet linen. The number of crucibles which have been deemed necessary, are thus successively emptied in order to stop up all the holes with the melted iron, which consolidates and incorporates itself with the broken utensil, and which becomes as good as new.

The furnace which I saw was calculated to contain eight crucibles at a time, and while the fusion was going on was covered with a stone by way of increasing the intensity of the heat."

Mr. Balestier, United States Consul at Singapore and United States Envoy to South Eastern Asia, during his recent visit to the United States, politely offered to procure any information for the Patent Office—agricultural and mechanical—that might be desired from the East.

Among other subjects of inquiry suggested to him, iron founding was named: an art of remote antiquity and brought to considerable perfection by the Chinese. The excellence and lightness of their hollow ware are proverbial; while the readiness with which they fuse and handle small quantities of the metal in the reparation of damaged wares excites surprise. The last operation Mr. B. had often witnessed, but without giving special attention to it. He promised, therefore, to minute down the particulars sufficiently in detail to enable any mechanic successfully to perform it. His letter is subjoined, and by it every thing is made clear. Van Braam leads one to suppose the sides of repaired rents are fused together or united as in soldering other metals, while from Mr. B's account, such is not the fact. The fluid metal in filling the crack is spread over it on both sides of the vessel, and thus forms a species of rivet.

Macao, *Feb.* 6, 1850.

To Thos. Ewbank, Esq., *Commissioner of Patents*,

Patent Office, Washington, D. C.

Dear Sir,—According to your desire, I have carefully observed the Chinese manner of re-uniting and joining together cracked or severed cast iron vessels, so as to make them as useful as ever after an accident, which is as follows: referring you to the utensils used, which I have numbered as at foot, and have had put into a box directed to you, and shipped per United States ship *St. Mary*, Commodore *Geisinger*, bound home, and which the Commodore will hold subject to your order.

I procured the accompanying cast iron pan, measuring 12 inches in diameter, by 4 four inches deep. A crack of 3 inches was made in it in the first place, and in the second a piece was entirely broken off: giving rise to two distinct operations.

The operator commenced by breaking the edges of the fractures slightly with a hammer, so as to enlarge the fissures, after which the fractured parts were placed and held in their natural positions by means of wooden braces. The pan being ready, crucibles made of clay, were laid in charcoal, and ignited in a small portable sheet iron furnace, with bellows working horizontally. As soon as the pieces of cast iron with which the crucibles were charged were fused, it was poured on a layer of partly charred husk of rough rice, or paddy, which was previously spread on a thickly doubled cloth, the object of which is to prevent the sudden cooling and hardening of the liquid metal. Whilst in this liquid state it was quickly conveyed with the right hand to the fractured part under the vessel, and forced up with a jerk into the enlarged fissure, whilst with the left hand a paper rubber was passed over the obtruding liquid, inside of the vessel, making a strong, substantial and neat operation.

You will thus remark that the art of the Chinese for re-uniting cracked or severed cast iron vessels, of all sizes, consists in cementing them with cast iron, whilst in the liquid state.

I have the honor to be, dear sir,

Your most obed't serv't,

J. BALESTIER.

The weight of this pot is 3¼ pounds. Except at the centre, where a part two inches over is left thick and flat for a base or foot to rest on, the thickness does not exceed, and in fact scarcely reaches $\frac{1}{16}$ of an inch. The handles are cast on, but appear to have been first formed and inserted into the mould. This does not seem to have been of sand, as the inner and outer surfaces are smoother, and of a different appearance from iron cast in that material. Of the metal used for repairing this pot, Mr. Balestier has forwarded a lump that was not melted. It is part of an old kettle, and differs but little, if any, from our pot metal.

The crucible, not much larger than a thimble, is made apparently of the same material as our common sand crucibles; except the shape, it could not be distinguished from one of them.

The amount of one fusion seems not to cover more than half an inch of the crack, and hence in the piece inserted, no less than nine distinct applications of the melted metal are seen—resembling in the inside so many ragged wafers touching each other, while on the outside, where the metallic plaster was applied, there are the same number of rude protuberances.

Dr. Gale, one of the examiners of the Patent Office, has made, at my request, a chemical examination of a portion of the basin, and finds it a very pure white cast iron, containing scarcely any foreign matter, except a little carbon and silex, ingredients always present in cast iron.

The subjoined figure represents the itinerant artist with his portable forge, at work in the street. The front half of the wooden chest is his *Fung Seang* or bellows, a description of which may be found in Ewbank's Hydraulics. Its principle is that of the double acting force pump, and it is constructed wholly of wood, except the valves and packing of the piston, which are paper, and singularly durable. The long coarse file, with a prolonged smooth extremity to slide through a ring, fixed on the chest, is a common accessory to a tinker's budget. By the arrangement, he possesses a tolerably good substitute for a bench and vise, and can increase or diminish the pressure of the file on the object operated on, at pleasure.

CHINESE TILE-MAKING—BRICKS, &c.

The following paper is by George R. West, Esq., of this city. Mr. West, in 1843, accompanied, as artist, the United States Mission to China, and returned recently, bringing with him a portfolio of graphic sketches, illustrative of the arts, manufactures, &c., of the Chinese.

No people, existing or extinct, surpass these in mechanical ingenuity and resource. To them the rest of the world is indebted for printing, gunpowder, the mariner's compass, porcelain, and a thousand minor contributions to modern civilization. In all their industrial operations there is something more or less new to us. In the process of tile-making, here described, some good ideas are manifested, and they are not confined to working of clay, by any means. In neatness, expedition, and saving of labor, it may safely be asserted that nothing can be found comparable to it in the manual operations performed in European or American tileries. The rearing of a prism (see *a*, in the cut,) of the kneaded clay, of such an outline as to furnish accurately shaped slabs or slices, ready to fold round the tapered and contractile core, is worthy of notice. So is the union of four perfectly modelled tiles in one short tube, which the workman finishes as fast as another cuts off slices from the prism of clay, and quicker than a single tile is made, in the ordinary manner, by other people.

Chinese Tile-Making.

SIR:—Agreeably to your request, I hand you with pleasure a sketch and description of the Chinese process of moulding earthen tiles, at Tinghae, Chusan.

The tiles used for roofing in China, are only partially burnt. They resemble in appearance and texture, terra cotta, and differ in form from those used in Spanish countries, in having no recurvature at either side, a cross section being a portion of a ring or circle; see the cut where a double row of short tubes is figured, drying in the sun. The manufacture is very extensive and important, from the fact of tile roofing, with one exception, (thatching) being the only style adopted in the southern part of, and I believe, throughout the whole empire. A novel and ingenious method is practised, of moulding four in the form of a short conical tube, in the same time that would be required to mould one separately—an illustration of the original and interesting methods these people have, of accomplishing their desired ends with ease and precision, by means rude and simple, but at the same time efficacious. [Not more so, however, than the process of moulding sheet tin for lining tea canisters, which is familiar to every person who has visited Canton, or the process of mending fractured porcelain and the most delicate glass-ware, with numerous copper clamps. Such examples are very common, and it is useless to cite them here, as the same may be said, with truth, of all their manufactures, and every thing they do, from the beautiful embroidered crape shawl, to the pork fat candle.]

With the aid of the subjoined sketch, the manner of conducting the process of making four tiles at one operation, will be readily understood. Three persons are here represented, but I have often seen one alone go through the operation with surprising rapidity. One of the figures in the foreground is represented in the act of cutting a slice of clay from a high mass before him, with a gauge knife; another bending and uniting a slice over the mould or core, which he holds in his right hand, upon a small revolving table before him; another removing a tube just formed, to the drying ground. Two figures are represented in the background, kneading clay, &c. The two detached views at the foot of the sketch, are representations upon a larger scale, of the

core and gauge knife. The core or mould consists of a circular conical hoop of the desired height and diameter, and is so constructed as to spring inwards, to allow of its being easily removed after the tiles have been moulded over it. On its outer periphery are secured vertically, and at equal distances, four thin bamboo slats, which divide the mould into four equal parts; these are for the purpose of making incisions half way through the clay, so that the four tiles will be united in the form of a circular conical hoop or tube, preserving them in their true shape, and from all injury whilst undergoing the succeeding processes of drying and passing through the kiln. When the tiles are wanted for use, it is only necessary to give each hoop a slight tap with a hammer or trowel, to divide it into four perfect tiles. The hoops are usually thus treated, when taken from the kiln, as the tiles then occupy less space in transportation.

The gauge knife consists of a piece of wood a little longer than the width of the tiles, having a handle projecting at right angles from its centre, and shoulders or projections formed on its face, from which is stretched a fine metal wire, serving as a knife to divide the clay. These, with the small table revolving upon a vertical shaft stuck in the ground, on which the operator places the core whilst moulding, and a small bit of wood to smooth the clay, and a pan of water close at hand, to moisten it, are the only tools used.

Before commencing, a high mass of clay, large enough to make several hundred tiles, is first raised and formed by a pattern; the sides curved, the ends tapered, &c., so as to give the desired length and breadth to the tiles. Slices removed from this mass by means of the gauge knife, in the same plane with its top and bottom, it is obvious, will correspond with each other in shape and size. The process is as follows:—The operator holds the gauge knife by its handle, in his right hand, and presses its face close to the top of the mass of clay, at the same time drawing it towards him, from end to end; thus a slice is removed of the desired thickness. This slice being the exact shape and size for forming a conical hoop, the operator has only to bend it over the core, which he holds by its handle in his right hand, turning it with the revolving table at pleasure, while with his left he joins and smooths it with a bit of wood dipped from time to time in the pan of water. The core is now contracted, by drawing one edge inwards past the other, and lifted from the hoop of tiles. This completes the operation, and a boy removes the hoop to the drying ground. Thus four tiles are completed in one operation, almost as quick as thought, and with perfect accuracy of form.

At the same yard where I witnessed the process above described, were to be seen a great variety of ornamental brick, for the eaves of houses, to cover and give a finish to the ends of the tiles; also large flags of various sizes and forms, and of different colors, some for paving, and others for facing the fronts of houses. Some of the moulds were of metal, and very neatly made. The variety of ornamental brick, adapted to their curious style of architecture, is very great, and I can mention here, only one curious form of brick, which I believe is truly original with the Chinese. It is well adapted to a variety of useful purposes, and might perhaps be used in this country to advantage.

This brick is denominated the "dragon ribbed" brick, is about six inches long, two thick, and three wide, with a half circle groove formed longitudinally on its edge. They are used principally for partition walls, upper stories of houses and pagodas, light pavilions, &c., and in all cases, where lightness combined with strength, is desired. The manner of constructing a wall with this brick, is as follows:—Uprights with grooves longitudinally cut in their edges, are placed, if for the first story, in the ground, at the distance of from six to ten feet apart, and if for a small building, only one at each angle of the wall. A number of slender bamboos are now cut to the proper length, so as to extend from post to post, and the ends fall in the grooves in the posts. The first layer of brick is laid with the grooved sides up, which will form a half circle groove the whole length of the wall; into this groove a bamboo is placed, the ends of which project into the grooves of the posts. The space between the bamboo and the brick in the groove, is now filled with cement, and another layer of brick with the grooved sides down, is laid over the bamboo, upon the top of the first layer, and cemented. The bamboo is now completely enclosed within the brick, and its ends projecting into the grooves in the posts, binds the whole together. Thus layer after layer of brick are laid with bamboos enclosed within the grooves, until the wall has attained the desired height; producing a very light, cheap and strong wall. A wall constructed in this manner, of only two inches thick, will resist, it is said, as much pressure within or without, as a solid brick wall of eight times the thickness; and if iron be substituted for bamboo, the strength would be increased vastly.

These walls are said to be a secure protection against burglars, Chinese thieves seldom if ever attempting to enter a house through the door or window, but by removing with a sharp steel instrument, brick after brick out of the wall, without the slightest noise, until they have made a hole large enough to give them entrance; before entering, however, they cautiously introduce an artificial head of a man secured to the end of a pole, to ascertain if the inmates are asleep, and every thing is favorable to their purpose.

PIN MANUFACTURE IN THE UNITED STATES.

During the war of 1812, in consequence of the suspension of importations, pins became very scarce. The prices asked for the few in the market, were many times the original cost—in some instances as high as a dollar a paper, by the pack. About this time an effort was made to introduce the manufacture in New York. Some pin makers came from England, bringing the necessary implements, and commenced the business at the old States Prison at Greenwich, (New York) employing the labor of the convicts. I think the establishment belonged to, or was managed by a man named Haynes. How much was done, I am not informed; but the low prices which prevailed very soon after the termination of the war, were fatal to the enterprise, and it was abandoned. In the year 1820, Richard Turman obtained the tools which had been used by Haynes. He made a contract for pauper labor, and undertook the manufacture in the alms-house at Bellevue. Mr. Turman carried on the business a year or two, when he died; having lost by the undertaking a considerable share of his property. Probably the trouble and perplexity of the business, together with the confinement consequent on attending to it, hastened his end. No further use was ever made of the tools. I recollect hearing Mr. Turman say at this time, that he had seen a *machine* for making pins, that it had made pins, but was too delicate, or intricate to be used with advantage. I suppose this machine was one which was invented and patented by Moses

L. Morse, of Boston, during the war. I think Morse's machine had been worked to some small extent at that time; but it had passed into other hands, and was never used afterwards. His specification showed him to have been a man of good mechanical talents.

Lemuel William Wright, of Massachusetts, patented a machine for making "*solid-headed pins*," both in the United States, and in England, at an early period. I believe his specification and drawings are published in the London "Repository of Arts." He never attempted to put it to use in the United States, but in London he formed a company with a large capital, for the purpose of operating with it. The company built a large stone factory in Lambeth, and constructed some sixty machines, at great expense. It is understood that the machines failed in pointing the pins, and for that reason never could be put into successful operation. To obviate this difficulty, Wright invented a machine for heading the shanks, pointed and cut in the ordinary way by hand. The company did not succeed, and broke up with the loss of a great part of the investment. D. F. Taylor, who had been ruined by this failure, afterwards came in possession of the machinery, and, by connecting himself with a capitalist, under the firm of D. F. Taylor & Co., was enabled to start a manufactory of "solid-headed pins" at Stroud, in Gloucestershire. This was in 1832, or 1833. Some pins of their make even sold as early as 1833; which were the first "solid-headed" pins ever sold in any market. They obtained a patent for the "solid-headed" pin by act of Parliament. They used (principally or solely) the machine for heading only. Some account of Wright's machine is given in Mr. Babbage's work on the "Economy of Manufactures."

In 1832, a patent for a pin machine was obtained for the United States, by John J. Howe, and in 1833 and '34, patents for the same invention were obtained for England and France. This machine was designed to make pins similar to the English diamond pins, the heads being formed of a coil of small wire fastened upon the shank by pressure between dies. No arrangement was made to use this invention in Europe; but in December, 1835, the Howe Manufacturing Company, was formed in New York, for the purpose of putting it in operation. This company removed to Birmingham, (Derby,) Connecticut, where its manufacturing operations are now carried on. In the spring of 1838, a second patent for the United States, was obtained by John J. Howe, for a machine for making "solid-headed" pins in 1840; and this is the machine which is now in use, by the Howe Manufacturing Company.

Samuel Slocum, of Rhode Island, obtained a patent in England, for a machine to make "solid-headed" pins, in 1835. His invention was not put to use in England; but he established the manufacture of pins, by means of it, in Poughkeepsie, in 1838, under the firm of Slocum, Gillson & Co. His machine has not been patented in the United States, but has been, as it still is, run in secret. At this period, and till the Tariff of 1842 came into operation, pins (under the "Compromise Act,") were free of duty; while brass wire of which they are made, was subject to a duty of 20 to 25 per cent. Under this discouragement, the business made but slow progress. But under the encouragement given by the Tariff of 1842, the two companies above named, went on increasing their production, and doing a profitable business, till 1846. In the meantime, it having been found that pins *could* be successfully manufactured by machinery—and exaggerated ideas both as to the extent of the business and the profits to be made in it, having obtained extensive prevalence,—many persons in different parts of the country, became engaged in scheming on machinery for making pins, and much capital was expended, and finally sunk in these projects. These attempts were attended with various degrees of success; in a few instances a good article was produced, but in most cases, the article produced was more or less inferior in quality. The consequence was, that at this time, within but a few years after the manufacture had been commenced, and before it was fairly established (at least on its present basis,) the market was overstocked with goods, importations were nearly or quite arrested, and the business was ruined by domestic competition. This depression continued about two years, from 1846 to '48, and during this period, nearly every party engaged in the manufacture, or attempting to engage in it, excepting the two companies before named, suspended operations. Slocum, Gillson & Co., sold out their establishment to the "American Pin Company," of Waterbury, Connecticut, and the machinery was removed from Poughkeepsie to Waterbury, where it is now used by the last named Company.

The "American Pin Company," and the "Howe Manufacturing Company," now manufacture nearly all the pins consumed in the United States. There is a party at Poughkeepsie doing a limited business, and a small amount imported. Since the depression of 1846 to 1848, the business at the two companies named, has been reasonably profitable, having been rendered so rather by reducing the cost of production and the expense of selling, than by the small advance in price which has been realized. Both companies manufacture the wire for making their pins. During the last year, the two companies have used principally Lake Superior copper, for making their wire; their joint consumption of copper, amounting to about 250 tons, per annum. The present weekly production of pins by the two companies, may be stated at about 8 tons.

In connection with the improvement effected in the manufacture of pins, by the introduction of self-acting machinery, superseding a process which formerly required six or seven different manual operations, important improvements have been made in the method of sheeting the pins, or sticking them on paper. This, as previously performed, by inserting a few pins at a time by hand, was a tedious process, at which some five or six dozen papers were as many as a good hand could do in a day. By the improved machinery now in use, one hand will stick from 75 to 125 dozen a day, and do the work better than it was usually done in the old way. There are three patents now in force for improvements in the machines in use for this operation, viz: one granted to Samuel Slocum, one to De Grass Fowler, and one to John J. Howe. These patents are held jointly by the "Howe Manufacturing Company," and the "American Pin Company."

The present price of American solid-headed pins, is believed not to exceed two-thirds of the lowest price at which imported pins of equal weight were ever afforded before the manufacture was introduced, and for service, they are undoubtedly better than the article of which they have taken the place.

The American improvements in both the pin making and pin sticking machinery have been for several years in operation in England, and probably in other parts of Europe.

SAN TORINO EARTH.

Department of State,
Washington, Dec. 19, 1850.

Thomas Ewbank, Esq., *Commissioner of the Patent Office,*

Sir:—I enclose herewith an extract from a despatch from H. L. Maxwell, Esq., United States Consul at Trieste, respecting the "San Torino earth," which is said to make "the best under-water cement." It is respectfully submitted to your consideration, whether it would not be well to publish it, for general information, in your next report.

I am sir, respectfully, your obedient servant,

DAN. WEBSTER.

Extract from a communication under date of Oct. 9, 1850, received at the Department of State, from H. L. Maxwell, *Consul of the United States at Trieste, Austria.*

There is a cement now coming into general use here, which, if not already known in the United States, is worth being tried. It is called "San Torino earth," and has been found to be the best *under-water* cement ever used in these parts. It is mostly used in the building of piers, moles, docks, &c. The island, where it is found, and from whence it takes its name, is situated in the Grecian Archipelago, latitude 36° 23′, and longitude 25° 26′. The name given to it by the Turks, appears to be "Kameni," or, "the burnt Isle," and it is generally considered to be the remains of a volcano not yet entirely exhausted. The earth is exceedingly dry and appears to consist of silicate of iron and alumina, with a large proportion of a light, porous and fibrous substance which floats upon the water, and is supposed to be "pumice." It has been very extensively used in Syria and in Algiers, in the building of fortifications, &c., where it has been found to answer admirably, and also here a Trieste, and at Venice and Fiume, with equal success. These works have been chiefly under water in the sea, in which the cement sets very hard in a comparatively short time. Trials however have been made *above water*, and exposed to the action of the air, which are said also to have answered very well. For use, the following composition has been prescribed for works *under water*, viz: 7 parts San Torino earth—2 parts lime, and 7 to 9 parts stone rubbish; and for works above water, 6 parts San Torino—2 parts lime, and 6 to 7 parts stone rubbish. The rubbish stone should consist of pieces not too small, and as rough and irregular as possible, thus binding better with the cement. Where economy is greatly desired, a portion of sand may be used instead of wholly San Torino earth, in proportion of 4 parts San Torino, 2 or 3 parts sand, 3 parts lime, and 6 parts stone rubbish. This is said to be just as good as the first mentioned composition, though requiring longer time to harden. For use, the San Torino earth, sand and lime must be well mixed and made with the necessary quantities of water into a very consistent mortar, then heaped together and placed under roofing for two or three days. In the meantime the foundation should be made with loose stones thrown into the sea at the spot required, and the caisson or form sunk on this. Into this caisson are to be thrown alternate layers of the mortar and stones. To every 2 or 3 feet of mortar the same quantity of stone rubbish, and so on to the water's edge.

The price of this earth at the quarry is said to be from 8 to 10 carantani, per stago beneto, equal to about from 6 to 8 cents per cwt. If desired by Government, I will order a barrel for trial from here.

VIII.

PAPERS AND ABSTRACTS

RELATING TO

EARLY AMERICAN INVENTIONS,

FROM THE ARCHIVES OF STATES.

The following interesting facts have been brought to light by the papers under this head in the last report. Some of them cannot fail to surprise inventors of the present day.

Steel Making: in 1728, in Connecticut.

Attempt at increasing speed of vessels in 1693, in New York. [The device not described.]

Tide Mills: "of such a nature as hath not yett been used." New York; by the same inventor as the above.

Heating the supply water of steam boilers, by passing the feed pipe through the furnace—by Fitch, in 1785.

Pipe Boilers: proposed by Henry Voight, of Philadelphia, in 1788, and adopted by Fitch.

Raising water by steam acting on two pistons—by Rumsey.

Tubular Boilers—by Rumsey.

Propelling Vessels by reaction of a stream of water—by Rumsey.

Improvement on Savery—by Rumsey.

Reacting Water Mill—by Rumsey.

Cylindric Saw Mill—by Rumsey. *et. seq.*

Card Making Machine—by Oliver Evans.

Improvements in Milling—by Oliver Evans.

Steam Carriage, or Locomotive—by Oliver Evans.

Carding and Spinning Machines—by Robert Lemmon, in 1786, (in Maryland.)

Printing Press—by Benjamin Dearborn, New Hampshire, 1787.

Balances, or Scales—by Benjamin Dearborn.

Hand Fire Engine—by Benjamin Dearborn.

Improvements on Chimneys.

Preparing Indian Corn, } patents granted in 1717.
Straw and Chip Hats, }

In the hope of eliciting further information, circulars were addressed to the State Departments of such States as had not been heard from: the following replies have been received. For the copious and characteristic extracts from the State papers of Connecticut, the office is indebted to the interest taken in

the subject by Hon. L. P. Waldo, of the House of Representatives. In these will be found information on Iron Works:—*Furnaces, Pig-iron, Slitting Mills, Kettles, &c., Iron Wire, Steel, Nails &c.*

Bell Founding,	Torpedo,
Polishing Crystals,	Water Mills,
Type Founding,	Perpetual Motion,
Pin Making,	Cloth Making,
Clock, *(winding up itself,)*	Stocking Weaving,
Steam,	Flax and Woollen Manufacture,
Drill Plough,	Silk Raising,
Pottery,	Linseed Oil,
Glass,	Sugar Refining,
Pitch,	Snuff,
Salt,	Cloth Dyeing, &c.
Paper,	

NEW JERSEY.

State of New Jersey,
Department of State,
Trenton, December 24, 1850.

Hon. Thomas Ewbank, *Commissioner of the Patent Office:*

Sir:—Your Circular of the 6th inst., directed to His Excellency the Governor of this State, has been referred to this Department, and at his request, diligent search has been made among the records, but no evidence has been discovered that Patents have ever been granted either by the Provincial, Colonial, or State governments of New Jersey.

I have the honor to be sir,
Your obedient servant,
THOS. S. ALLISON,
Secretary of State.

MASSACHUSETTS.

Commonwealth of Massachusetts,
Secretary's Office, Boston, *December 17th*, 1850.

Sir:—Accompanying this, you will find a memorandum of such matters as are found in the records of this department concerning patents or privileges.

We find no documents of which we can send you copies, which we would gladly do, if in our power. Should we find anything more on the subject, we will transmit to you at once.

Very respectfully, your ob't serv't,

Hon. Thos. Ewbank. W. B. CALHOUN.

1652.—John Clark allowed by General Court, 10s., for three years, from every family who should use his invention for saving wood and warming houses at little cost. After trial for this period, he was granted the same privilege during his life.

1641.—General Court Records: Samuel Winslow had invented a method of manufacturing salt. None are to make this article for ten years, except in a manner different from his—provided he set up his works within a year.

1656.—John Winthrop, son of the Governor, granted the sole privilege of making salt for twenty years in Massachusetts, after his particular method.

1671.—Richard Wharton, a lawyer of Boston, and Company, have certain special privileges from the legislature for the manufacture of tar, pitch, turpentine, &c.

1672.—General Court reply to several hatters, who wished to have as a Company, peculiar privileges, that there should be granted to them when they should make as good hats, and sell them as cheap as those imported were.

1722.—The Legislature offer, by an act passed, a premium for duck and linen made in the province, of domestic material.

1640.—The General Court offered 3d. on every 1s. worth of linen and cotton cloth made in the colony; but this was repealed in the same year, because of the public burdens.

1701.—The Legislature to encourage the sowing and manufacture of hemp, raised in the Province, engage to pay to any Company who purchase this article at 4½d. a pound, ½d. on each pound so purchased.

DELAWARE.

MILFORD, DELAWARE, December 12th, 1850.

SIR:—Yours of the seventh instant came to hand to-day, to which I hasten to reply, that I have directed a search to be made in the public archives of the state for the information desired.

I have the honor to be, your ob't ser't,

WILLIAM THARP.

HON. THOS. EWBANK,
Commissioner of United States Patent Office.

SECRETARY'S OFFICE, DOVER, January 3rd, 1851.

SIR:—His Excellency, the Governor, directs me to say in reply to your circular of the 7th December, that there are no records or documents in the State Department of this State relating to the subject of patents, or which would furnish any information of the kind desired by you—nor can he obtain such information by inquiry. It is not known that any patents were granted under the Colonial Government of the State. The evidences of such grants, if any there were, would more likely be found at Harrisburg. No patents are known to have been granted by the State Government, prior to the confederation of the States.

I have the honor to be, with great respect,

Your ob't serv't,

D. M. BATES.
Secretary of State.

HON. THOS. EWBANK,
Commissioner of Patents,
Washington.

CONNECTICUT.

EXTRACTS FROM COLONIAL AND STATE PAPERS, IN THE OFFICE OF THE SECRETARY OF STATE, HARTFORD.

Early Acts of the Colony to Encourage Discoveries and Inventions.

At a session of the General Assembly, at Hartford, March 10th, 1663 [4.]

"The court for the encouragement of any person that will lay out himself for the discovery of any mines and minerals, &c., do order that whosoever shall make such discoveries, and purchase it for the country, he shall be honorably rewarded out of what he doth discover, as aforesaid. (Colony Records, II. 193.)

In the printed statutes of 1672, the laws state:—For the encouragement of such as will lay out themselves upon the discovery of mines or minerals, for the public good:—

It is ordered, by authority of this court, that whosoever shall expend their time or estate upon such discoveries, and purchase them for the country, he shall be honorably rewarded out of what he doth discover, for the same. (p. 52.)

It is ordered that there shall be no monopolies granted or allowed amongst us, but of such new inventions as shall be judged profitable to the country, and for such time as the general court shall judge meet. (p. 52.)

And to the above was subsequently added,—

"*An Act for Encouraging Adventurers in Discovering Commodities.*"

Be it enacted, &c. That if any person or persons shall set themselves on work to discover any commodities that may be of use for the country, for the bringing in a supply of goods from foreign parts, that is not as yet of use among us; he that discovers it, shall have due encouragement granted to him, and the adventurers therein. (Statutes of 1715, p. 5.)

IRON.

The following paper, designed to be presented to the Parliament of Great Britain, being preserved on file, would indicate that it originated in this colony.

"Reasons against a general prohibition of the iron manufacture in his Majesty's plantations, intended by a clause in the bill now depending, entitled,—*A Bill for Encouraging the Importation of Naval Stores from America.*"

I. If the clause be taken in a strict sense, all iron work for building ships, houses, mills, and even what is necessary for instruments to till the ground, will be forbid to be made there; whereby it will become impracticable to live in the plantations, because this sort of iron manufacture must be made on the spot, that it may be framed and fitted to the size of the work.

II. To forbid his Majesty's subjects the making any sort of iron wares, when its for their own necessary use, and not for exportation, seems to bear hard on the common rights and liberties of mankind; especially when the ore is what their own soil yields, and what is found but in small quantities, comparatively, in the mother kingdom.

III. If such a prohibition be thought just, to prevent the plantations from interfering with the iron workers in this kingdom, all other tradesmen may expect, in their turns, to be forbid working at their respective callings; for by the same reason, the people may be forbid making cheese or cider, for fear of prejudicing the manufactures in *Cheshire* and *Herefordshire.*

IV. It is humbly conceived, there is no occasion for this clause. All labor is so excessively dear in the plantations, that no manufacture of the lesser iron wares can vend, or ever does there, but when it happens by accident that there is a great scarcity of the same commodity made in *Great Britain.*

V. The encouragement given by the bill for the importation of bar iron from the plantations, by taking off the duty, which is two pounds per ton, is not sufficient to bring it in; of which there needs no other proof, than that a ton of iron is worth sixty pounds in *New England*, their money, and but twenty pounds here, to say nothing of the chargeable freight thence; so that if the clause pass, the iron ore in the plantations will be of use neither there nor here.

VI. It seems a further hardship, that the subjects abroad should be permitted to forge their ore into bars, but not to run or cast it into pots and other implements, because the same fire, and even the same heat, will suffice for both.

It is therefore humbly prayed, that the clause prohibiting any kind of iron wares to be made in the plantations, though for their own use, and not for exportation, be left out of the bill. (Industry I. 98.)

IRON WORKS IN LYME.

To the Honorable General Assembly, &c.

The memorial of Samuel Southworth, of Lyme, in the county of New London, humbly sheweth:—

That he hath lately, at great cost and charge, built an iron work, and hath made considerable quantity of iron, and hath also built a refinery to refine pig iron, which is to be had plentifully at Philadelphia, which iron when refined, is as good for any use as Sweeds or Spanish; which if the same could be carried on to good purpose, would be a great advantage to the country in general, and hinder the importation of great quantities of iron. And your memorialist, being much reduced by his great cost in building said works, is unable to carry it on to good purpose, and the same will unavoidably sink and come to nothing, unless your honors will, in your wonted goodness to relieve the distressed, relieve your memorialist, by loaning him some money out of the public treasury, to the quantity of £2000. Which your memorialist humbly prays that your honors would, (loan) and that upon good land security or bond to your honors' or committee's acceptance; and that he may pay in interest and principal in iron, at as much less than the market price, as your honors judge reasonable. But if that cannot, by your honors, be complied with, then that he may have it on good security as above, on moderate interest, to be paid in some convenient time. And your memorialist, as in duty bound, &c.

SAM'L SOUTHWORTH.

LYME, May 15th, 1741.

(Industry I. 132.)

No legislative action on said petition.

General Assembly appointed a "committee to make a proper inquiry for obtaining an account of the quantity of iron made in this colony, as required in a letter from the Lords of the board of trade, dated June 9th, 1757, to the Governor and Company of this colony, and make report, &c., to this present Assembly." (Industry I. 174.)

IRON WORKS AT DERBY.

To the Honorable, &c.

The memorial of Ebenezer Keny, Joseph Hull, Jr., and John Wooster, all of Derby, &c., and Thomas Pirkins, of Enfield, &c., humbly showeth:—

That your honors' memorialists, being desirous of erecting and setting up iron works, on the falls of Nangatuck river, in said Derby, where there is a proper and convenient place therefor; and the Indians of said Derby, whereof John Howdee and Joseph Chuse are the head or chief men, [and] own about 40 acres of land, bounded west on said river, south on said falls, and running so far north as the head of said falls, which will impede the setting up said iron works, unless liberty can be obtained for purchasing the privilege of a highway by the river side, &c.

Whereupon your memorialists humbly pray, &c.

Dated at Hartford, this 12th day of May, 1760.

EBENEZER KENY.
et. al.

Petition granted by Assembly. (Industry I. 180.)

IRON WORKS AT CORNWALL.

To the Honorable General Assembly of the English Colony of Connecticut, in New England in America, now sitting, &c. Oct. 1761.

The memorial of John Patterson, Ephraim Patterson, and Thomas Russell, all of Cornwall, in the county of Litchfield, humbly sheweth:—

That your honors' memorialists are owners of a tract of land lying on the east side of Owesatunnuck river, and adjoining tract thereto, in said Cornwall, in which is a proper place for building a furnace for running iron ore into pigs fit for refinery, and are owners of land stocked with wood for coal, and have a good sufficiency of ore to supply said furnace; and being sensible of the great advantage it would be to the interest of people of this colony, and being advised that it will, in process of time, be somewhat profitable to the undertakers, are zealously inclined to set up such furnace, but have not personal interest enough at present, to carry it on to effect; therefore pray your honors to grant us the liberty of taking out of the public treasury of this colony, £1200, in bills of credit on this colony, and that we may have it for the term of four years, upon our giving land security double the value of said sum, or bonds with sufficient security, payable at the end of said time, with the lawful interest; said security to be according to the judgment of such committee as your honors shall appoint; said money to be taken out of the treasury, in case your memoria. go on and get such furnace at work within two years. And your, &c.

Dated in Cornwall, this 10th day of October, 1761.

JOHN PATTERSON.
EPH'M PATTERSON.
THOS. RUSSELL.

(Industry I. 204.)

Assembly continued petition to May next.

To the Honorable, &c.

The memorial of William Tanner, Benoni Peck, Elijah Steel, Heman Alling, all of Cornwall, &c., humbly sheweth:—

That your memorialists have purchased the one-eighth part of the great ore bed in Salisbury, in the county of Litchfield; and that your memorialists have in Cornwall, a very convenient and suitable place, on the Housatonuck river, to set up a furnace for the making of iron; which place is abundantly furnished with wood for the said purpose; and it is about nine miles distant from said ore bed, whereof four miles is good water carriage. And your memorialists have made preparation for erecting a furnace in said place, for the making of iron, and therein expended about £100 lawful money; and your memorialists beg leave to inform your honors, that they have been disappointed of a large sum of money, of which they were assured and depended thereon, at their entrance upon this design; which disappointment they have been unable to retrieve, and thereby they are rendered wholly unable to prosecute said design, which your memorialists really believe would be very beneficial to this colony, by supplying the inhabitants thereof with iron made in the colony, and preventing the exportation of moneys therefor. And your memorialists could easily carry on and execute said design with £1000 cash, which they have been unable to procure, unless they join with persons out of this colony; although they are willing to give interest and land security worth double said principal sum and interest.

Wherefore your honors' memorialists humbly pray your honors to loan, out of the public treasury of this colony, to your memorialists, the sum of £1000 to enable them to set up a furnace for making iron, as aforesaid, on their securing principal and interest as aforesaid. And your honors' memorialists, as in duty bound, shall ever pray, &c.

WILLIAM TANNER.
BENONI PECK.
ELIJAH STEEL.
HEMAN ALLING.

Dated at New Haven, the 11th day of March, A. D. 1762.

(Industry I. 205.)

No action by Assembly on petition.

IRON WORKS IN LYME.

The papers relate to a controversy about the use of water wanted for a gristmill. Extracts follow:

"That it is of much greater consequence to the public, that their gristmill should be kept going, than that said iron works should: yet your memorialists apprehend, that if said water, preserved in such large ponds, was prudently used, said iron works might go, without hurting the gristmills, many more months in each year, than they have ever done in any one year since they were erected; for that they, for many years now last passed, have been kept going but very little in the winter season, when there is water, &c., and have been kept going in the summer, or dry season of the year, when there is not water, &c.

And they petition General Assembly to regulate the matter.

Petition is negatived. (Industry I. 202.)

SLITTING MILL IN SUFFIELD.

Whereas, Mr. Ebenezer Fitch has represented to this court, that divers gentlemen, in company with himself, are willing and desirous to set up a slitting mill upon the river called Stony Brook, within the bounds of Suffield,* in the county of Hampshire, or elsewhere in the county of Hartford, within this colony, to slit and draw out iron rods for nails and other artificers in iron, their work and use; and since the charge and adventure of the first undertakers of such an affair must be considerable, hath therefore prayed this court for a private act in favor of himself and company, to grant them the sole privilege of such a mill for some time, in recompense of their expenses and adventure; and the court, considering the great advantage such a mill will be to this government, as well as the neighboring, have therefore thought fit to encourage the same.

Now, therefore, for the encouragement of said Ebenezer Fitch, and such as shall join with him in the said undertaking:—Be it enacted, &c., that no other person or persons whatsoever, shall or may erect any slitting mill or slitting mills in any part or place within this, his Majesty's colony of Connecticut, upon any pretence whatsoever, at any time during the space of 15 years, from and after this present session of this general court, upon pain and penalty of £10 per month, for every month that any such slitting mill shall stand within this colony, within the time aforesaid, to be recovered, &c.

Provided, that the said Ebenezer Fitch and company shall, within three years, &c., erect and set up a good sufficient slitting mill, &c.

Passed General Assembly, May 1716. (Industry I. 101.)

*Then claimed by Massachusetts.

ENFIELD IRON WORKS.

To the Honorable, &c.—The Petition, &c.

That Joseph Webb, of Wethersfield, in his life time, to wit, on the 19th day of September, A. D., 1759, bargained and agreed with Col. Timothy Dwight, of Northampton, &c., and Captain Samuel Dwight, of Enfield, to purchase of them one fourth part of their Iron Works, at said Enfield, together with one fourth part of the land in said Enfield, granted for building said iron works, and one fourth part of the dam, implements, &c., at the great importunity of said Timothy and Samuel, and upon their representation that the same might be paid for, and they would take their pay for the same in bar iron, manufactured in said works: whereupon the said Joseph was induced to agree and did agree to buy the fourth part of said works, &c., at the price of £100 money, to be paid in bar iron of that value at said works, &c.

(The remainder of the petition relates solely to the fulfilment of the terms of the contract. Mehetabel Dean was the widow of said Webb.)

Signed,

SILAS DEAN,
MEHETABEL DEAN.

Wethersfield, January 28, A. D. 1767.

(Industry II. 129.)

SALISBURY MINES AND IRON WORKS.

A Court of Election held at Hartford, May 14, 1674.

This Court grants John Bissell 100 acres of land, provided he take it up where it may not prejudice any former grant. (Towns and Lands VI. 82.)

At a General Assembly holden at Hartford, May 12, 1726.

This Assembly do appoint the surveyor of the county of Hartford, to survey and lay out the said 100 acres of land, in any of the ungranted lands of this colony, according to said grant. (Towns and Lands VI. 82.)

To the Honorable the General Assembly, sitting at Hartford, May 9, 1734.

The memorial of Jared Eliot, of Killingworth, Elisha Williams, of New Haven, Martin Kellogg, of Wethersfield, Robert Walker, Jun., of Stratford, John Ashley, of Westfield, Philip Levingston of Albany, and Ezekiel Ashley of Sheffield, humbly sheweth:

That this Honorable Assembly at their session on May 14th, 1674, granted 100 acres of land to John Bissell, late of Windsor, deceased; and at your session on May 12, 1726, ordered the surveyor of the county of Hartford, to survey and lay out said 100 acres in any of the ungranted lands of this Colony. In pursuance whereof, Jonathan Burnham, surveyor of lands for the county of Hartford, laid out said lands, as followeth, that is to say:—To begin at a stake and heap of stones west of Ousatonock river, and westerly of a large pond known to the Indians by the name of Wonoikopozo pond, said pond lyeth easterly of the road leading from Weatauge to Sackett's farm, and from thence measured south 13° 30′ west, 120 rods, to a stake and heap of stones; then measured east 13° 30′ south to a stake and heap of stones, 33 chains, 33 links and one third of a link, to a large black oak tree marked, and with stones about it; from thence measured north 13° 30′ east, 30 chains, to a stake and heap of stones; then measured west 13° 30′ north, 33 chains 33 links and one third of a link, to the place where it begins; and marked trees in the line between each monument:—Which said 100 acres of land laid out as aforesaid, is now by mean conveyances become the estate of your memorialists, and there being found in said lands, a bed of iron ore, we have advanced considerable sums to set up iron works for the improvement of it: Whereupon your memorialists humbly pray that this assembly, would allow us to take out a patent under the seal of the corporation, for the confirmation of our title to said land; and your memorialists as in duty bound, &c. (Towns and Lands VI. 83.) JARED ELIOT, *et. al.*

Upon the memorial &c., * * Wonokopoiko pond, which said 100 acres of land was surveyed and laid out by Jonathan Burnham, &c., unto John Pell and Ezekiel Ashley, as is set forth in the survey of said Jonathan Burnham, dated Oct. 27th A. D., 1731:

It is Resolved, That the memorialists have a patent as prayed for, provided they shew to the acceptance of the Governor and Secretary, that the right to the remainder of the 100 acres of land, (which is not yet made out) is well vested in said Philip Levingston, by lawful conveyance, before the said patent be executed. May 1734. (Towns and Lands VI. 83.)

ORE BED.

To the Honorable, &c., May 1784.

The memorial of Samuel Forbes, Henry Levingston and Nathan Hall, in behalf of themselves and the rest of the proprietors of the iron ore bed in Salisbury, &c., humbly sheweth:

That your memorialists, being owners of said ore bed, with the right only of digging and raising the same, have found, by long experience, that valuable body of minerals is constantly wasting, by the irregular method of raising the same, in that the canals or water courses (are stopped) which increase the quantity of ore, and care is not taken to keep them open, after the mines have exhausted a vein of the bed of ore, or from some other cause which your memorialists are convinced is occasioned by the irregular conduct of the miners, who are not under the possible control or direction of the proprietors, as each one digs and raises for himself, and strangers are constantly trespassing with impunity, whereby great injustice is done, not only to your memorialists in general, but to individual proprietors, who cannot derive the avails of their proportions of ore raised from said bed, and the public are in danger of losing that valuable resource of the most useful and necessary manufactures of this State. And your memorialists would observe, that in their present situation, a recovery at law for any trespasses is impracticable, being tenants in common, all suits for trespass must be brought in the name of all the proprietors, three eighths of which proprietorship is divided amongst near 100 persons, and is continually changing, whereby suits abate before any trial or judgment can be had thereon; and for each proprietor to commence a suit for his share or moiety of the ore raised by any of his fellow commoners, is attended with more expense than the avails are worth. Neither can your memorialists adopt any efficacious method of raising the ore, to prevent the injuries aforesaid, and many other inconveniences and losses which unavoidably attend their present tenancy, which your memorialists are confident can be provided against, were they properly incorporated, with power to appoint an agent or committee to superintend the raising of the ore, and employing miners according to the directions of the major part of the proprietors, at an annual meeting, with power of suing and being sued, by their agent or committee, and also the power of making and carrying into execution necessary by-laws for the benefit of the proprietors.

Whereupon your memorialists pray your Honors to take their case into your wise consideration, and grant them a Charter of Incorporation, thereby enabling the proprietors of the iron ore bed in said Salisbury, to regulate the raising said ore, and appointing an agent or committee to superintend and regulate the same according to the directions of the proprietors, at their annual meeting, and a power of making necessary by-laws, and of suing and being sued, by their agent or committee. And your memorialists, &c.

SAMUEL FORBES,
HENRY LIVINGSTON,
NATHAN HALE.

Dated at Salisbury, the 26th day of April 1784. (Industry II. 184.) Act of Incorporation granted, (186.)

In a petition for town privilege, May 13, 1736, petitioners of Salisbury say: "We * * are building iron works, and have plenty of ore, &c. (Towns and Lands VII. 232.)

To the Honorable General Assembly, &c.

The memorial of Charles Caldwell, of Hartford, &c., and George Caldwell, of Salisbury, &c., humbly sheweth:

That your Honors' memorialists have purchased the principal part of the furnace at Salisbury, aforesaid, for the making pig iron, potash kettles, and common pots and kettles of iron, &c, which cost them a very large sum of money; and that for sundry years last past, they have vigorously carried on the business of making pig iron, &c., to the very great advantage of the colony, as well as to their own private benefit, and have supplied many forges in this colony with pig iron to be made into bars, and have, over and above that, exported and sold abroad pig iron, and pots and kettles, annually to a large amount. And your memorialists have also erected a good new forge within 15 miles of the town of Hartford, [at Simsbury] for the making of bar iron out of pigs. And your memorialists would further observe to your Honors, that while they are pursuing that business with satisfaction to their own benefit, they also find by constant experience that it is of vast public advantage to the colony, as every bar of iron produced thereby is a saving of so much cash to the government, and keep that cash among ourselves which used to be sent abroad, for the purchase of iron, which is an article that the colony cannot subsist without, and which costs them annually about £20,000, a very large sum to be sent yearly out of the colony, which your memorialists suppose they have already put a great stop to, by means of said furnace, and suppose themselves fully able to supply the colony entirely with pig iron, which is easily wrought into bars fit for use by their own as well as the various other forges in this colony. 'Tis not unusual that matters of such public benefit and utility should meet with obstruction from those who find their advantage in keeping the colony dependent on foreign markets for their supply of such a valuable article. We, your memorialists, have met with and experienced very great hindrances, troubles and difficulties from persons of that character, many times to very great loss, though we have constantly kept our works in order and under improvement, at a vast expense, being obliged constantly to retain in our service for carrying on the business, about 50 hands, who are all employed in the different branches of the business, and we now have as large a stock on hand to be wrought up into iron, as we ever had since we owned those works, but find ourselves not able to make those works so extensively useful to the public as well as beneficial to ourselves as we might do, could we command somewhat more of the ready cash in this season of the great scarcity of money. And knowing your Honors' strict attention to whatever is for the public benefit of the colony; we your Honors' memorialists do thereupon humbly pray this Honorable Assembly to take the matters aforesaid into your serious consideration, and that your honors would be pleased to order and enact that your memorialists may and shall have the sum of £1,200 on loan, out of the public treasury of the colony, on interest, to be repaid again into the treasury, at the end of 2 years, on your memorialists procuring and giving good and sufficient security, that shall be approved of for the repayment thereof, in order that we may the more advantageously carry on said works: and we, as in duty bound, shall ever pray.

GEORGE CALDWELL,
CHARLES CALDWELL.

Dated in Hartford, this 7th day of Oct. A. D. 1767. (Industry II. 132.)
Loan is so made, and committee is appointed to execute the bonds. (131.)

To the Honorable General Assembly, &c.

And now your memorialists beg leave to represent to this Honorable Assembly, that they conceive themselves obliged, out of gratitude to your honors, and loyalty and friendship to the true interests and weal of this colony, to inform, that, notwithstanding the moneys graciously granted to your memorialists aforesaid, and received by them under the disadvantages it was, they find they cannot hold and carry on said furnace to advantage to the public or themselves;—for that some years past your memorialists were necessitated to hire £1,500 of lawful money in New York government, for which one Mr. John Rutsen was bondsman, to whom your memorialists were obliged to mortgage said furnace and bed of ore, &c. And that said Rutsen is sued and has judgment against him for said money by means of, and at the instigation of those who are seeking to engross said works and ore into their own hands,

out of this colony, whereby said Rutsen must and will (notwithstanding the utmost endeavors of your memorialists and the helps already afforded them) recover said furnace, and your memorialists' whole interest in said ore from your memorialists, for the sum aforesaid with the addition of about two years interest. not half the sum it cost your memorialists, whereby the whole interest of said ore bed and furnace will go from your memorialists, and fall into the hands of people living in the province of New York—whereby this colony will be deprived of the only means of supplying and carrying on the iron manufactory within themselves, which is of the greatest necessity and importance in almost every business of life. [Petition is here mutilated.] General Assembly to appoint a [committee to look into the] affair, or contrive some other way whereby said [ ] may be cleared from said ore and furnace by the colony, and to take a conveyance of said ore bed and furnace to the Governor and Company of this colony, in security, which your memorialists are willing to give, asking only that they may have the use and improvement of said furnace and ore bed for the space of four years; and till then allowed them to redeem said furnace and ore bed from said Governor and Company: or some other way devise means effectually to prevent the loss of so great, necessary and lasting advantage of furnace and ore bed to the colony, which your memorialists imagine can be done without advancing any money, by turns, orders, &c. And your memorialists &c.

CHARLES CALDWELL,
GEORGE CALDWELL.

Dated at Hartford, May 16th, A. D., 1768. (Industry II. 134.)
Referred to a committee.

The following is but a synopsis of papers:

Richard Smith of Boston, in the spring of 1768, was induced to supply Nathaniel Porter of Lebanon, with goods to the value of £862 for stores in Simsbury and Salisbury, to be vended to workmen in the iron works, and in the purchase of stock for the same, for which he was to receive pay in pig and bar iron of Charles & George Caldwell. In the fall, said Smith came into Connecticut, to see if it would be prudent for him to furnish said Porter more goods on the same account: When he was induced by the false representations of said Caldwells, to become a partner in said iron works in Simsbury and Salisbury, (at which time their affairs were in a most perplexed situation, and the furnace and premises were mortgaged to John Rutsey of Albany,) for half of which property said Smith agreed to give said Caldwell, £1,000 cash to clear Rutsey's mortgage, and £100 to be furnished in goods. But on a subsequent visit to Connecticut, Smith was surprised, that the fee of said property was vested in the Sheriff, Ezekiel Williams, by a deed of Caldwell's of anterior date to secure a debt in his hands: And to clear the same and claims of sundry other creditors, Smith was obliged to advance £1,200 L. M. additional. Finding himself thus deceived and traduced, he offered Caldwells a release, on giving him security for what he had advanced; as they were unable do this, he contracted to purchase all their interest in the iron works, for which he was to allow them £4,213 15s. He then, December 20th, entered into partnership with George Caldwell, in trade and the manufacture of iron; said George to take the oversight and management, and be at one-third of the expense, and share one-third of the profits. But at the earnest request of said George, on February 19th, 1769, Smith contracted to restore the whole works to him on his entering into bond to pay said Smith,

£8,663 9s. 5d. in three yearly instalments; which said Caldwell, utterly neglected to fulfil. Smith accordingly, in January, 1770, proceeded to oust said Caldwell, and took possession. (The forge at Simsbury, had been carried away by a flood.) As said Caldwells continue to harass him in every possible manner, Smith prays the General Assembly, April 21, 1770, to grant him a committee to settle their claims in equity, that he may be quieted in possession. (Miscellaneous III, 234.)

George Caldwell gives another version of the transactions, viz: That in view of the profitable investment, Smith offered to become a partner, with the ulterior design of getting the works out of their hands. That he promised on said Charles Caldwell's retiring from the concern, to set him up in trade to gain a livelihood; and that George Caldwell, was forced to enter into a bond, to release the property to Smith. And on July 3d, 1769, Smith's agent with others, forcibly made an attack on said George, in Salisbury, took away his books and papers, put a stop to the works; and on the entrance of said George with John McAlpin, on the premises, January 4, 1770, Smith entered a complaint against them for disturbing the peace; and on warrant, said Caldwell was thrown into prison, and on trial, he was found guilty and fined; and February 7, 1770, he was ordered by the court, to surrender the premises to Smith. Caldwell avers that said judgment was erroneous, and prays the General Assembly to set the same aside, and to restore him the property, and allow him £2,000 damages, April 28, 1770. (Miscellaneous III, 236 to 242.)

Caldwell's petition is rejected, and that of Smith's is referred to a committee, May, 1770; who, in October, 1770, report that no settlement can be made with Smith, but by assigning to him the debts. And the Assembly order said committee to proceed and finish a settlement with him. (Miscellaneous III, 235.)

Richard Smith carried on the iron works, under the agency of Col. Joshua Porter; but on the breaking out of the Revolutionary war, Smith not proving to be a friend to his country, his property was seized upon, and improved by the government of Connecticut. (See below.)

At a meeting of the Governor and Council of Safety, Tuesday, 9th January, 1776.

On representation to this board, that the iron furnace at Salisbury, belonging to Mr. Richard Smith, now in Boston, is in good repair, and capable of being improved to great advantage for the public by manufacturing iron, casting cannon, cannon balls, &c. On consideration thereof, it is voted and resolved, That Col. Jedediah Elderkin, be and he is hereby appointed a committee to repair forthwith to said furnace, and to the iron works of said Smith, at Sufferage, [Canton,] or higher up, and find the true state and circumstances of said furnace, and how they may be improved for the benefit of the colony, in either of the ways aforesaid, consult and advise in the best manner he can, as to the propriety of immediately improving and setting said works agoing for any or either of the purposes aforesaid; and make the best estimate he shall be able; and with his best discretion, if he shall find it expedient, give proper orders for executing any or either of said designs; and make report of his doings and opinion in the premises. (Council of Safety I, 59.)

At a meeting, &c., January 29th, 1776.

Col. Elderkin, gave in his account and report of the circumstances, &c. of the furnace, &c. at Salisbury, and the works thereabouts, Colebrook, &c.

Among other things, that a lot of about 200 acres of land lies near the furnace with about 150 acres of wood upon it, and may be bought in order for coal, and very difficult to get it in any other way. (Council of Safety I, 65.)

Governor and Council appoint a committee to purchase, &c. (65.)

At a meeting, &c., February 2, 1776.

Col. Elderkin is hereby appointed a committee to repair forthwith to Salisbury, and give proper orders and directions for procuring every necessary material for setting forward and promoting said business, and getting everything into the best readiness to carry on the same. (Council of Safety I, 74.)

Third February, 1776, &c., voted and ordered, that the committee of the paytable draw on the treasurer in favor of Col. Elderkin, for the sum of £100, to enable him to do the necessary to forward the works to be done at the furnace in Salisbury, whither he is going by order to prepare said furnace for the casting of cannon, &c. 'Tis done! and the Governor lent him the money, and his order is endorsed. (Council of Safety I, 76.)

16th February, 1776, &c. Voted, that Lemuel Bryant of Middleborough, as a cannon founder at Salisbury, and David Cawer, Zebulon White and David Oldman, in those parts as moulders, and that said Bryant, procure four moulders for shot, and he, to come by 15th March, and the rest by 1st April. (Council of Safety I, 86.)

18th March, 1776, &c. Lemuel Bryant and Zebulon White were present, who had been sent for, near Middleborough, &c. as cannon founder, moulder, &c. The first demands two dollars, and the other one and one-third dollars per day, and to be supported. And having great necessity of them, and they affirming that they have had and are offered the same near home; it is, therefore, and on that ground, agreed to allow them that pay and support; but it is agreed and understood, that if said Bryant does not succeed, he is to have no other allowance than his support. And they are desired and sent forward to Salisbury, for the purpose of pursuing the business of making cannon, &c.

It is voted, that Col. Joshua Porter be and he is hereby appointed chief provider and overseer of the works at the furnace in Salisbury, and to do whatever shall be needful and proper to promote the public service at that place, observing such orders as shall be given to him from time to time, by His Honor the Governor, and this Council or the General Assembly of this colony, and keep proper accounts to be rendered when required. And this sent in a letter to said Porter, by said workmen. (Council of Safety I, 96.)

To the Honorable General Assembly, &c.

The memorial of Joshua Porter of Salisbury, &c., humbly sheweth, That in March last, he was appointed overseer and manager of the furnace at Salisbury, for the purpose of casting cannon, shot, &c., by his Honor the Governor and his Council; that he immediately entered upon the business, went to procuring coal and ore, and putting in repair the furnace, and for that end, drew out of the colony treasury about £550 L. M., which money is all expended; and your memorialist wants about £800 more, to enable him to carry on said business with vigor and to the best advantage, which he will receive to be accountable for. Whereupon, &c.

JOSHUA PORTER.

May 14th, A. D. 1776. (Revolutionary war VII, 374.)

Allowed £800 on giving his receipt.

Committee is appointed to take into consideration the matter relative to the foundry at Salisbury, and to consider what is best to be done relative to the continuing and carrying on the same; and also to take into consideration

Mr. Paine's letter respecting the same, and report make, Oct. 1776. (Revolutionary war VII, 376.)

We, your honors' committee, &c.

Having considered the great utility and public benefit, which has already accrued by the foundry of cannon at said Salisbury furnace, in the summer past, and the great advantage which may hereafter arise by pursuing the same, notwithstanding we are apprehensive, that the cost may increase in procuring coal; yet, we are of opinion that every effort and exertion ought to be used to continue the present blast as far into winter as is possible, considering the season, and that every preparation ought to be made this winter, of provisions and all proper materials, for carrying on the foundry of cannon for the next season under the general direction of the Governor and his committee of safety, as has heretofore been. And as to the subject of Mr. Paine's letter referred to, we are of opinion, that it will not be practicable to add another furnace to the present, for the casting of large cannon; that the water would not be sufficient, and on many other accounts very inconvenient.

Signed per order, ELIPH'T DYER.

(Revolutionary war VII. 377.)

Whereas, the public safety makes it necessary still to continue the cannon foundry at Salisbury in blast, for the purpose of making a sufficient quantity of cannon, &c. for the public defence, &c.

Therefore resolved, &c. That Joshua Porter, Esq., who has the charge of the foundry, be empowered, &c. (378.)

Committee is appointed to consider what other and further measures it may be expedient to take, to continue the furnace at Salisbury in blast, and the foundry of field pieces and other cannon, so much needed for the use and defence of this and the other American states in the present war, and make report as soon as may be, December, 1776. (Revolutionary war VII. 379.)

The state continued to sustain the furnace, appoint managers, &c. for some years. (Revolutionary war VII, 380, &c.)

May, 1777. The overseers petitioned the Assembly, that the workmen might be exempted from liability to be drafted into the public service. (Revolutionary war VII. 387.)

The classes of men which must necessarily be exempted from military calls, which may impede the cannon foundry, are—

The managers and clerk,	3
Draughtsman of patterns and turners,	3
Founder, firemen and moulders,	10
Other workmen at the furnace, viz:	
Borers of cannon,	2
Dressers of cannon,	2
Clay Spanker,	1
Gutterman,	1
Filers,	2
Banksman,	1
Ore burner,	1
Ore pounder,	1
Ore wheeler,	1
Carpenter,	1
Colliers and ore diggers,	30
	59

(Revolutionary War, VII. 389.)

Assembly exempt 50 men necessarily employed, (388.)

The following are mere abstracts:

April, 1779. Governor and Council of Safety are authorized to lease the furnace for one year. (Revolutionary war, XIV. 281.)

William Whiting having leased the same, petitions the General Assembly to exempt workmen from draft, (284,) and they exempt 40 men, (285.)

Committee to take into account the circumstances of the furnace, April, 1780. (Revolutionary war, XVIII. 105.)

Report.—Governor and Council of Safety, leased the furnace and lands of Richard Smith to Wm. Whiting, to pay two tons of pig iron per month while in blast, &c., and Whiting proposes conditions for continuing. The wants of the state require that the furnace be kept in operation. (104.)

Joshua Porter says, he was appointed agent, March, 1776, and served 11 months, cast 300 tons of iron, and saved the state £8,306. His accounts were put into the hands of Wm. Whiting, his clerk; and he is surprised to learn that a committee have found him in arrears. He has in his hands £333 state money, but has received no pay for his services, &c.

On report of committee, he is allowed said £333 as compensation, and commended for his faithful services, May, 1780. (Revolutionary war, XX. 294 to 297.)

Richard Smith, late of Boston, now of Hamburgh, Germany, owner of the furnace and of large tracts of land, committed them to the care of Colonel Joshua Porter, Feb. 28, 1775, to lease and improve for said Smith's benefit. Since Col. Porter improved the premises for one year for the state, he says, they have been improved and leased to little advantage. The works are impaired and the utensils lost. He thinks, after the present lease of Mr. Whiting expires, it will be better for the state to relinquish all control,—as was done with Smith's refinery at Colebrook,—and leave the whole to private improvement. Oct. 16, 1780. (Rev. war, XX. 298.)

Col. Porter and Mr. Whiting both petition for a lease of the furnace, &c. Nov. and Dec. 1780. (Rev. war, XX. 302 and 299.)

General Assembly negative both petitions, and order governor and council to lease to the highest bidder, for one year, the furnace and lands at Salisbury, and the refinery at Colebrook, and take measures to have the iron at Salisbury refined. Nov. 1780. (Rev. war, XX. 303, 306.)

Sheriff Lord reports, that he attempted to lease the premises, for which £321,000 state money was bid; but becoming embarrassed, he stopped the vendue, and asks for instructions. Feb. 27, 1781. (Rev. war, XX. 309.)

Referred to a committee, who report that Smith joined the enemy, and his estate should be confiscated. March 3, 1781. (309.)

Ordered, that all persons holding property of said Smith, appear before the next assembly, to give reasons why his estate should not be confiscated.

Col. Porter and Jared Lane, each representing that they are attorneys, agents and factors of Richard Smith, petition general assembly, that after the expiration of the present lease, each of them may have liberty to improve the works for the owner.

Referred to a committee, who report that Smith went off from Boston with the British troops in 1775, and is a prescribed person in Massachusetts; and recommend that the furnace, &c., be improved by the state, until Smith's political character can be further investigated; and that taxes paid by said Lane, as agent, be refunded. Feb. 1781. (Rev. war, XX. 307.) Approved (308.)

Richard Smith states, that he left the country in 1775, on his private business, and was unable then to return. He petitions the assembly for liberty to return and possess his estate; the use of which he will lay no claim to, and will loan the state £1000 from the avails of goods he wishes to introduce. Jan. 1783. (Rev. war, XXIV. 101 to 103.)

He is so admitted a member of the state, on taking the prescribed oaths, &c. (104.)

COLEBROOK IRON WORKS.

Committee to call Mr. Ogden to account, Nov. 1780. (Rev. war, XX. 303.)

To the Honorable, &c.

The memorial of Jacob Ogden, of Colebrook, in the county of Litchfield, humbly sheweth:—

That in the night of 30th day of August last, the iron works and forge in the occupation of your memorialist, at said Colebrook, by some means, unknown to your memorialist, took fire and burnt to ashes, with the bellows and all the utensils thereto belonging: that your memorialist had laid out of his own money, in repairs from time to time, to the amount of about £200 L. M. which is now all lost: and the business of manufacturing iron and steel at said works, is at an end for the present. And your memorialist is willing and desirous of erecting a new forge in the same place where the old one stood, and of carrying on said business, provided he can be properly encouraged; and has already proceeded so far in said business, as to have set up a new frame; but from the difficulty of the times, and the lowness of his finances, he finds himself perplexed in getting forward with the dispatch he could wish, and that the public exigencies seem to require. He flatters himself that the utility of the business to the public, the acceptable manner in which he has performed it heretofore, and his determination to render it as useful as possible in future, will entitle him to the favor and patronage of your honors. [He then prays for a lottery to raise £300, or $1000, and adds] and he be enabled thereby to go on with dispatch in completing said works, and have them a going in about five or six weeks, and be able to work up his stock on hand, of which he has a large quantity provided, in the course of the year, which will furnish a large supply of iron and steel, for the use of the citizens of this state, and tend to render those articles plenty and cheap. Or that, &c., in some other way, &c.

JACOB OGDEN.

Dated in Hartford, Oct. 19, A. D. 1781.

(Industry II. 175.) Negatived.

IRON WIRE.

To the Honorable, &c.

The memorial of Nathaniel Niles, of Norwich, in New London county, humbly sheweth:—

That by reason of the present unhappy controversy between Great Britain and British America, and the consequent interruption of trade, it is become of very interesting importance to these colonies, that the article of iron wire on which the woollen and cotton manufactory so greatly depends, should be manufactured in these colonies, which hitherto hath not been done; and that it is of importance this should be gone into with the greatest expedition, since the makers of wool cards, quite from Philadelphia to Nova Scotia, are at present wholly out of proper employ. That your memorialist, desirous to serve his country in so important an article, has been at considerable expense of time, pains and cash, in acquiring the practical knowledge of this business; for which purpose he has attended, as far as he could gain advantage, either by men or books, to the European method; which he finds to be very tedious, it being necessary to carry each bar of iron through about 200 holes in a steel plate, before it is reduced to the size of card wire, and it being difficult and considerably expensive, and at the same time absolutely necessary to take the scale from the wire that is raised by heating, which operation must necessarily be frequent, in order to preserve the ductility of the metal. That in order to this article being afforded at the rate at which it has usually been sold by the importer, the apparatus must be very complicate, various and expensive, your memorialist apprehending the whole will amount to not less than £300. That your memorialist, considering the burdens that lie on the public at present, would undertake the business wholly on his own risque, notwithstanding the dangers into which his interest would, by this means, be thrown; had he a sufficiency first to make suitable preparations, and then to carry on this branch of manufacture, without involving himself in inextricable embarrassments. That not being able to do this, your memorialist, confiding in the zeal of this honorable assembly to promote American manufactures, humbly begs the grant of a lottery to raise £300, for the purpose aforesaid, not desiring, however, that the moneys so raised should be committed to him, to be applied by him at pleasure, any farther than such managers of said lottery, or such other persons as this honorable assembly shall see fit to appoint for that purpose, shall find evidence that the several sums they imburse have, bona fide, been applied to the single purpose of preparing to manufacture iron wire. The remainder of the proceeds of said lottery, if any there be, to be applied as this honorable assembly shall please to direct. That your memorialist apprehends he can, on such a grant being made, afford the several sizes of iron wire at the several rates at which they have most usually been vended in this and the neighboring colonies, by the importer. That if your memorialist finds, on experience, that he cannot afford it at such a rate, he will be holden to such prices as any committee appointed from honorable assembly shall judge reasonable, after an examination of the expense of making.

That if this honorable assembly shall not see fit, in their wisdom, to grant such a lottery, your memorialist begs such assistance as shall enable him to prosecute this business, either by a loan of money from the public treasury, or such other way as your honors, &c.

Hartford, May 17, 1775.

NATHAN'L NILES.
(Industry II. 151.)

On the memorial, &c.

Resolved by this assembly, that be and they are hereby appointed a committee to examine into the matters contained in said memorial, and the necessary expense of erecting the proper works for the manufacturing of iron wire, and what encouragement may be properly given the memorialist therefor. And if said committee, upon due examination, shall judge it reasonable and expedient, they are hereby empowered to draw their order on the colony treasurer for any sum not exceeding £300, to be paid by said treasurer, who is hereby directed to pay the same to the memorialist, upon his giving good security, to the acceptance of said committee, that such sum shall be improved solely for the setting up and carrying on said manufactory, and that the principal sum so received, shall be repaid at the expiration of four years after received, without any interest thereon.

May 1775. (Industry II. 152.)

Niles continued the manufacture of wire through the war. (See snuff.)

To the Honorable, &c.

The memorial of Samuel Bull, of Middletown, &c., humbly sheweth :—

That your honors' memorialist, being about to set up the manufacture of *wire*, hath turned his attention to the building and works erected at Middletown, &c., for the refinery of lead; which buildings and works, your memorialist is informed, by men skilled in the trade of drawing wire, would answer his purpose exceeding well, &c. The zeal which your honors have at all times, and especially since the commencement of the present war, shown to encourage and promote home manufactures, has induced your memorialist confidently to hope for your honors' patronage, in a branch of business which is likely to be very useful to the public. His only request is, that your honors would permit him to take said buildings and works, and use them for the purpose aforesaid, for the space of seven years, &c.

Dated at Middletown 28 May, 1782. SAMUEL BULL.

(Industry II. 176.)

Referred to a committee; on whose report a committee is appointed, to view the buildings and works at Middletown, and agree with said Bull for their use, &c. (177, 178.)

NAILS.

An Act for the Encouragement of Manufacturing Nails.

Be it enacted, &c. That there shall be paid out of the treasury of this state, a premium on nails manufactured in this state, of the following dimensions, viz: on all nails that shall weigh not more than 13lbs., nor less than 10lbs. per 1000, three-eighths of a penny; on all nails that shall weigh not more than 10lbs., nor less than 4lbs. per 1000, two farthings on the pound; and on all nails of less dimensions, a premium of one penny per pound;—from and after the first day of October next, for the term of 3 years. May 1786.

(Industry II. 215.) Negatived in upper house.

STEEL.

To the Honorable, &c.—May 1728.

The humble memorial and request of Samuel Higley, of Simsbury, and Joseph Dewey, of Hebron, &c., sheweth :—

That the said Higley hath, with great pains and cost, found out and obtained a curious art, by which to convert, change and transmute common iron into good steel, sufficient for any use; and was the very first that ever performed such an operation in America, having the most perfect knowledge thereof, confirmed by many experiments; and hath communicated the same to the above named Joseph Dewey, and jointly with him, have made further experiment and improvement, with considerable cost and labor; and we are thereby well assured, that the art, by good improvement, may redound to the public benefit and advantage of this colony, in that we have good reason to hope that we shall produce as good, or better steel than what comes from over seas, and at considerable cheaper rate. And that the affair be set forward

with the greater expedition and certainty, we propose to take into our company and assistance, four men, more able and of greater ability than ourselves to promote and set forward, to the honor of the British nation and prosperity of this colony.

Therefore we, the said Higley and Dewey, humbly pray this honorable assembly would be pleased to grant to us, your honors' humble petitioners, our heirs and assigns, free liberty to set forward said art, and practice the business or trade of steel making, for the space of twenty years next coming, and prohibit all others that may pretend thereto, within this colony, without our consent: provided we, your petitioners, or any under us, improve the said art to any good and reasonable perfection, within two years from the day of the date hereof, and so long as we shall well prosecute the same as above, and no longer, and your memorialists, &c.

SAMUEL HIGLEY.
(Industry I. 118.) JOSEPH DEWEY.

This may certify to all concerned, that Samuel Higley, of this town of Simsbury, came to the shop of us, the subscribers, being blacksmiths, sometime in June, 1725, and desired us to let him have a pound or two of iron, made at the new works near Turkey Hills, which we, according to his desire, let him have, shaping several pieces according to his order. He desired that we would take notice of them, that we might know them again; for, said he, I am going to make steel of this iron, and shall in a few days, bring them to you to try for steel. Accordingly he brought the same pieces which we let him have, and we proved them, and found them good steel, which was the first steel that ever was made in this country, that we ever saw or heard of. Since which he hath made farther experiments, taking from us iron, and returning it in good steel. As witness our hands, this 7th day of May, 1728.

TIMOTHY PHELPS.
(Industry I. 120.) JOHN DRAKE.

Whereas, &c.

We being willing to give all due encouragement to works of this nature, are pleased to condescend to their request; and do therefore by these presents grant to them, the said Samuel Higley and Joseph Dewey, our license and liberty for the sole practising the said art of steel making, to be and remain to said Higley and Dewey, &c., for and during the space of 10 years, next ensuing this date, strictly forbidding all persons practising the same within this colony, &c., without the consent and approbation of the said Samuel Higley, &c., under their hands and seals, as they will answer the country at their peril; the said Higley having power to take into their company, in and of himself, &c., three partners, and the said Dewey, in like manner, one partner.

Provided, always, that the said Higley and Dewey, &c., improve the art as above, to any good and reasonable perfection, within two years, &c., and so long as they shall prosecute the same, and no longer. May 1728.

(Industry I. 119.)

To the Honorable, &c. Oct. 1740.

The memorial of Thomas Fitch, George Wyllys and Robert Walker, Jr., all of said colony, most humbly sheweth :—

That your memorialists have been at the pains and expense of procuring the art and skill of making and converting iron into steel, and do judge it would be of very considerable advantage to this colony if the same be suitably encouraged and well performed in the same; and that your honors' memorialists are desirous to undertake the business aforesaid, if they may be suitably encouraged therein.

Whereupon, your memorialists most humbly move and pray this honorable assembly to grant us the sole liberty and privilege of performing the said manufactory of making and converting iron into steel, for the space of twenty years; and that your honors may more fully see the thing we desire, and the easier make the said grant, we have drawn a bill for an act for the purpose aforesaid, which we herewith present, and pray your honors to pass the same into your act, or something equivalent thereto. And your memorialists, &c.

New Haven, Oct. 1740.

THOMAS FITCH.
GEORGE WYLLYS.
ROBERT WALKER, JR.

(Industry I. 137.)

Granted for fifteen years, on condition that the said Fitch, Wyllys and Walker, &c., shall neglect to begin and perform said work, within two years after this date, and shall at any time after said two years, neglect to make half a ton of such steel in any one of the years within said term, then this grant and act, in every part thereof, shall be void. (138.)

To the Honorable, &c., October 1743.

Messrs. Fitch, Wyllys & Walker, in their petition add,—Whereupon, we with our assigns, one of whom was the Rev. Mr. Timothy Woodbridge of Simsbury, now deceased, expended a considerable sum of money in making a furnace, and providing other materials, in consequence of said grant, and in pursuance of said design, and had agreed to have made an experiment before the expiration of the said two years; but while we were preparing and before we had got ready, Mr. Woodbridge, on whom our dependence was to prepare and make the experiment, was removed by death, and thereby we prevented doing what we intended, within the limitation aforesaid: And as we are now got in readiness to make the experiment in a short time, and are willing to have the advantage of our risque and expense, and having been disappointed as aforesaid,—we pray your honors to renew the said grant to us and our assigns for the remaining 12 years, on the conditions before made upon, only we are willing that instead of two should be one year to effect the work in, &c.

New Haven, Oct. 18, 1743. Signed as above.

Assembly so renew the grant. (140.) (Industry I. 139.)

To the Honorable General Assembly,

Whereas, the General Assembly were pleased by an act bearing date, October 1740, to grant to Messrs. Fitch, Wyllys & Walker, the sole privilege of making steel, for the term of 15 years, upon this condition, that they should, in the space of 2 years, make half a ton of steel: The aforesaid 2 years being expired, and the condition not complied with,—application being made to the General Assembly in October last, they were pleased to renew the grant, upon condition that half a ton of steel should be made before the setting of the Assembly in October, 1744.

These are to certify and inform your honors, that after many expensive and fruitless trials, with which sundry of the owners were discouraged, the affair being still pursued by others of them, it has so far succeeded, that there has been made more than half a ton of steel at the furnace in Simsbury, which was erected for that purpose by the gentlemen to whom the aforesaid grant was made.

AARON ELIOT,
ICHABOD MILLER.

(Industry I. 141.)

To the Honorable, &c. October, 1744.

They add—And as a specimen of the goodness thereof, to answer the intentions of German steel, I, the said Aaron Eliot, who have had the care and oversight of said business, and performed said work, do herewith present to your honors for examination, instruments made with the said steel, made at Simsbury, aforesaid: And pray in behalf of said grantees and their assigns, that this Assembly would order a record to be made, that the condition of said grant appears to have been fulfilled to the satisfaction and acceptance of this Assembly: which will greatly oblige, &c.

AARON ELIOT, in behalf, &c.

(Industry I. 142.)

Assembly so declare and order, Oct. 1744. (143.)

To the Honorable, &c. May, 1772.

The memorial of Aaron Eliot, of Killingworth, humbly sheweth:

That your memorialist has, for a number of years, carried on the steel manufactory in this colony, and has made very large quantities, sufficient to supply all the necessary demand of that article in this colony, as well as to export large quantities for supplying the neighboring governments; and that the fortune of your memorialist has not been large enough to supply himself with a sufficient stock to carry on the business; and has therefore hitherto been obliged to procure his stock of iron at New York, on credit, and pay for the same in his steel when made, at the moderate price of £56 the ton, from whence it has been again purchased in this colony at the price of £75 and £80 the ton. And for several years past, almost the whole supply of steel in this colony has been from New York, of the manufacture of your memorialist at the aforesaid enormous advance: and your memorialist himself conceives, that the interest of the colony is to encourage necessary and advantageous manufactories within this colony, not only for the necessary consumption of the colony, but for export, which your memorialist will be able to effect, in the aforesaid article of steel, with some small assistance from your honors, to procure him a sufficient stock, and thereby save large sums of money within this colony which is annually paid to New York for the steel manufactured in this colony.

Wherefore your memorialist humbly prays your honors to loan him £500 out of the public treasury, for three years, without interest, whereby he will be enabled to carry on the aforesaid business to considerable public advantage. And he, &c. AARON ELIOT.

(Industry II. 144.)

Assembly granted him said loan, May 1772. (145.)

To the Honorable, &c. The memorial, &c.

Your memorialist further shews, that at present it will be very inconvenient for him to repay said sum, as he hath lost a large quantity of his steel in a store at Boston, where it was deposited for sale; his market at New York is interrupted, and he hath exerted himself to lay in a large stock to supply the demand for steel in this colony, which, in the course of the last summer, is greatly increased; and from the particular situation of public affairs, and from the great difficulty of procuring foreign supplies.

And thereupon he humbly prays that the loan of said money may be continued to him for the space of two years longer, or such lesser term as to your honors shall seem meet: And that a suit which the treasurer hath commenced against him and his surety, upon your memorialist paying the cost that hath arisen, may be discontinued: And your memorialist, if required, is ready to give any farther security that may be demanded.

Dated at New Haven, Dec. 21st, A. D., 1775. AARON ELIOT.
(Industry II. 146.)
Assembly extend the time of payment two years. (146.)

BELLS.

To the Honorable, &c.

The memorial of Abel Parmele, of New Haven, humbly sheweth:

That, whereas, your memorialist has been at great expense of both time and money, in order to gain the art and skill of casting large bells for the use of churches, schools, &c., and hath made such experiments as that your memorialist is well assured that he can perform, to good acceptance, and much for the public advantage of the government: Considering,—

1. Your memorialist can perform the work cheaper, allowing the discount of our currency with that of Great Britain, than it can be brought from foreign parts.

2. The best and principal product of our land will scarce, at any rate, make returns.

3. A great part of the materials of which such large bells are made, are the product of our country, and almost wholly useless for any other service.

4. If a bell should happen to be split, as many are, the recasting again here will save the great expense of transportation, the risque of the seas, &c.

And now your memorialist begs leave to remind this Honorable Assembly, that the performance of such as hath not been attempted, as yet, in the country, and the charge and expense of an undertaking so great; and calling to mind how ready your honors have been duly to encourage such undertakings, and your unwillingness that any suffer thereby; and your memorialist being desirous of reaping the benefit of his own study and industry, humbly requesteth of this Honorable Assembly, that he may have the whole profit and management of said affair of making and vending large bells within this colony of Connecticut, for the space of 20 years next coming: And that for the term aforesaid, no other person without the license of your memorialist, shall, within this colony, presume to set or make any bell of a larger size than 10 inches diameter, or for some shorter term, or some other way, as you, in your great wisdom think best, to encourage your humble memorialist. And your memorialist, as in duty bound, &c.

New Haven, Oct. 19, 1736. ABEL PARMELE.
Negatived in both Houses. (Industry I. 129.)

POLISHING CRYSTALS.

To the Honorable, &c.

The memorial of Abel Buell, of Killingworth &c., humbly sheweth:

That your memorialist having been convicted &c., of being guilty of altering the bills of public credit of this colony, &c. And whereas, this Honorable Assembly did so far compassionate the youthful follies of your memorialist as to give him enlargement from prison, where, by the laws of this colony, he was sentenced during life, and permitted him to dwell with his family in Killingworth, &c. Since which, duly sensible of his past error and offence, for which he justly suffered, he has with diligence applied himself to industry for the support of his family. And your memorialist would humbly beg leave to inform your honors, that in prosecuting the business of his calling, he hath discovered a method of grinding and polishing crystals and other stones of great value, all of the growth of this colony, and that without the aid or direction of any person skilled in the art, by which discovery, a great saving and advantage will accrue to this colony, by preventing the importation of such stones from abroad: And whereas, by the late laws of this colony, this Honorable Assembly were pleased to offer a premium to any person who should make any useful discovery for the advantage of this colony; your memorialist relying on the mercy and clemency of this Honorable Assembly in forgiving offences, on proper evidence of repentance and reformation, is encouraged to implore their gracious interposition, and that your honors would restore your memorialist to those liberties and privileges which he has justly forfeited, at least so far as may enable him to carry on the business, in all its branches, of so useful a discovery made by your memorialist, so as to render the same extensively advantageous to the colonies in general, and to this government in particular. And your &c. ABEL BUELL.

Dated in Killingworth, 8th day of Oct. A. D. 1766. (Industry II. 126.)

Certificate of justice of peace and townsmen, to his good behaviour, Oct. 8, 1766. (128.)

He is restored to all those liberties and privileges by him forfeited, on giving bonds, &c. (127.) [See the following memorial.]

TYPE FOUNDING.

To the Honorable, &c., October, A. D. 1769.

The memorial of Abel Buell of Killingworth, &c. humbly sheweth:

That your memorialist having experienced the great goodness of this Honorable Assembly, for which he begs leave to render his most grateful tribute of thanks, and to assure them from a grateful sense of their clemency, he has made it his unwearied study to render himself useful to the community in which he lives, and the American colonies in general; and by his unwearied application for a number of months past, has discovered the art of letter founding. And as a specimen of his abilities, presents this memorial impressed with the types of his own manufacture: And whereas, by an ancient law of this colony, this Assembly were graciously pleased to enact, that any one who should make any useful discoveries, should receive an encouragement therefor, from this Honorable Assembly; and as the manufacture of types is in but few hands, even in Europe, he humbly conceives it to be a most valuable addition to the American manufacture; and as the expense of erecting a proper foundry will be great, and beyond the abilities of your memorialist, he humbly hopes for encouragement from this Assembly, either by granting him the liberty of a lottery for raising a sum sufficient to enable him to carry on the same, or in some other, &c. ABEL BUELL.
(Industry II. 137.)

[The type, about Brevier with Bourgeois body, is more beautiful that any specimen we have seen of that period, and the impression better than the present average of Congressional Documents.]

Referred to a committee who report. (138.)

We have conferred with said Buell, &c., and are fully convinced that he hath discovered the art of letter founding; and that he is capable of making instruments necessary for the proper apparatus of letter founding, &c.

And on their recommendation the Assembly resolve, That the treasurer of the colony be, and he is hereby directed to pay out of the public treasury to said Buell, £100, upon his giving bond, &c. in the sum of £200 condition, that he set up and pursue within one year next after the receipt of said £100, the art of letter founding in this colony, and not depart therefrom to reside in any other province or colony within seven years next after the receipt of said money, and re-pay said £100 at the end of said seven years; and that in case said Buell pursues said business in this colony, the space of 12 months after receiving said £100, the treasurer is hereby further directed to pay said Buell one other £100, (payable as above,) &c. (139.)

Sir:—The long absence of my husband, makes me almost despair of ever seeing him again, &c. When he left me, it was unknown to me that he was so much involved as he was; and in a very few days, every thing was seized from me. I have by dint of industry got together so much, that I can now refund the money which he had of the state, &c. If, therefore, the £100 can be accepted in full for the demand against us, I am ready to pay it, &c.

I am, &c.,
ALETTA BUELL.

New Haven, August 8, 1777. (Industry II. 158.)

Assembly order the bond to be given up on the payment of said £100 August 1777. (157.)

(Abel Buell's name again appears among the petitioners of New Haven, for a tariff of duties on imports, October 12, 1785.) (Industry II. 201.)

PIN MANUFACTURE.

To the Honorable, &c.

The petition of Leonardus Chester of Wethersfield, &c., humbly sheweth:

Whereas, we are obliged totally to withdraw commerce from the parent state, and we have wantonly and negligently been dependent on them for most of the ornamental, as well as useful articles of life, to the almost entire neglect of manufactures and arts,—those stabilities of wealth and affluence—esteeming it a surer and easier method to gain wealth and riches by agriculture, yet drove to the last resource of breaking off all connection, which has, to mutual advantage, so long subsisted, we find that our dependence has been so great and universal, that we sensibly feel it in the minutest trifles. And to avoid the discomfitures and sufferings, we might otherwise subject ourselves to, it behooves every well disposed mind to parry the thrust by every lawful method in his power, as well individuals as societies of men.

Actuated by these principles, your petitioner has turned his attention to *arts* and *manufactures*, and while others have been industriously busied investigating some method to end the present grand dispute, your petitioner has been engaged as far as in him lay, and perhaps as far as any individual in this colony, to make provision for an easy contest, and has with great expense, erected a manufactory house, and engaged a number of useful and necessary manufacturers in various branches in a particular manner. The pin manufactory never before attempted in this colony, which at first blush to a person unacquainted with the work, would seem so diminutive and trifling as to the expense, that any person of a moderate fortune, might attempt and execute within himself; yet your petitioner begs leave to acquaint this Honorable House, that although he did most minutely and critically sit down and count the cost, it has, owing to innumerable embarrassments and difficulties, surpassed his calculation. Under all embarrassments, he has, however, thus far completed the works, that he can by samples, demonstrate, that they can be made as well as in London, and upon as fixed principles, saving the prime cost and charges of the wire; which to carry into an extensive execution, will demand a larger capital than your petitioner, exclusive of his other business is able to advance, especially at the dead crisis of collecting debts.

Your petitioner, therefore, by advice of his friends, and numbers of well disposed persons of worth, has taken this method, and humbly prays that this Honorable House will be pleased to look into the premises, and appoint a committee to inspect the works, and report the practicability of its execution, and certainty of an easy supply of that article, though trifling at first view, yet essentially necessary to the community, and on that principle *important*, as every individual will be affected by the want, which said committee may be vested with such power as to advance such a sum of money from the public treasury upon good security, as shall execute the design: Or, as the call is at present so loud, and a considerable sum of money might profitably be advanced for wire, which might immediately be worked up to advantage, judging, that at this time of stagnation of cash, your petitioner as aforesaid, not being able to collect his dues, this House would not wish that your petitioner should be obliged to part with his paternal interest for the service of his country; that they would encourage him by bounty, or a loan of a certain sum for a certain time, interest free; the way your Honors shall think most eligible, will confer a favor and advance the public good. And your petitioner, &c.

LEONARDUS CHESTER.

Wethersfield, December 21st, 1775. (Industry II. 153.)

Referred to a committee who report:—

That one method of encouraging said manufacture may be by premium or bounty.

** That a bounty or premium of 3d. on the pound may be proper to be given for every pound of good merchantable pins that shall be made in this colony within one year, &c.; and 1d. on the pound, &c., the next year after, &c.

We beg leave further to report, that Mr. Leonardus Chester, appeared before us, and represented that he had contracted with, and hired a workman and five hands well skilled in the pin manufactory, and hath already advanced £1700 towards providing buildings, tools, machines, and materials for carrying on the manufactory aforesaid. That the expense of setting up the same greatly exceeds his expectations. That his stock is so far exhausted in preparations, that he is not able to procure stock to employ said workman. And that in case he could be indulged with a sum of money for a term, interest free, he would be willing to submit to the following conditions, to wit: that his manufactory should be open to the inspection of the General Assembly, that he would be laid under obligation to sell his pins at a reasonable profit, to be determined by the General Assembly, and give security to apply the money received wholly to carry on said manufactory under penalty, &c. Whereupon, &c. a loan of money, without interest, to said Chester, is another method by which said manufactory may be encouraged, &c. (154.)

After disagreeing votes, the Assembly order a continuance to the next session. So it ended.

CLOCK THAT SHALL WIND UP ITSELF.

To the Honorable, &c.

The petition of Benjamin Hanks of Litchfield, humbly sheweth to your Honors :—

That your petitioner after unwearied trouble, pains, and study for a number of years now last past, in search of mechanical knowledge, not only for his own pleasure and amusement, but for the benefit of mankind, has made a large improvement thereon, by inventing, contriving and executing a clock or machine that winds itself up by help of the air, and will continue so to do without any other aid or assistance, until the component parts thereof are destroyed by friction; which will keep the most regular time of any machine yet invented, as it is ever wound without any variation or stop to her motion, and consequently not only a great ornament, but improvement in mechanism, which your Honors' petitioner will submit to your Honors, and beg them to take the matter into their wise consideration; and as he has been at great pains, trouble and expense, in accomplishing the same, that they would graciously grant unto your petitioner, the sole and exclusive right and privilege of making and vending said kinds of clocks for the term of 14 years, or some other way, &c.

BENJAMIN HANKS.

Dated at Litchfield, this 6th day of October, A. D. 1783.

(Industry II. 181.)

Lower House at first, negative his petition; but finally, such exclusive privilege is granted. (182.)

STEAM ENGINE.

To the Honorable, &c.

The petition of Barnabas Deane humbly sheweth :—

That your petitioner, for valuable considerations given to certain ingenious persons in Great Britain, the first and original inventors of the new improved steam engine, (who, by act of Parliament of Great Britain, have an exclusive right to construct and use the same within that kingdom, for the space of 25 years :) your petitioner has acquired a perfect knowledge of the construction thereof, with new improvements, and the application thereof to a great variety of important purposes; such as the raising of water, the manufacturing of iron, and to the working of corn mills, saw mills, and of mills of every kind. Your petitioner, therefore, humbly prays that an act of assembly may be passed, to give and grant to your petitioner, and to his heirs and assigns, the sole and exclusive right and privilege of erecting and making use of the aforesaid steam engine, for the purpose of manufacturing of iron, and of working of corn mills, saw mills, and mills of every other kind, for and during the term of 20 years from the date of such act or grant, in and throughout this state. And your petitioner, &c.

BARNABAS DEANE.

Dated in Hartford, May 27th, 1786.

Negatived.

(Industry II. 213.)

John Fitch, the inventor of the *Steamboat*, was a native of Connecticut, and it is said, made his first experiments in the Connecticut river.

Ship Building has ever been carried on from the earliest period in Connecticut, but no special privileges were ever granted.

DRILL PLOUGH.

To the Honorable, &c. Oct. 1771.

The petition of Benoni Hilliard, of Saybrook, humbly sheweth :—

That the society established in London, Anno Domini, 1753, for *Encouragement of Arts, Manufactures and Commerce*, in order to incite and stimulate persons to make improvements in the arts and in manufactures, and to the discovery of further advantages in commerce and agriculture, and every useful part of learning, from time to time, have given præmia on new inventions, proving useful either in the culture of lands, or in further promoting and advancing the arts, manufactures or commerce; and more especially, on the 10th of April, A. D., 1765, at a meeting of members of said society, in the *Strand*, in London, duly convened according to the rules and orders of said society, they voted a premium of fifty pounds sterling for the best drill plough that should drill, sow and cover the corn or seed at the same time, being an improvement upon such drill ploughs as were then already known or in use. And said society, on the 30th of May, A. D., 1764, resolved, that no member of said society should thereafter be a candidate for, or entitled to receive any premium, bounty or reward whatsoever, except the honorary medal of said society. And your petitioner, being under low circumstances, was moved and induced by the said offer of the premium of fifty pounds, as aforesaid, to undertake to make a drill plough, such as should be an improvement on all drill ploughs at that time known and in use; and after much time, study and perplexity of mind, effected the same, and constructed a drill plough, such as he judged would merit the premium offered as aforesaid. And your petitioner being a person of obscure life, and little acquainted with persons of rank and figure, in order to obtain said premium, applied to Benjamin Gale, Esq., of Killingworth, &c., a neighbor to your petitioner, and who was also a corresponding member of said society, to advise and assist him in procuring said bounty and premium. And said Gale undertook to negotiate and transact said business for your petitioner, so as to obtain said premium; and in consideration thereof, your petitioner was to give said Gale one-half said premium when received, as a reward for his services in procuring the payment thereof; and as it is contrary to the rules and orders of said society, for any member to receive a bounty; and also by the rules and orders of said society, if any person should be detected in any disingenuous methods to impose on the society, such person shall forfeit the bounty for which he is a competitor, and be deemed incapable of obtaining any premium thereafter: It was therefore agreed between said Gale and your petitioner, to keep secret the aforesaid bargain respecting the division of said premium, and that said Gale should solely transact all matters relating to the obtaining the premium aforesaid. And your petitioner, confiding in the honor and fidelity of said Gale, in the matters aforesaid, sometime in the year 1765, delivered the said drill plough, by him solely invented and constructed, unto said Gale, that he might transmit the same to said society, and obtain the premium therefor, if the same should be judged to merit the offered bounty, to be divided as aforesaid. And said Gale received the said plough for that purpose; and said Gale having so gotten said plough into his possession, in order to procure a great name and character of a person of skill and ingenuity, and to spread abroad his fame and reputation, did most unjustly and falsely write and declare to said society that he, said Gale, was the sole inventor and constructor of said plough; and said society having received said plough, adjudged the same to merit the offered premium, as aforesaid, and to be a great and valuable improvement on all drill ploughs before known and in use. But the said Gale being a corresponding member, by the rules and orders aforesaid, could not receive the bounty aforesaid, (he being supposed to be the inventor and constructor of the aforesaid plough) and therefore said society struck a golden honorary medal for said Gale, to perpetuate his fame and reputation as a gentleman of a fruitful invention, and very useful to his fellow-men in his day and generation; which medal said Gale has received, and the same is in value, in money, worth £7. 10s. L. M. By all which misrepresentations and fraudulent transactions of said Gale, your poor petitioner has lost the benefit of the premium aforesaid, is defeated in his expectations, by the fallacious and fraudulent doings of said Gale as aforesaid, and said Gale refuses to pay and satisfy your petitioner any part of said £50. Your petitioner would further represent to your honors, that as said Gale is and was a gentleman intrusted in many and important places of public trust, the execution of which, your petitioner conceived, would never be committed to any but such as your honors esteem to be persons of fidelity and virtue, he in his humble station was induced, by the public character of said Gale, to put great confidence and trust in him, and thereby, in some parts of the aforesaid representation, may not be able fully and clearly to evince the same, without the testimony of said Gale, or of your petitioner; although he is able, he conceives, to render the same highly probable in every part thereof, by other and disinterested witnesses, and in many of the material parts thereof, fully to evince the same.

Wherefore, your petitioner humbly prays your honors, by yourselves or a committee, to inquire into all the aforesaid matters, by the oaths of the parties, and other evidence, or otherwise, as shall be thought fit; and that said Gale may be, by your honors' decree, held to pay and satisfy your petitioner the sum of £50 sterling, or such part thereof as your honors shall think just and reasonable, or in some other way, &c.

Dated in Saybrook, August 22, A. D., 1777.
(Industry II. 148.) BENONI HILLIARD.
Petition was withdrawn.

POTTERY.

To the Honorable, &c.

The memorial of Samuel Dennis, of New Haven, humbly sheweth:—

That he is acquainted with the potter's business, and is about to erect a stone pottery; and there is in this country a plenty of clay, which he presumes of the same kind with that from which the queens-ware of Staffordshire is usually made; and that he wishes to erect a pottery for the purpose of manufacturing the finer kinds of ware usually made in Staffordshire, particularly the queens-ware; that the expense of this undertaking, of procuring the requisite information, and the workmen acquainted with the business, is too great for his property. Your memorialist conceives that the public would be so greatly benefited by a work of this nature, and particularly by obtaining and diffusing the knowledge of the business, that your honors will readily afford him some assistance. The manufacturing of those articles would be attended with not only the advantage of saving the expense in the country, but would probably, in a short time, very greatly reduce the price of them, as they now come to the consumer at two or three times the original cost, by reason of the high freight and other charges. Your memorialist thinks, that by the aid of £250 or £300, he could complete the business, and he would give sufficient security to lay out the money for the aforesaid purpose, and to repay the sum within three years. Your memorialist, therefore, prays your honors to loan him that sum without interest, for said three years, on those conditions, &c. SAMUEL DENNIS.

New Haven, October 9, 1789.
Negatived. (Industry II. 242.)

GLASS.

To the Honorable, &c. May, 1747.

The memorial of Thomas Darling of New Haven, in the county of New Haven, humbly sheweth to this Honorable Assembly:

That whereas, your memorialist has taken pains to inform himself in the art and mystery of making glass, and is persuaded that, by your Honors' leave and with proper encouragement, he can carry on the affair, so as to be beneficial both to himself and this government. The charge for setting up works for that business being great, and some considerable length of time required before they can be profitable—For

First.—He may be obliged to send to England for workmen, not being able to procure them at Philadelphia, and they main't be able to get here in a year or two, by reason of the difficulty occasioned by the war.

Secondly.—It will take considerable time to build the furnace, for it is dubious, whether the clay may be found here, either to build the furnace of, or to make the pots that contain the metal.

Thirdly.—There may be much time spent in experiments upon sand: for though all sand contains a glass, yet it may not answer either as to the quantity or quality; for some sand yields so little, that costs of fluxing and blowing could never be answered; and other sand, though it may yield in good proportion, yet it main't be sufficiently transparent, which is the peculiar excellency of glass.

Many other difficulties your Honors can easily perceive, may arise in an affair so great with so many dependencies, so that your memorialist main't be able to carry on the affair, either for his own benefit, or the public's in 4 or 5 years.

Wherefore, he humbly prays this Honorable Assembly, would grant your memorialist and his assigns, by your Honors' patent, the sole liberty and privilege of manufacturing and making glass within this government, for the space and term of 25 years next coming, or as long as your Honors shall think fit. And your, &c

THOMAS DARLING.

Hartford, May 1747. (Industry I. 159.)

On the memorial, &c.

It is resolved by this Assembly, That the memorialist and his assigns, shall have the sole liberty and privilege of making and manufacturing glass in this colony, &c. for the space of 20 years from this time; and all and every other person and persons are hereby forbid and prohibited setting up, erecting, and carrying on any works, buildings, or materials for carrying on the business of making glass as aforesaid, in this colony for the space of 20 years next coming, without the liberty of the memorialist or his assigns, on penalty that every such person or persons so doing, shall forfeit the sum of £1,000 money, to be recovered, &c.

Provided, nevertheless, that if the memorialist and his assigns shall neglect or fail to erect, set up and prepare suitable works and materials for the making of glass, as aforesaid, for the space of 4 years, or shall fail of making the quantity of 500 feet of good window glass, in any one of the remaining 16 years, after the aforesaid 4 years, that then this grant and every part thereof, shall be void, &c.

May 1747. (Industry I. 160.)

To the Honorable, &c.

The memorial of Elijah Hubbard of Middletown, Isaac Moseley of Glastenbury, Wm. Little, Jr. of Lebanon and Pickett Latimer of New London, &c., humbly sheweth:—

That they are desirous to erect a glass house, and set up and carry on the manufacture of glass of various kinds within this state. That upon inquiry, they find the introducing this manufacture into the state, will be attended with great expense and risque; and in case of success, will not be attended with sufficient profit to compensate the trouble and expense, if others availing themselves of the labors and experience of the first adventurers should establish rival works, as soon as they have collected workmen, and overcome the difficulties of a new adventure, in a manufacture hitherto unknown in this state.

Whereupon, they humbly pray your Honors to extend your gracious encouragement and protection to them; and upon condition, that they do within one year erect a glass house, and begin to manufacture glass within this state, for and during the term of 20 years next ensuing,—or for and during such term as to your Honors shall seem meet. And they, &c.

ELIJAH HUBBARD, *et al.*

Dated at Hartford, this 18th day of October, A. D. 1779.

(Industry II. 169.)

Granted during the pleasure of the Assembly. (168.)

To the Honorable, &c.

The memorial of Isaac Moseley and William Little, Jr., &c., humbly sheweth, &c.

..* That the said Hubbard and Latimer, upon consideration of the great expense and risque to be incurred, have declined to proceed further in said business; and that your memorialists, earnestly desirous to proceed in said business, have, at much expense of time and money, endeavored to inform themselves of the necessary cost of erecting works, and setting up said manufactory, and find that the cost of works, utensils and lands, will amount to about £3,000, L. M. as in 1774: That a number of able and experienced workmen may be obtained at a great expense, who are, nevertheless, slow to engage upon account of the expense and damage arising to them, by removing their families, &c. Your memorialists are willing yet to risk their time and fortunes in an attempt to introduce so useful and necessary a manufacture, but do not think themselves able to do it without some further encouragement from the public.

And thereupon, they humbly pray your Honors to grant them liberty [to raise] £2,000 in good and lawful money, or the value thereof in bills by lottery, as your Honors shall think meet, under such restrictions and regulations as may be judged proper, to enable them the better to set up and introduce said manufacture, or in some other, &c.

ISAAC MOSELEY.
WILLIAM LITTLE, Jr.

Dated in Hartford, the 8th day of June, A. D. 1780. (Industry II. 173.)

Upon the memorial, &c.

As a further encouragement to their undertaking and carrying on so useful and necessary a manufacture, [they] shall have and enjoy the sole and exclusive right of manufacturing glass within this state for 15 years, from and after the 1st day of July, 1780, upon conditions that they establish such manufactory as aforesaid, by the 1st day of November, 1781, and that, from that day forward, during the continuance of this grant, carry on in a regular manner, the business of such manufactory, so as to furnish for sale the usual quantities of glass, which are commonly made and sold at such kind of manufactories. (Industry II. 174.)

To the Honorable, &c.

The memorial of Wm. Pitkin, Samuel Bishop and Elisha Pitkin, humbly propose to your Honors—

Whether manufacturing glass in this state will not be for the public emolument of the same; and if it be thought an object worthy the attention of your Honors, they will, if properly encouraged, erect works and pursue said business. Money out of the public treasury in this distressing day, we do not expect; but an exclusive right to such manufacture, such length of time as may be thought proper to save them the great expense that will be necessary in buildings, &c. for said purpose, &c. And if the proposal meets your Honors' approbation, we pray a committee to hear your memorialists in the premises, and report, or any other way, &c.

WM. PITKIN
SAMUEL BISHOP.
ELISHA PITKIN.

Hartford, January 28th, 1783. (Industry II. 179.)

Referred to a committee, who report. (179.)

It will be a benefit to this state, to grant to the memorialists an exclusive right of manufacturing glass, for the term of 25 years, from and after the time they shall begin the first blast. And that the memorialists ought to be exempted from all assessments on account of the profits which may arise by manufacturing glass for the term of 10 years, from the rising of this Assembly.

Granted, on condition they begin manufacturing within three years.

(Industry II. 180.)

To the Honorable, &c. Oct. 1789.

The memorial of George Pitkin, Richard Pitkin, Wm. Pitkin, Jr., George Pitkin, Jr., and Richard Pitkin, Jr. of East Hartford, &c.; Aaron Bissel, Epaphias Bissell, and Daniel Ellsworth of East Windsor, and George Hale of Glastenbury, &c., humbly sheweth:

That your memorialists, conceiving that the erecting of glass works would be of public utility, and hoping they would prove to be of private advantage, have been at great expense in erecting buildings and furnaces, and providing materials, and procuring workmen for the purpose of establishing and carrying on a glass factory. That besides, &c., they have been subjected to great losses and disappointments, by means of one Robert Hughs of Boston, who entered into partnership with the memorialists, and engaged to furnish a large proportion of the stock for carrying on said factory; and who having induced your memorialists to believe, that he was a person well skilled in the aforesaid manufactory, was by them appointed and employed to superintend, and direct the business of their glass works; but the said Hughs utterly failed of furnishing stock, and also proved by his subsequent conduct, to be totally un-

skilled in the business of said factory. And the memorialists ...

skilled in the business of said factory. And the memorialists would further represent to your Honors, that the expense of carrying on said factory is greater than they expected, &c. That notwithstanding the aforesaid losses and disappointments, as the memorialists possess buildings, and have a considerable stock on hand, to be employed in said factory, they have proceeded to engage a number of workmen, and with such encouragement as might be afforded by the Legislature, without being burdensome to the public, they think they might prosecute their undertaking with success. The memorialists, conceiving that the prosperity of the State is intimately connected with the introduction and improvement of manufactures, and that the making of glass is one of the most important manufactures that can be introduced among us, &c., pray your Honors to interpose and grant them a lottery for the purpose of raising the sum of £400, &c. GEORGE PITKIN, *et. al.*

East Hartford, Oct. 6, 1789. (Industry II. 239.)

Lottery so granted, and managers appointed. (240.)

PAPER.

Upon the memorial of Christopher Leffingwell, of Norwich, &c., preferred to this Assembly, &c., May, 1768, and by continuance comes to this Assembly, shewing that he hath, at great expense, erected a paper mill in said Norwich, and procured workmen for the making and manufacturing various kinds of paper, &c., praying that a bounty may be granted him, on all paper made and manufactured in his said paper works, &c. And farther, it appearing to this Assembly that sufficient materials for making paper are and may be had in this colony.

Resolved by this Assembly, that the said Christopher Leffingwell be allowed and paid out of the treasury of this colony, two pence the quire on all good writing paper, and one penny the quire on all printing and coarser paper, that shall be made and manufactured in said paper mill, during the pleasure of this Assembly.

And it is farther resolved, that the said Christopher Leffingwell shall render an account annually, to the treasurer of this colony, of the quantity and kinds of paper made and manufactured in said paper mill in each year, duly attested upon oath, and upon his producing such account duly attested as aforesaid to the treasurer of this colony, the said treasurer is hereby directed and ordered to pay the said bounty as above stated, annually, at the expiration of each year, from and after, &c. May 1769. (Colony Records X. 439.)

At the end of the first year, May 1770, Leffingwell presented his affidavits and bill for manufacturing

4,020 quires of writing paper at 2d.	£33 10*s.* 0*d.*
10,600 " printing &c., paper, at 1d.	48 6*s.* 8*d.*

Which was paid him, and bounty discontinued.

(Industry II. 140 to 142.)

To the Honorable, &c.

The memorial of Hannah Watson and Sarah Ledyard, of Hartford, humbly sheweth:

That their lately deceased husbands, Ebenezer Watson and Austin Ledyard, in their lifetimes, and a few years since, had jointly, and at great expense, erected a paper mill in East Hartford, complete and excellent as any one upon the continent, and which had now begun to be of advantage to the owners, and great utility to the public, as it wholly supplied the press of

Hartford, (from whence issue weekly more than 8,000 newspapers) a great part of the writing paper used in the state for one year past, and had supplied large quantities for the use of the continental army, and officers: but most unfortunately for the memorialists, on the night after the 27th inst., in a manner to them unknown, (though suspected to be by means of some evil minded person) took fire and was wholly consumed, with all the effects therein, being about 20 reams of paper, and materials for 300 more, &c. Capital loss of more than £5,000, &c.

Dated at Hartford, Jan. 28, 1778. HANNAH WATSON,
(Industry II. 159.) SARAH LEDYARD.

Assembly grant them a lottery to raise £1,500. (160.)

TORPEDO.

(Of this important invention to destroy an enemy's shipping, but little appears on the files and records.)

At a meeting of the Governor and Council of Safety, Feb. 2, 1776—

Mr. [David] Bushnell was here by request of the Governor and Council, &c., and gave an account of his machine contrived to blow up ships, &c., and was asked many questions about it, &c., &c.

Voted, That we hold ourselves under obligations of secrecy about it. And his Honor the D. Governor is desired to reward him for his trouble and expenses in coming here, and signify to him that we approve of his plan, and that it will be agreeable to have him proceed to make every necessary preparation and experiment about it, with expectation of proper public notice and reward. (Council of Safety I. 73.)

Feb. 3, 1776.—Moved by the Governor, by motion to him from Governor Griswold, that some encouragement should be given to enable Mr. Bushnell to pay expenses incurred in preparing his machine for the design projected, &c., and to carry forward the plan &c., &c., it appearing to be a work of great ingenuity, &c. &c., a prospect that it may be attended with success, and being undertaken merely to serve the public, and of considerable expense and labor, &c. It is thought reasonable that something should be done, &c.

Voted and ordered, That the treasurer pay and deliver to his Honor, the Deputy Governor, the sum of £60, to be by him improved for the use of the colony and public, according to instruction from the board.

(Council of Safety I. 76.)

WATER MILLS.

To the Honorable, &c.

The memorial of David Bushnell, of Saybrook, in New London county, humbly sheweth—

That your memorialist, after long application to mathematical and philosophical studies and frequent and expensive experiments on mechanical improvements, hath discovered a new method of constructing water mills in such a manner,—by projecting the flume under the water wheel, so that the aperture through which the stream flows against the wheel, shall be advanced beyond a line let fall perpendicular from the extremity of that part of the wheel which is nearest the pond, and by placing the buckets of the water wheel obliquely to the radii of the wheel, and perpendicular to the stream which turns it,—that the force, action and impression of the same stream in turning the mill will be greatly increased, and in many cases, trebled beyond what it can be in mills of the usual construction: And has also discovered a further valuable improvement in grist mills, by fixing the rounds or leaves of the trundle head, so as to swivel or turn in the trundle head, whereby the friction in turning the mill will be greatly diminished: Which improvements, the memorialist conceives, will be of general utility to the public. And whereas, for perfecting and completing said invention and improvement, the memorialist finds it necessary to put himself to considerable additional expense, and employ his time and attention for a proportionable period.

Wherefore, your memorialist humbly prays this Honorable Assembly to grant him the sole right of constructing, altering and repairing water mills in the State, in the manner and according to the improvements above described, for such term as shall be adjudged reasonable, as a compensation to the memorialist; and further order and enact, that whoever, within this State, shall, during such term, construct, alter or repair any water mill, in the manner and according to the improvements aforementioned, either in part or in the whole, without license from the memorialist in writing first had and obtained, shall forfeit and pay to the memorialist such penalty as your honors, in your wisdom shall judge proper. And your memorialist, &c.

DANIEL BUSHNELL.

Dated at New Haven, this 28th of Oct. 1784.
Negatived. (Industry II. 189.)

PERPETUAL MOTION BY WATER.

To the Honorable, &c.

The petition of Harris Ransom, of Colchester, in said State, humbly sheweth:

That your petitioner, at great expense, with much pains, labor, and study, has obtained the art or mystery of making a perpetual motion of water, whereby he is able and can raise the water from any river, pond, spring or fountain, to the height of 30 feet perpendicular, and convey the same to any parts of any towns or cities, or return the same to the original fountain or head, which said performance will be of great advantage, not only to the petitioner, but to the public in general, by affording them at all times, good and wholesome water at a very trifle of expense; and also will provide all towns and cities with constant and unfailing streams, sufficient for the carrying any iron works and mills of all kinds:

Wherefore your petitioner humbly prays this Assembly to grant unto him and his heirs, a full power and license, under certain restrictions, to set up and erect his said works within this State, and that no person shall be allowed to set up any such works after the pattern of those by your petitioner so set up, within the term of 20 years, without a license first had and obtained from your petitioner; and that all such machines, mills, &c. set up by your petitioner for his own improvement, shall be free from all taxes and assessments for the term of 100 years, and that all such works set up by others licensed by the petitioner's license shall be free from all such taxes for the term of two years after erected. The petitioner being restricted in setting up his said works, not to obstruct any water to the damage of any individual person, or to the public in general. No action by Assembly. (Industry II. 216.)

Filed—"Prisoner in goal, memorial."

To the Honorable, &c.

As there is a new discovery of raising the water up, so as to turn it out of the valleys, and turn it into the hills to water the dry land, and to carry mills or to carry iron works or any other water craft, to water cities and towns, to drain dead swamps and ponds—since the thing is so profitable to this State, 'tis the earnest request of us all as one, that this petitioner's petition may be heard and granted him. Signed by ISRAEL NEWTON,
and 8 others.

(Industry II. 217.)

TIDE MILLS.

To the Honorable, &c.

The memorial of John Shipman, of Saybrook, in New London county, humbly sheweth:—

That by reason of extreme drought, the inhabitants of sundry towns in this colony, have been greatly distressed, as well for want of grinding grain, as in other respects; an instance of which is in the town of Saybrook, especially the first parish, where there hath not been, for four months next before the 18th inst., twenty bushels of grain ground in said parish; and the inhabitants have been obliged to carry all their grain out of town, in order to have it ground, and great part of it more than twenty miles, at great expense of time and money, and are now reduced to the necessity of carrying it to Long Island, and have been sundry times obliged to leave it, for want of wind to carry the wind-mills, and the inhabitants in the meantime distressed, for want of bread; by which your honors' memorialist hath been induced to turn his mind much on the subject of mills, especially such as might be made by salt water. And as the tides in the salt water creeks towards the eastern part of the colony, especially where they run near the uplands, don't ordinarily ebb and flow more than two feet and a half, it renders the use of salt water for the purpose aforesaid, very difficult. Yet your honors' memorialist is confident, that by close application and hard study, he has been so happy, though master of but little philosophy, as to hit on a plan on which he can build a grist-mill, though with something more than the ordinary expense, that will grind well and to good purpose, 12 hours in 24; and he verily believes, may be so constructed as to go continually, as long as wood and iron will last, without exhausting any considerable part of the water; and as such a discovery, if he should succeed, would be more beneficial to the people in general, especially on the sea shore, than to the particular owner, your honors' memorialist is encouraged to hope that your honors will do something to encourage him in such an undertaking. Therefore, your honors' memorialist, believing in your honors' good disposition to promote a design of such public utility, humbly prays your honors to grant him proper encouragement, either by way of a lottery to raise such sum as your honors shall think best, or a sum by way of premium, to be advanced on the completion of the proposed machine, in case he should succeed; and previous to the undertaking advance £100, or such greater or lesser sum as your honors shall judge fit, by way of loan without interest, for such number of years as your honors shall judge fit; or grant him the privilege of such a constructed mill, to the exclusion of other persons; or in such other manner as your honors, in your great wisdom shall devise. And your, &c.

JOHN SHIPMAN.

Dated at Saybrook, the 19th day of October, A. D., 1773.
Referred to a committee. (Industry II. 149.)
Upon the memorial, &c.

Resolved by this assembly, that the memorialist, &c., have the full and exclusive privilege of constructing, erecting and improving a tide grist mill, on the plan and construction proposed, for the term of forty years, at all places within said town of Saybrook, and within ten miles westward of Connecticut river; provided the memorialist, &c., do erect such mill within the term of five years next ensuing, and constantly keep up the same fit for use and improvement, so as to be beneficial to the public. And all persons are hereby prohibited from erecting or improving any tide grist mill, for the term aforesaid, within the limits aforesaid, without the liberty of the memorialist, &c., on the penalty of £50, L. M.

January 1774. (Industry II. 150.)

CLOTH MANUFACTURE.

To the Honorable, &c.

The memorial of Samuel Loomis, of Colchester, &c., humbly sheweth :—

That he has by great labor and pains, acquired a knowledge of erecting works for the manufacturing of wool, cotton, hemp, flax and silk, upon a new constructed plan, according to certain plans herewith exhibited, which may be done by hand or by water works; and that he can, by such machinery, perform the whole process of taking the aforesaid articles in raw materials, and making them into cloth, in a much easier manner than any now in practice, by which our manufacturers may be encouraged, the price of such cloth lessened, and vast sums of money saved in the state. And your memorialist would represent, that in case the raising of hemp in this state should succeed according to the encouragement given, that he should, by the aforesaid works, be able to manufacture a sufficiency of duck to supply a considerable part of the shipping of the state.

Your memorialist further represents, that said works cannot be erected without the expense of about £2000 L. M.; and that no individual will venture upon so great an undertaking without the public encouragement and security of enjoying the exclusive right and privilege of taking the profits resulting from such an enterprise, until he has reimbursed to himself the expense of erecting such works.

Your memorialist, therefore, prays your honors to take this matter into your consideration, and to grant to him the *sole and exclusive right and privilege* of erecting machines and works for the purpose of manufacturing the articles of wool, cotton, hemp, flax and silk, in the manner aforesaid, within this state for the term of fourteen years; and also grant to your memorialist the sole and exclusive right and privilege of manufacturing the aforesaid articles in such works by him erected, for the term aforesaid; or in some other way grant to your memorialist such public encouragement as the importance of the undertaking justly merits. And your petitioner, &c.

Dated at Hartford, May 28, 1787. SAMUEL LOOMIS.

(Industry II. 218.)

Plans or diagrams presented by petitioner.

For spinning cotton and wool, ... (219)
" Loom, ... (220)
" Carding, ... (221)
" Spinning flax and hemp, ... (222)

Referred to a committee, who report :—The committee conceive that the interest of this state is concerned to promote various manufactures, and particularly of this kind, as this will find useful employment for many who might otherwise be idle, give spring to industry and improvement, lessen importation from abroad, gradually turn the balance of trade in our favor, and eventually be the source of wealth and respectability, and therefore every attempt towards improvement in this respect, ought to be regarded in a favorable light.

It cannot be expected that any person would be at the expense and hazard of erecting works of this kind, which will probably cost not less than £2000, and be liable to be defeated of all prospect of advantage, by others who may think proper to do the same after him, but have not courage enough to begin the attempt.

In this view of the matter, the committee beg leave to give it as their opinion, that Mr. Loomis be allowed, for the term of seven years, the exclusive right and privilege of erecting machines and works for the purpose prayed for in his memorial, on the east side of Connecticut river, or within ten miles west of said river, and of using and improving the same for that term; and that for the second term of seven years next following, if he shall so long improve the said works, no person shall be allowed the privilege of erecting similar works within thirty miles of the works he shall so erect within the aforesaid limits.

Provided, that no privilege granted the present sessions of assembly, to promote the manufactures of wool, be affected thereby.

All which is submitted, &c.

Signed per order. JOHN TREADWELL.

(Industry II. 223.)

Corresponding act was passed May 1787. (224.)

STOCKING LOOMS.

To his Excellency, &c. May 1776.

The memorial of James Wallace, stocking maker, sheweth :—

That your memorialist has been in Wethersfield since December last, during which time he has exercised his trade of stocking making, which he professes himself master of, both in the silk, cotton, thread and worsted way, in all their different branches. That from a desire of serving this province, and settling therein, he prays your honors to lend him £100, to enable him to extend and carry on his trade, so that it may be of use to the public in general. He further intends, if encouraged, to erect an engine for the purpose of spinning cotton and woollen yarn, which will be of infinite service to several branches of the weaving business, and enable them, in a short time, to bring their goods to market, as cheap as they can in the old country. And as a security for the payment of the same, at such time as your honors shall think fit to lend it, he purposes to give a security on his frames, to any one or more gentlemen that will be good enough to take the trouble of the same. And your, &c. JAMES WALLACE.

Negatived. (Industry II. 155.)

To the Honorable, &c.

The representation and memorial of Benjamin Hanks, of Windham, &c., humbly sheweth :—

That he, relying upon a belief that your honors are ever desirous to promote and encourage every useful manufactory within this state, he hath taken encouragement to address to your honors upon the subject of fabricating stocking looms; to perform and effect which, he conceives that he is sufficiently skilled; that he, your memorialist, has been much used to and acquainted with laboring in iron, brass and steel, and every other material necessary to construct the proposed machine; that he is fully persuaded that he could, with some small encouragement, soon construct and finish a number of such looms, to the satisfaction of the public, and every skilful weaver therein; that he conceives that having completed his desires in that particular, that the public would be greatly benefited thereby, not only in more readily and cheaply supplying the soldiery with that necessary part of clothing, viz: stockings, but also the inhabitants of the state. But your memorialist being young, and not of sufficient cash to procure those materials which are necessary for the desired purpose, he is thereby unable and prevented from making the attempt. Whereupon, he humbly prays your honors to take the matter into your just consideration, and grant him such premium as your honors may think proper, upon his having completed a good and sufficient stocking loom, and upon such other conditions as are fit and suitable; and, in the meantime, entrust him, upon proper security, with a sum sufficient for the purpose. Or otherwise, &c.

BENJAMIN HANKS.

Dated in Windham, this 14th day of August, 1777.

(No action on it.) (Industry II. 156.) See clocks.

STOCKING WEAVING.

To the Honorable &c.

The petition of Thomas Hubbard and Christopher Leffingwell, both of Norwich, &c., humbly sheweth:

That your memorialists have, at very great expense and cost, procured 8 stocking frames for the weaving of stockings, and have endeavored to procure workmen to make use of said frames, to prevent, if possible, the necessity of sending away such large sums of specie to procure these articles, in hopes that by said business to make reasonable profit to themselves. But their workmen prove very unsteady and idle: Therefore your memorialists are constrained to take apprentices to find employment for said frames, which have not as yet, borne any profit to them, as they are assessed for said business, and said apprentices are rated for their polls in your memorialists' list, which has so discouraged your memorialists, that they must lay aside business, without the favorable interposition of your Honors. And your memorialists pray your Honors to patronize and encourage them by relieving them from any assessment on said trade, for the term of five years, and likewise release and exempt all persons that shall be, by your memorialists, constantly employed in said trade and business, from being rated for their polls, for the term of two years next coming. Or otherwise, &c.

THOMAS HUBBARD,
CHRIS'T LEFFINGWELL.

Dated in Norwich, the 20th day of May, 1789.

Granted in lower House. Negatived in upper. (Industry II. 238.)

WOOLLEN MANUFACTURE.

To the Honorable, *&c.* Oct. 1736.

The memorial of John Davis, of Lyon's Hall, in the county of Hereford, in Great Britain, now resident in Litchfield, &c., clothier, humbly sheweth:—

That your memorialist, about 13 months since, came over into New England from said Lyon's Hall, where he had practised and improved himself in

the art and mystery of a clothier, for the full space of 30 years and upwards, and then brought with him a considerable quantity of full cloths to the value of £300 or £400, sterling M. to sell and vend in this country, all of your Honor's memorialist's own manufacturing, which cloths well suited the country, and sample and specimen thereof your memorialist has here to shew your Honors. And your memorialist designing to have returned, but upon observation of the country, and view of the woollen manufactory, finds that the poorness of the cloth is chiefly owing to the unskilfulness of the inhabitants in the art aforesaid, whereby much good wool is in a great measure lost, and cloth confounded and rendered much less serviceable as well as fashionable for the people; which your memorialist humbly thinks your Honors are well aware is occasioned by the unskilful management of the wool, in mixing and preparing the same for as well as the unqualified practitioners in the mystery aforesaid; a due encouragement whereof under the present and prevailing extravagance of the price of cloths of the English manufactory at home, your Honors doubtless are sensible would commode and benefit the country in a very material article.

Thinking, therefore, there might be a disposition in this Honorable Assembly to give a proper encouragement to some private person that should appear, to set up the same for the cultivation of a trade so very necessary to the country (as far as may be consistent with the country's safety therein) would take leave hereby humbly to propound to this Honorable Assembly, that your memorialist would gladly set up the trade in such place as might best accommodate the people, if therein he might have the countenance and encouragement of this Honorable Assembly; and also, that his knowledge, practice and improvement in his said trade, which he has so long been improving himself in, might be extensively beneficial to the people of this government, (where he is minded to make his abode,) your Honor's humble memorialist would willingly communicate his skill and experience to the people, as to mixing their wool and preparing and qualifying the same for the wheels, by suitable cards for the country's wool; and the country's improving such wool cards as are altogether unsuitable for the same, is a great means of spoiling the cloth, as well as to its decency as duration; and the unskilfulness of the women, in their carding, chops the wool and breaks the staple of it.'

Which your memorialist could abundantly satisfy those in the least measure acquainted therewith, and could afford such directions as would facilitate the labor and pains in preparing their wool, with 4 times the ease at least, besides the vastly greater benefit of the cloth; and would instruct the people in such and so many places and towns and counties in the government, as your Honors in wisdom should direct, in any method that your Honors should think best, by public advertisements, and especially by personal instructions in mixing their wool, coloring, fulling, pressing and shearing their cloth.

And your memorialist's request is, as an encouragement thereunto, that he may have, by this Assembly, a grant of such a sum of money of the public treasury, that thereby he may be able to procure such utensils to use and improve in the directions of the people in the premises, and be under advantages to give his instructions to the country in such places, ways and methods as this Honorable Assembly shall prescribe, or of such a tract of the colony's land as may be a meet compensation to your memorialist, for so profitable an undertaking. Or some other way, &c.

JOHN DAVIS,
Clothier.

Hartford, May 20, 1736.

Negatived. (Industry I. 128.)

Your Honor's committee appointed to take into consideration the subject matter the memorial of William Crandall, and report what is expedient to be done, etc., beg leave to report,

That a woollen manufactory, in all its branches, would be very important to this State: but the sum proposed by the memorialist to be raised by a lottery, &c., being £6,000 L. M., is too large to be raised by said lottery; and your Honor's committee have not been able to devise any mode which they can with confidence recommend to your Honors for the purpose of introducing the woollen manufactory proposed by the memorialist. All which, &c.

Signed per order. WM. HILLHOUSE.

(Industry II. 214.)

The committee appointed to take into consideration what further encouragement might be given to manufactures and agriculture in this State,—

Report, That in a general view of the subject as relative to manufactures, the most direct and proper means of promoting them that occurred to the committee were by levying and collecting duties on imports, particularly on such articles as might, with great advantage, be manufactured in this State; but as a regulation of this kind might probably be superseded by the federal government before it could operate to effect, it appears to the committee, improper to adopt a system on this ground. In this view of the subject, the committee have thought proper to report only a temporary provision for the encouragement of the woollen manufactory, which more than any other at present, appears to merit particular attention.

The company formed by gentlemen in this city [Hartford] and its vicinity, for this laudable purpose, appears to be actuated by generous motives in the undertaking, though not without a reasonable prospect, in the ultimate progress of the business, of deriving profit to themselves. But as the first attempt to establish this manufactory must be attended with great expense, and the profits must be, at first, very precarious, the committee think proper to recommend the following encouragements, &c. (230.)

And on their recommendation, the buildings of the company are exempted from taxation, and also the polls of the workmen; and a bounty is granted of one penny a lb. on all woollen yarn that shall be spun and made into cloth at said manufactory before June, 1789. May, 1788. (Industry II. 231.)

To the Honorable, &c.

The petition of Jeremiah Atwater, Jr., and William Lyon, of New Haven, humbly sheweth:

That your petitioners, being desirous of promoting the manufactures of this State, have, in the course of the preceding summer, procured a large quantity of sheep's wool, and have also built at a considerable expense, machines and implements for manufacturing the same into woollen cloths of various kinds. That by this manufacture, they have given employment to more than 30 persons, male and female, and hope to be able to continue and augment the business. But as your petitioners are alone in the expense of this undertaking, and as a manufacture of this kind carried on in anywise extensively, is entirely new in this part of the country, and your petitioners find many difficulties therein, and, as they conceive that if it be prosecuted, it must be beneficial to the community, they request some encouragement of your Honors, that you would be pleased to grant to them some bounty on the wool they

have and may manufacture; or such other encouragement as to your Honors may seem just. And your, &c. JEREMIAH ATWATER, Jr.

New Haven, Jan. 5, 1789. WILLIAM LYON.

(Industry II. 234.)

Lower House refer to a committee. Jan. 1789. (235.)

LINEN.—*(See Hemp Below.)*

And further be it enacted, For the encouragement of making fine linen cloth, that whosoever shall bring to the county court, in the county in which he dwells, any linen cloth which in the judgment of the said county court, shall be in goodness equal to Garlick's of six or seven shillings per yard, according to the usual price thereof in our shops; and will make oath before the said court, that the said linen cloth was made in the said county, by their own industry or their proper charge, shall receive for their recompense, one-quarter part of the value thereof, which shall, by their order, be drawn out of the public treasury of the colony. This act to continue in force seven years. Oct. 1732. (Industry I. 48.)

(No vote on it.)

Committee to confer, consider and draw up, what may be proper to be enacted by this Assembly, relating to premiums on the manufactures and husbandry of this government. May 1735. (Industry I. 125.)

An act, &c, Be it enacted, &c. That there be paid out of the public treasury of this colony, a premium of one-sixth per yard, for all fine linen cloth made of yarn of six run to the pound and upwards to eight run, being full yard wide; and one-third for cloth of seven-eights of a yard wide, made of yarn of the size above said; and one-quarter for cloth three-quarters of a yard wide being well whitened; and for such cloth as above said being unwhitened, the same premium shall be paid, except three pence on each yard to be abated. And for all linen cloth upon which the premium is allowed in said act to be well whitened, being made of yarn, eight run to the pound and upward, the same premium shall be allowed for unwhitened cloth, except four pence per yard to be abated, as is there allowed for well whitened cloth, &c. May 1735. (Industry I. 126.) Not passed.

DUCK.—*(See Hemp Below.)*

To the Honorable, &c.

The petition of Richard Rogers of New London, humbly sheweth:—

That your petitioner having insight in the trade of making *canvas* for shipping, and having expended near £140 for the setting up the trade; and hath made of the cloth of good acceptance of those that understand the same. That your petitioner taking encouragement by the law, page 86, (see page 1, above) to venture upon so great an expense; and considering that the trade being set up, a market will much advance trade, in that so considerable a sum is expended to other governments to purchase of that manufactory, which might be improved in other trading, a market ourselves, as it will advance our own people, being improved in the raising of hemp and flax, and spinning the same; also bring into the government a considerable trade to have it made a market; and said canvas can be made much cheaper than it is now bought, coming from England and Holland.

That your petitioner doth humbly pray your Honored Assembly, that they would be pleased to grant the sole making of it to your petitioner, for fifteen years in this government. He keeping said trade going forward, for which he hath eight looms already set up, with what other encouragement your Honors will be pleased to grant. And your petitioner, &c.

RICHARD ROGERS.

(Industry I. 106.)

We, the underwriters, having viewed a certain piece of duck designed for the making sails for shipping, made by Mr. Richard Rogers, of New London, do adjudge the same to be very good and substantial cloth for that use; and that he having advanced a very considerable interest for the promoting this design,—it is our opinion, he well deserves all proper encouragement in that affair.

Signed by twenty-eight leading men in New London, &c.

New London, 20th May, 1724. (Industry I. 105.)

We, the subscribers, being weavers, and work in Richard Rogers, his shop, in New London, and we do declare, that a certain piece of duck, marked No. 4, RRER was wove in said Rogers, his shop, and do further declare, that it is good merchantable cloth, and of the best cloth that is made of that sort of duck.

Signed by six weavers. (Industry I. 107.)

Lower House grant petition. Negatived in Upper.

The next year, he renewed his petition at greater length: (Industry I. 109.) And was allowed the exclusive privilege of manufacturing duck for seven years. Oct. 1725. (110.)

To the Honorable, &c. May 1741.

The petition and memorial of Samuel Judson of Stratford, &c., humbly sheweth:—

That your Honors' memorialist did, some years since with considerable cost, set up and carry on the trade of weaving duck and canvas; and having made and vended about sixty or seventy bolts, the buyers and all others who saw the same, commended the same for good. But having had the misfortune in that affair, to sell to some persons out of this government, who have not to this day, made payment, for which reason, chiefly, I, for three years last past, laid aside the trade. But now, conceiving the carrying on the trade might be of advantage to myself, and much to the advantage of this government, had I a stock to carry on the same with, and being unwilling to break my landed estate to raise a fund, and having my looms and tackling by me, I have taken encouragement from the generous disposition your Honors have frequently discovered for the promoting of this branch of manufacture in particular,—to pray that your Honors, would grant that I may, for the carrying on said trade of duck or canvas, draw out of the treasury of this colony, the sum of £150 of new tenor bills of credit of this colony, upon my giving security, &c., with the interest, at three per cent., &c. And your, &c.

SAMUEL JUDSON.

Stratford, May the 12th, A. D. 1741. Negatived. (Industry I. 131.)

HEMP.

An Act for the Encouragement of raising Hemp and Silk, and of making fine Linen. Oct. 1732. (See Silk and Linen.)

Be it enacted, &c. That it shall be lawful for any and every town in this colony, annually to choose three discreet men in their town, to be surveyors of hemp. And it is hereby provided, that whosoever in the town where such surveyors are appointed as aforesaid, shall produce 100lbs. of hemp as shall be bright, well cured and water rotted, of four feet at least in length, and well cleansed, fit for use, &c., shall have a certificate thereof to the treasurer of the colony, of the quantity of hemp so raised and manufactured as aforesaid. The said treasurer is hereby ordered to pay out to him 2s. for every 100 weight, certified as aforesaid; and so pro rata for greater or lesser quantities. (Industry I. 48.) No action was had thereon.

An Act for the Encouragement of raising Hemp, making Canvas of Duck, and also for making fine Linen. May 1734.

This assembly considering the great profit and advantage that might in time accrue to his Majesty's people in this government, by the raising of hemp, making canvas and fine linen, &c., if the same may be sufficiently encouraged and promoted:

Be it enacted, &c. That there shall be paid out of the public treasury of this colony, to every person or persons inhabiting in this colony, as a premium, the sum of 4d. per pound for every pound of good, well dressed, water rotted hemp, that shall be by him or them raised or procured to be raised, and shall be the proper growth of this colony; provided, there shall be no premium allowed to any man, for any quantity less than 50lbs.

Be it further enacted, &c. That there shall be likewise paid out of the public treasury, the sum of 20s. for every bolt or piece of well wrought canvas of duck fit for use, of 36 yards in length and 30 inches wide, and weighing not less than 45lbs., made of hemp aforesaid, or well dressed, water rotted flax, to be paid to him that shall do, or procure the same to be done and manufactured as aforesaid.

Be it also further enacted, &c. That as a premium for the encouragement of making fine linen, there shall also be paid out of the public treasury of this colony, to every person or persons that shall make or procure to be made within this colony, any fine linen cloth, as followeth, viz: for every yard that is well spun, wove and whitened, and is a yard wide, and made of yarn that is eight runs to the pound, 2s. per yard, and so pro rata for wider or narrower cloth so made; and also for fine cloths of the same width, a proportion to the fineness thereof, to be determined by the number of runs to a pound, provided none be allowed to be narrower than three-quarters of a yard, and that no deceit or fraud be imposed upon the public, &c.

Provided, this act shall continue and be in force for the space of five years from the rising of this assembly, and no longer. (Industry I. 51.)

Act continued in force five years. May 1740. (Industry I. 67.)

Continued in force till May, 1750, as voted by lower house. Upper house dissent. May 1745. (Industry I. 77.)

An Act, &c. May 1787.

Be it enacted, &c. That all persons in this state may annually, &c., insert in their lists of rateable estate, &c., an account of the quantity of land which they shall have severally sowed with hemp, &c.; and listers shall deduct from the list of such persons respectively, at the rate of 40 shillings per acre, for any quantity of land sowed with hemp, &c., as aforesaid.

(A duty was to be laid on the importation of hemp, of 6s. per 100cwt., after May 1789.) (Industry II. 70.)

FLAX MACHINE.

To the Honorable, &c. May 1753.

The memorial of John Bulkley, of Colchester, in the county of Hartford, in the colony of Connecticut, in New England, humbly sheweth :—

That whereas, there are great quantities of flax raised in this colony, and that article is become so considerable a part of the staple thereof, that the encouraging the raising and manufacturing so valuable a commodity, by all proper ways and means, must conduce much to the public interest; and as the common way of dressing and cleansing flax here is so very laborious, and calls for so great a number of hands to be employed in that business, that in a country where laborers are so scarce, and labor so very dear, it is a great discouragement that attends the raising of that article; so any way that can be devised for the better and more expeditious dressing of flax, and with much less labor, would be serviceable, and tend much to promote and encourage the farmers in raising greater quantities of flax in this colony.

And whereas, your memorialist understands that the trustees of the society for managing the linen manufacture in Scotland, have advised to and encouraged the erecting and setting up there a late invented water machine, for dressing and cleansing flax, which does it in a better and more expeditious manner, and with a great deal less labor than the common way, and is found by experience to be a great encouragement to the linen manufactory there; and as your memorialist apprehends that the setting up such machines in this colony would have the same effects here; so he proposes, upon suitable encouragement, to be at the pains and expense of procuring the same kind of machines to be used in this government.

Whereupon, your memorialist humbly prays this honorable assembly to encourage him in so good a design, (which if it succeeds, he imagines will be greatly for the public advantage, though it cannot be effected without great charge and expense to the undertaker,) to grant to him and his associates the sole liberty and privilege of erecting and setting up machines for the purpose aforesaid, within this colony, for the space of twenty-one years next ensuing the rising of this assembly; and to prohibit all other person or persons erecting the same kind of machines, or any in resemblance or imitation of them, in this colony, without leave or license from your memorialist and his associates, during the full term aforesaid.

Provided your memorialist and his associates shall, within eighteen months next ensuing, erect and set up one machine for the purpose aforesaid, in some convenient place in this colony, as he and they shall think proper, for a trial or experiment.

Provided also, that if said attempt should prove successful, that then, if the said memorialist and his associates shall not, within seven years next ensuing after the setting up of said first machine, erect and set up in some convenient place in each county in this colony, for the purpose aforesaid, one such machine at least, that then in such case, it shall be lawful for any other person or persons to set up machines for the same purpose, in every such town where the said memorialist and his associates shall not, within seven years have erected one such machine as aforesaid, at least.

And your memorialist is willing that in your honors' grant, a clause should be inserted, that nothing therein should be construed or understood to prohibit any persons in this government from making or using any instrument or machine for the purpose aforesaid, that have been or are now in use in this colony. And as in duty, &c. JOHN BULKLEY.

Hartford, May 1753.

Negatived in lower house. (Industry I. 171.)

To the Honorable, &c. Oct., A. D., 1753.

The memorial of Jabez Hamlin and Elihu Chauncey, humbly sheweth :—

That whereas, there is a new invented water machine for the dressing of flax, brought into use in Scotland and Ireland, by the societies for managing the linen manufactures there, which is found by experience, to be a much more expeditious and less expensive method than that in use here.

And whereas, your memorialists are of opinion that the procuring the said machine to be set up in convenient places, and brought into use in this colony, would greatly encourage the raising larger quantities of flax, and conduce much to the public interest of this government,—we would propose to be at the charge and expense (which will be very considerable,) of procuring the said machine, to be set up and brought into use here, upon proper encouragement.

Whereupon, your memorialists humbly pray this honorable assembly to encourage them in so good a design, by granting to them and their associates, the sole liberty and privilege of erecting and setting up the said machine for dressing of flax, in such towns in this colony as they shall think proper, for the term of twenty-one years next ensuing; and that all other persons be prohibited setting up in this colony, any such machines, or any in imitation of them, during said term.

Provided the said memorialists shall, within eighteen months next after the rising of this assembly, procure one such machine, to be set up in this colony for an experiment.

Provided also, that if the said memorialists shall not, within seven years next ensuing, set up one such machine at least, in every town in this colony, that they shall forfeit and lose the benefit of setting up in all such towns as they so neglect, after the seven years are so expired, and the inhabitants of said towns may themselves set up said machines, as they see cause. And in all the towns in which the said memorialists shall set up said machine within said seven years, they shall keep the same up and in repair, during the said term of twenty-one years. And in case they shall let any of them be out of repair the space of fifteen months, they shall forfeit and lose the benefit of the monopoly herein granted, in such town where the said machine so lies without repairs.

Provided also, that this grant shall not hinder the use and improvement, or setting up hereafter, any mills or machines that are now used in dressing flax in this colony; nor any other that may be invented, if diverse from, and not in imitation of the machine your memorialists pray for liberty to erect and set up.

JABEZ HAMLIN.
ELIHU CHAUNCEY.

(Industry I. 172.)

Liberty was granted for fifteen years, &c. (173.)

SILK.

An Act, &c.

Be it further enacted, &c. That whosoever shall raise silk among us, and shall shew it to the county court in which county it is raised, at their nex sessions after the making thereof, and will, upon their oaths, declare before the said court, that by the silk worms which they have nourished and brought up since the last sessions of the said court, the said silk was made. That then said court shall certify the same to the treasurer of the colony, and order him to pay out of the public treasury, the sum of ten shillings per pound, and so pro rata for greater or lesser quantities, to him that brings such certificate. Oct. 1732. (Industry I. 48.)

Not acted on by the Assembly.

An Act for the Encouragement of the Raising of Silk in this Colony.

This Assembly, observing and being well assured, that good silk may be here made here, and that by proper improvements, a sufficiency thereof may be raised and produced amongst ourselves, whereby industry may be promoted and the wealth of this government in time much increased; and considering that the beginning of things beneficial and profitable, are attended generally with difficulty and charge, which use and experience may remove, abate, and render easy and profitable.

Be it therefore enacted by the Governor, Council and Representatives; in general court assembled, and by authority of the same, that there shall be paid out of the public treasury of this colony, as a premium for the raising silk; that is to say, for every ounce of good sewing silk, one-sixth; for every pair of silk stockings weighing 4 ounces, and so pro rata seven-sixths; for every yard of silk stuff, 1; and for every yard whereof the warp is all silk, two-thirds; for every yard of silk half yard wide, weighing less than one ounce, three-ninths; for every yard weighing one ounce, and less than two ounces, six-ninths; for every yard weighing two ounces or more, nine; all to be well wrought:—which premium shall be paid on an order obtained of the county court, on the public treasury aforesaid, to be given by the court in the county where the person dwelleth, that shall produce the said silk, and shew to the satisfaction of the said court, that it is bona fide, the growth and product of the silk worms, bred and nourished in this colony, and that no premium hath been before taken or allowed for the same or any part thereof.

This act to continue in force for the space of 10 years, and no longer. (Colony Records VI. 161.)

Continued in force 10 years longer, May 1745. Lower House dissent. (Industry I. 76.)

To the Honorable, &c.

The memorial of Nathaniel Aspinwall of New Haven, humbly sheweth:—

That from the experiments that have been made, there is great reason to believe that the cultivation and manufacture of silk, might become a source of much wealth to this state, especially as a principal part of the labor might be performed by persons aged, decrept, &c. capable of doing very little if any other business. But as the planting and cultivation of the mulberry tree would be attended with considerable present expense, without any immediate profit, the good people of this state cannot be induced to turn their attention to the business without some recommendation and encouragement from this Honorable Assembly. The importance of encouraging the manufactures of this state must be obvious; and as there is a fair prospect that the silk manufacture might be improved to great advantage and profit to the state—

Your memorialist, therefore, humbly prays your Honors to afford your patronage to the infant manufacture; and grant the small encouragement of exempting the polls of such persons from the list, for the term of one year, who shall plant, cultivate, and raise one hundred mulberry trees, and keep them well pruned and attended, and for a greater number of said trees an exemption in proportion; and also free the land whereon they grow from taxation, being set in the proportion of one hundred trees to an acre; or in some other way, &c.

NATHANIEL ASPINWALL.

Dated at New Haven, the 2nd day of October, 1783.

(Industry II. 184.)

Referred to a committee, who report favorably, Jan. 1784. (183.)

An Act to promote the making of Raw Silk within this State, January 1784.

Whereas, by the experiments which have been made, it is highly probable that the making of raw silk will be attended with much advantage to the good people of this state. Therefore,—

Be it enacted, &c. That from and after the first day of March, A. D. 1784, to the first day of March, 1793, whoever shall plant one hundred thrifty shrubs or saplings, of three or more years growth, of the white mulberry tree on his, her, or their land within this state, at such distances from each other as will be favorable for their growth and for collecting their leaves, shall receive at the end of every year, and during the term of three years from and next after the year in which such saplings shall have been planted as aforesaid, ten shillings, L. M., and so in proportion for every one hundred of such saplings, planted as aforesaid, upon proof and certificate thereof as hereafter directed, that such saplings were, at the end of every three years after they were so planted in a thrifty condition. Every such certificate shall be given in at the end of every of the three years as aforesaid; and no certificate shall be given for any number of such saplings, but for one or more entire one hundred as the case may be.

Be it further enacted, That whoever shall make any raw silk from worms and mulberry trees of his own raising within this state, by properly winding the same from the balls or cocoons, after the said 1st day of March, and for fifteen years next thereafter, shall have and receive 3d. L. M. for each ounce of such dry silk, which he, she or they shall make as aforesaid.

Every of which bounties given by this act, shall be paid out of some tax which has or shall be granted for the support of the civil government of this state.

[The remainder of the act provides, that on the certificate of two justices of peace, the collector of the tax may pay said bounty.] (Industry II. 62.)

An Act, &c., (Repealing the above, and providing;) That whoever shall make any raw silk from worms and mulberry trees of his own raising, within this state, by properly winding the same from balls or cocoons, after the 1st day of July next, and for ten years next thereafter, shall have and receive as a bounty from the treasury of this state, 2d. lawful money, for each ounce of such silk well dried, which such person or persons shall make as aforesaid; which bounty shall be paid out of the duties arising on the importation of foreign articles into this state, &c. May 1784. (Industry II. 63.)

MANSFIELD SILK COMPANY.

To the Honorable &c.,

The memorial of a number of the inhabitants of the town of Mansfield, within said State, whose names are hereunto subscribed, humbly sheweth:

That your memorialists, under a full conviction of the unhappy situation to which they and the other inhabitants of this State have been reduced by reason of drawing from us our circulating medium, and depriving the country of her wealth in purchasing articles of foreign growth and manufactures, have, for a considerable time past, turned their attention to the cultivating of mulberry trees, and the manufacture of silk. And your memorialists would inform your Honors, that from the encouragement of the Honorable Legislative body of this State, in the premiums which they have been pleased to grant, from the natural fitness of the soil for the production of the mulberry, and by your memorialists' own industry, they have been able to raise large quantities of raw silk, some of which has been manufactured into cloth, and the remaining part into sewing silk, which if properly made, is acknowledged to be equal to any that is imported. And your Honors' memorialists would beg leave further to state, that they live contiguous to each other, and from the nature of the soil which they possess, and from their situation, they have not the least doubt but that, under proper regulations, they should not only be able to supply the people of this State with sewing silk of the best quality, but afford a considerable supply of silk cloths, and in a short time, make the silk manufactory not only advantageous to themselves, but of utility and importance to the public.

Whereupon, your memorialists pray that your Honors would grant that they may be formed and incorporated into a company or body which shall be called and known by the name of the Director, Inspectors and Company of the Connecticut Silk Manufacturers, and that by that name they and their successors forever may have perpetual succession, and may be persons in law capable of suing and being sued, pleading and being impleaded in all suits, and also may have power of purchasing, holding and conveying any estate, real or personal, and may have a common seal, and that they have power of appointing or choosing a director, inspectors, and other necessary officers for said company, at such time or times, and in such a manner as to your Honors may seem meet, who shall be vested with such powers as your Honors shall judge necessary: And further, that said company have power of passing by-laws and rules for the well ordering and regulating themselves in and about the raising and manufacturing silk, and which are not repugnant to the laws of this State, which by-laws shall be binding on and among themselves; and likewise that they may make such regulations as to them shall seem necessary, respecting the admitting persons in, and making them members of said company: and that said company and the members of the same be exempted of and freed from every kind of tax or assessment for or on account of the profit or advantages which may or shall arise from or by means of said manufactory. Or that your Honors would grant your memorialists such other privileges and immunities as in your wisdom shall appear to be most conducive in rendering said manufactory both permanent and useful. And they, &c.

Signed by THOMAS BARRONS,
Dated at Mansfield, Sept., 1788. and 31 others.
(Industry II. 236.)

Act of incorporation, (requiring a vote of two-thirds to admit a member,) Oct., 1788. (237.)

LINSEED OIL.

At a General Assembly, &c, Oct. 1718,

At the humble suit of John Prout, Jr., gentleman, Moses Mansfield, mariner, and Jeremiah Atwater, brasier, and for their encouragement to set up a mill and other necessary furniture, to improve the flax seed of this colony for the extracting and producing linseed oil:—

This court hath therefore granted, and doth hereby grant to the said John Prout, &c., the whole and sole privilege of making linseed oil within this colony, and that no other person or persons shall set up any mill or other engines for that purpose, within the county of New Haven, during the space of 20 years next coming, nor in any other part of the colony, without the special leave asked of this court, whereof the parties above named shall be seasonably notified, within the 20 years above mentioned. Provided said John Prout, &c., shall set up such mill, and all needful furniture for the use aforesaid, in New Haven, within the space of 2 years next ensuing, and keep the same in good repair, at all times till the expiration of the said 20 years.

(Industry I. 121.)

To the Honorable, &c.,

The prayer of Samuel Burr and Nathaniel Burr, Jr., of Fairfield, &c., humbly sheweth,—

That the General Assembly at their sessions, Oct. 1728, &c.

* * Although the said undertakers have erected and set up a mill for the purpose aforesaid, yet they have not made so steady an improvement thereof as to use the flax seed even of the county of New Haven, much less of the other counties, nor to provide oil for the people thereof. Neither do they improve, of late years, any part of the seed raised in the county of Fairfield, nor furnish them with oil, &c. We, therefore, your humble petitioners, pray you would be pleased to grant liberty to us to set up a mill, &c., in the county of Fairfield, etc.

Fairfield, Sep. 13, 1732. SAMUEL BURR,
Negatived, Oct., 1732. NATH'L BURR, Jr.
(Industry I. 122.)

TEA.

To the Honorable, &c. Oct. 1765.

The memorial of Alexander Phelps, Amasa Jones, and John Coleman, all of said colony, humbly sheweth,—

That your Honors' memorialists have, with great pains and expensive pursuits, made discovery of a plant in a distant part of this continent, bearing such resemblance in figure and taste to the genuine foreign Bohea tea, that we are well assured 'tis the same kind. Whereupon, we now address your Honors, praying your attention to a discovery so highly interesting and beneficial to this community, to people of all ranks in this day of distress; as it will be not only much cheaper, but also more easily purchased by barter than that which is imported: and as this discovery has already been attended with great expense, and still must be much more so by transplantation, gaining the art of thoroughly curing, etc. We pray your Honors would grant us a patent of manufacturing, and also vending such plant or tea, within this colony, exclusive of all others, for the space of 20 years next coming, or for such other term as your Honors shall think proper. And your, etc.

Dated at Hartford, this 1st day of Oct. 1765.
Negatived. (Industry II. 123.) ALEX'R PHELPS, *et al.*

MOLASSES.

Upon the petition of Edward Hinman, of Stratford, praying liberty and a commission to make molasses of Indian corn stalks, in the county of Fairfield,—

This Assembly grant the liberty prayed for to the petitioner, within the county of Fairfield; and that any person or persons within said county, shall, within the space of 10 years, presume to set up any works for the making of molasses of corn stalks, without allowance from the said Edward Hinman, shall pay and forfeit unto the said Hinman the sum of £5 a month;—always provided the said Hinman make as good molasses, and make it as cheap as comes from the West Indies. Oct. 1717. (Industry I. 123.)

SALT.

To the Honorable, &c. Oct. 1746.

The memorial of John Jerom and Stephen Jerom, Jr., of Branford, etc., humbly sheweth:—

That, whereas, it would be a great public advantage to the inhabitants of this colony, if we could get into the method of making salt by boiling sea water, as practised in sundry places in Europe. And the charge of setting up convenient works for that purpose would be very great and the success uncertain, as appears, in that the General Assembly at Boston, about 50 years ago, granted to Elisha Cook, Esq., and others, the sole privilege of making salt in the province, for the space of 14 years; and yet either by reason of the freshness of the sea water, the coldness of the climate, or their want of sufficient skill, they were not able to effect the design to any advantage. Yet your petitioners having been instructed in that art are willing to be at the charge and risk of making an attempt of that nature, if they may obtain the favor and countenance of this Honorable Assembly.

Your petitioners, therefore, humbly pray that this Honorable Assembly would be pleased to grant to your petitioners and their associates, the sole license and privilege of making salt as aforesaid, within this colony, for the space of 14 years next ensuing. And so, &c. JOHN JEROM,
(Industry I. 182.) STEP'N JEROM, Jr.

Assembly grant the same for 14 years:—

Provided, nevertheless, that if the memorialists &c., shall neglect or fail to erect, set up, and prepare suitable works and materials for the making of salt as aforesaid, for the space of 2 years, or shall fail of making the quantity of 500 bushels of good salt in any one of the remaining 12 years, &c., then this grant &c., shall be void. Oct. 1746. (Industry I. 183.)

Upon the memorial of Stephen Jerom, Lyme, Oct. 1749, &c.

That he therefore speedily erected and set up salt works in the town of Lyme, in this colony, at very great expense and charge, and hath made considerable quantities of good salt, to the great benefit of his Majesty's subjects in this colony: and that he finds, by experience that said affair is capable of great improvements, had he money sufficient to carry on said business, for the want of which he finds himself much hindered in prosecuting said affair; and praying for a grant of £1,000, O. T., out of the colony treasury on interest. (Industry I. 184.)

Assembly loan him the same for 2 years, on his procuring security, &c. (186.)

He again petitions, Oct. 1751, and adds,—

Whereas, your memorialist lately came into this country from Great Britain; and upon my first coming into this colony, found salt to be scarce, and fetched a good price; and being willing, &c., undertook to raise salt works for the making of salt, and expended in so doing the sum of above £2,500, which sum exhausted more money than the value of all the estate your memorialist had in the world, &c. (But as the price of salt fell one half at the ending of the war, he asks, etc.) (Industry I. 187.)

Assembly continue the loan of £1,000 for 3 years, without interest. (188.) Upper House dissent.

After various efforts, seconded by assistants in Lyme, he petitions, and adds,—

He set up said business, and with the utmost diligence followed the same for the space of 3 years or more, and made more than 3,000 bushels of good salt, etc. He is desirous his bondsmen should be reimbursed; and prays for a lottery to raise £150 L. M., equal to £1,000 O. T. loaned.

Lyme, May 6, 1760. STEH'N JEROM.
Negatived. (Industry II. 193.)

Again he states he has paid all the £1,000 loaned, except £250, which he prays may be remitted.

May 12, 1769. Negatived. (Industry II. 136.)

SUGAR REFINERY.

To the Honorable, &c.

The memorial of George Phillips, of Middletown, humbly sheweth:—

That the consumption of loaf sugar imported into this state annually, amounts to a very large sum, which is, in general, paid for in cash; that the manufacture of that article has not been set up within this state, and the stock and buildings necessary to carry forward that business will amount to a sum not short of £6000; that your memorialist is desirous to set up the manufacture within this state, but in accomplishing his purposes, he will be obliged to adventure most of his property, which will greatly injure him, unless he has some public encouragement on this subject. He therefore prays your honors to grant him the exclusive privilege of manufacturing that article within this state, or such part thereof as shall be reasonable, for such term of time as your honors shall judge reasonable. And he, &c.

GEORGE PHILLIPS.

Dated in Middletown, Oct. 15th, A. D., 1784. (Industry II. 193.)

Assembly allow him the exclusive privilege of manufacturing for ten years, provided they set up their works by December 1, 1785; and provided the assembly may grant the same privileges to two other sugar works in this state within said ten years. (Industry II. 194.)

John Heyleger, late of St. Croix, W. I., now of New Haven, Elias Shipman and Lina Denison, of New Haven, and John Morgan, of Hartford, petition for a sugar refinery in New Haven. May 16, 1785. (Granted.) (Industry II. 197.)

A similar grant was made to Elijah Backus, Joshua Huntington and Dudley Woodbridge. Norwich, May 1786. (Industry II. 199.)

PITCH.

John Eliot, of Windsor, offering to this assembly, that he will undertake the making of pitch in considerable quantities, which may be of great advantage to those parts of the government where tar is to be obtained, and an addition to the naval stores, if he may be encouraged therein:

This assembly, being well satisfied of the public advantages of such a new improvement, never heretofore made in this government,—do grant to said John Eliot, &c., the sole making of pitch within this government, for the term of ten years next ensuing, &c. And for the better encouragement of the said undertaker, this assembly orders and grants the said undertaker, that if any pitch shall be made in this government, by any other person or persons, except for their own use, and not for sale, whereby the said undertaker will be more or less obstructed, hindered or disadvantaged, and the intent and good meaning of said grant frustrated,—it shall be lawful for said John Eliot, or his assigns, by warrant from authority, directed to any officer or indifferent person, to seize said pitch, one-half for his own use, and the other half to the use of the colony, to be tried and condemned in any of her Majesty's courts in this colony.

Provided always, nothing herein shall be taken to hinder the masters or owners of any vessels trading in this government, to boil up tar for the use of their vessels.

Provided also, that the said Eliot do set about and effect the said undertaking within the space of two years after this present session of the general assembly. May 1708. (Industry I. 99.)

Encouragement had before been given by the colony for the manufacture of pitch and tar; but no such general grant.

POTASH.

Upon the humble motion, request and representation of Samuel Williard, Jabez Hamlin, Seth Wetmore, Elihu Chauncey and Robert Fairchild, shewing their desire and design of undertaking to make and manufacture potash, if they may be suitably encouraged therein, and that the same, if performed, will be of great advantage to this government; therefore that all due encouragement be given to promote such profitable and useful manufacture in this colony:—

Be it enacted and granted, &c., unto the said Samuel Williard, &c., the whole and sole liberty and privilege of making and manufacturing potash within the bounds and limits of this colony, for and during the full term of twenty years next after this assembly, and that they, &c., shall have liberty to erect, build and set up any works, engines and machines for that purpose, within the limits of this colony, within the term aforesaid; and all other persons, &c.

Always provided, that this grant or patent is upon condition, that the aforesaid Williard, &c., shall make and manufacture two tons of good merchantable potash, fit for transportation, within the term of two years next after the rising of this assembly, and two tons annually, every year after, during the term aforesaid.

Provided also, that the benefit of this grant or patent shall not extend to the said grantees in such county in this colony, where they shall not, in the space of five years, &c., set up and erect proper works for the manufacturing potash as aforesaid. May 1741. (Industry I. 134.)

To the Honorable, &c. Same petitioners add:—

Your memorialists say that they have been at considerable expense and cost to be instructed in the art and skill of making of said potash, and have set up

works at Middletown, and made some trial of making the said potash, and have made several barrels of it; and have, for more than twelve months, sent the same home to England to have the same proved, and to know what the same is worth by one Mr. Joseph Scott, of New York, who has been gone for England above one year, who promised to send us an account thereof; and more, we have sent home, by way of Boston, and before now expected returns, that so we might be further satisfied whether it would be a profitable commodity, and worth our pains to make the same; but as yet we have had no returns; and the time is now near expired that we were to make said two tons; and we have now, in two counties more, provided and been at cost in procuring ashes and other materials, to set up in other counties; [we] would therefore humbly pray, that notwithstanding the said provision in said patent, that if your memorialists shall make two tons by the last of May, 1744, with what they have already made, that the said patent may not be forfeited, &c.

JABEZ HAMLIN, et al.

Hartford, May 13, 1743. (Industry I. 135.) Granted. (136.)

At the commencement of the revolutionary war, the manufactures of *potash*, *salt-petre* and *powder* were encouraged, and extensive works were erected, and large quantities of powder were made, through the war, particularly in East Hartford and Glastenburg, and Windham, &c.

No individuals were ever allowed to practice the art and mystery of *tanning* without license from the general court, although no exclusive privileges were granted.

SNUFF.

To the Honorable, &c.

The memorial of William Pitkin, of East Hartford, humbly sheweth;—

That he hath suffered great losses by fire, in manufacturing gunpowder for the use of this state, and a mill which cost about £400, is now altogether useless, which he wishes to employ for his own benefit and the emolument of the public, without injury to any individual. Your memorialist is confident your honors are fully persuaded of the importance of encouraging our own manufactory; and for that purpose, begs your honors to grant him the exclusive right and privilege of manufacturing snuff, such length of time, free from assessments and taxes, as will be sufficient, with other prospects, to induce a young man, skilful in said manufactory, to make it a business for life. And your, &c.

WILLIAM PITKIN.

Hartford, June 1, 1784. (Industry II. 187.)

At first negatived in lower house, but finally granted on those terms for fourteen years.

To the Honorable, &c. Oct. 1785.

The memorial of Elijah Lothrop, of Norwich, &c., and Timothy Donevan, late from Ireland, humbly sheweth:—

That the said Lothrop hath in Norwich aforesaid, an excellent stream of water for useful mills of all kinds that go by water, and owns a building which during the late war was erected and made use of by Mr. Nathaniel Niles for manufacturing wire, and said Mr. Niles being now gone into another state, said Lothrop hath purchased the same for the purpose of a snuff mill:

That the said Donevan hath contracted with the said Lothrop for the use of said stream, for a long time to come, viz: for the term of fifty years, with design to set up said manufacture of snuff, as also the business of a

CLOTHIER AND BLUE DYER,

and is well skilled in those manufactures, and hath large property, which he is desirous to bring into this state, sufficient to carry on the same, and purposes to settle his sons in those manufactures in said Norwich. That your memorialists have already been at great expense in preparing proper gear and engines for said business, and were pursuing their said design with speedy progress, until a few weeks passed, when to their great surprise and astonishment, they were informed that the Hon. William Pitkin, Esq., did in May, 1784, obtain, &c. (above.)

Now your memorialists beg leave to suggest to your honors, that the Hon. William Pitkin, Esq., not being the original inventor of the art of snuff making, nor skilled in that business, had no claim to that grant, in exclusion of those who well understood the business, and had a good right to exercise their skill in said art, for the support of themselves and families, by a lawful calling; nor was it known that any legislative body had a right to grant away the trade and professions of the subjects of the state, to any individual, for his private emolument, or to make exclusive grants to exercise any particular calling, unless to such persons as were the original inventors or prosecutors of such business or trade. And though exclusive grants are often made to the authors or publishers of useful books, for printing and vending the same for their own advantage, yet it is done as a reward for their labor, in which case, no man's right is taken from him; but people only who have no share in the invention, are prevented from taking the benefit of an author's labors before he can reap an adequate reward for his labor or discovery. And your memorialists having done nothing to forfeit their rights and estate in the business aforesaid, cannot be persuaded that this honorable assembly meant, by said grant, to deprive any individual of such right, but only to grant liberty to said William Pitkin, Esq., to carry on said business, free from all taxes thereon, which your honors had a good right so to do.

Wherefore, your memorialists pray your Honors to consider their case, and explain said grant to William Pitkin, Esq.; and grant liberty to your memorialists to carry on said business, together with the business of clothing and blue dyeing, and other colors in this state, subject to the same law of taxation as other manufactures in this state are subjected to; which will prevent the said Donevan from the necessity of moving with his property, into the state of New York, to carry on said manufactures, which will produce articles of commerce that may find their way into this state under the burthen of the merchants' profits. Or in some other way, &c.

ELIJAH LOTHROP.
TIMOTHY DONEVAN.

Dated at Norwich, the 8th day of September, 1785. (Industry II. 206.)
Negatived.

To the Honorable, &c. October 1785.

We, the subscribers, beg leave to signify our desire, that Mr. Elijah Lothrop and Timothy Donevan, may be allowed to carry on the business of snuff making in Norwich, and think the same cannot be of any damage to Col. Pitkin, as snuff is an article of trade, and will always find its way to the best market, it may be an article of exportation, or prevent it from being imported from the neighboring states, and from Europe. Said Donevan, also proposes to carry on the business of clothing and dyeing in the European manner, which must also be prevented, if he is not suffered to carry on the business of making snuff.

Signed by 243 residents of Norwich, Preston, Groton, Lebanon, &c. Dated at Norwich, September 8, 1785. [Industry II. 207 to 210.]

Mr. John Currie of East Hartford, testifies that Col. Wm. Pitkin applied to me about the month of July, 1784, to undertake the manufacture of snuff in East Hartford. In consequence of said application, I came from Philadelphia to said East Hartford, and assisted in laying the plan for the buildings, and saw the grant of the Assembly, and the engagements there made induced me to leave Philadelphia with my family,—where I am now settled to carry on said business. Every objection was thrown in my way to prevent my coming by intercepting letters, and preventing my business in Philadelphia, and offering high wages to prevent the manufacture in New England. The wages and encouragement given me, by Col. Pitkin for undertaking, I esteem better than £200, lawful money. I further say, that all the snuff made use of in the state of Connecticut, will not take the mill now erected, half the time it can work.

JOHN CURRIE.

Hartford, Oct. 17, 1785. (Industry II. 211.)

Builders testify, that Pitkin's buildings will cost £700. (212.)

Lothrop's petition is rejected.

[I, Wm. S. Porter, who have been some years employed in the office of Secretary of State of Connecticut, in compiling an analytical index of Public Documents, hereby certify that the above are true copies or abstracts of papers and records in said office, as per references.

Hartford, Feb. 28, 1851. WM. S. PORTER.]

Respectfully submitted.

THOS. EWBANK.

WASHINGTON, January, 1851.

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS

V[illegible]

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS

VOL. 2, 1850

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OF THE

COMMISSIONER OF PATENTS,

FOR THE YEAR 1850.

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" Jno. C. Reid, La Porte, Ind.
" R. Hubbard, Terre Coupee, North Ind.
" Joseph Brady, Brookville, Ind.
" Z. F. Lister, Shelby county, Texas.
" Benj. Grats, Esq., Lexington, Ky.
" W. W. Bannell, Washington, Wayne county, Ind.
" T. E. Wetmore, Kent county, Mich.
" Moses Frame, Washington, Ohio.
" John Grundy, Lewisburg, Pa.
" Edward Rowe, Somerset county, Me.
" Elijah Barrett, Greene county, Me.
" John Wilson, Hillsdale, Mich.
" John French, Rockingham county, N. H.
" Thomas W. Kitridge, Dover county, N. H.
" Thomas H. Browne, Oxford county, Me.
" Z. Townsend, Honeoye Falls, N. Y.
" H. H. Vorhis, Jr., Bergen county, N. J.
" Jno. T. Hylton, Camden county, N. J.
" M. Johnson, M. D., Salem, N. J.
" H. W. Chapline, Wheeling, Va.
" J. Hardesty, Rockingham county, Va.
" Isaac J. Lefterich, Wytheville, Va.
" James M. Bailey, St. Croix county, Wis.
" Charles Crockett, Wythe county, Va.
" Dexter B. Bailey, St. Croix county, Wis.
" A. Carpenter, Waukesha, Wis.
" Col. Thos. M. Bonderant, Buckingham county, Va.
" Matthew Dobbins, Allen county, Ohio.

From John Terrall, Columbiana county, Ohio.
" Milton J. Ross, Allen county, Ohio.
" Lester Taylor, Geauga county, Ohio.
" Alex. Ruff, Greene county, Ohio.
" Thomas Cooper, Hamilton county, Ohio.
" W. P. Putnam, Washington county, Ohio.
" Jacob Egbert, Warren county, Ohio.
" Alex. B. Sams, Highland county, Ohio.
" Lemuel Hole, Carroll county, Ohio.
" E. Huntington, Wood county, Ohio.
" William Bennett, Medina county, Ohio.
" J. Zimmer, Montgomery county, Ohio.
" Abner Phillrich, Butler county, Ohio.
" John J. Brown, Wayne county, Ohio.
" Walter Curtis, Washington county, Ohio.
" Abraham Hegler, Ross county, Ohio.
" Daniel Potter, Jefferson county, Ohio.
" David Sarchet, Guernsey county, Ohio.
" Jacob Proctor and others, Lawrence county, Ohio.
" Wm. Hamilton, Pickaway county, Ohio.
" Robert Mackey, Jefferson county, Ohio.
" William Walken, Adams county, Ohio.
" John Young, Richland county, Ohio.
" Elias Benton, Ross county, Ohio.
" Rufus Coats, Allen county, Ohio.
" Willis R. Smith, Huron county, Ohio.
" G. H. Strode, Fairfield county, Ohio.
" Robert George, Jefferson county, Ohio.
" S. A. Barker, Morgan county, Ohio.
" B. F. Abell, Geauga county, Ohio.
" William Deval, Washington county, Ohio.
" J. K. Goodin, Hardin county, Ohio.

From John Thompson, Champaign county, Ohio.
" John Byers, Ashland county, Ohio.
" Henry M. Earle, Greenville, S. C.
" Alex. H. Barton, Oswego, N. Y.
" John Edminston, Jefferson county, Ohio.
" John Pruinton, Portland, Me.
" Frederick Swan, New Sharon, Me.
" J. S. Keith, Oxford county, Me.
" Charles M. Halsted, Sussex county, N. J.
" Benj. Bugg, Chickasaw City, Miss.
" F. A. Kennedy, Lenawee county, Mich.
" Canada Frick, Lafayette county, Ind.
" Ariel Hunton, M. D., Lamoille county, Vermont.
" William Phelps, Shelby county, Ind.
" Moses Newell, Essex county, Mass.
" John Wilkinson, Philadelphia county, Pa.
" Willard Fisher, Norfolk county, Mass.
" Joseph Field, Claremont, Franklin county, Mass.
" Joshua Smith, Hanson, Mass.
" Elisha Edwards, Hampshire county, Mass.
" Reed Mills, Berkshire county, Mass.

From Temple Cutler, Essex county, Mass.
" Cyrus Holbrook, Worcester county, Mass.
" Clement Harrison, Berkshire county, Mass.
" Giles A. Barber, Lamoille county, Vt.
" Zenas Skinner, Chittenden county, Vt.
" John Thomson, South Barre, Vt.
" Ira Goodhue, Westminster, Vt.
" John Van Slicklin, Burlington, Vt.
" Harmon Northrop, Franklin county, Vt.
" James R. Bell, Guernsey county, Ohio.
" Daniel Wall, Luzerne county, Pa.
" John Fitch, Troy, N. Y.
" Alexander Carter, Montgomery county, Ala.
" John Bander Willis, no county nor State named.
" Mordecai Lottridge, Saratoga, N. Y.
" W. H. Frinke, (no residence nor date.)
" Lewis C. Gaines, (no residence nor date.)
" John J. Hagaman, Seneca county, N. Y.
" John B. C. Gazzo, (without date or residence.)
" Chas. F. Ingals, Sacramento city, Cal.
" John N. Rottiers, Jefferson county, N. Y.

In connection with the foregoing list of communications, it should be stated that some hundreds have been noticed under the heads of "Review of Crops," "Rearing Domestic Animals," and elsewhere. Many letters arrive at so late a period that it is impossible to get them copied and arranged ready for the press in season for the Report of 1850. The best of such will appear in that for 1851. It was expected that a large share of the agricultural statistics of the U. S. Census of 1850 might appear in this volume; but statistics relating to population being first prepared for the press at the Census Office, those relating to agriculture are unavoidably deferred.

REVIEW

OF

THE PRINCIPAL CROPS GROWN IN 1850.

WHEAT.

The circular issued from the Patent Office contains the following questions in reference to wheat: "Varieties in use? Average product per acre? Time of seeding and of harvesting? Preparation of seed, and quantity used per acre? How many times and how deep do you plough? Is the yield per acre increasing or diminishing? What is your system of rotation of crops? What the best remedies for Hessian-flies and weevils? The average price of wheat at your nearest market?"

The answers to the first question show, that from fifteen to twenty varieties of winter wheat and six or eight of spring wheat are cultivated in the United States at this time. These include not the whole, but the kinds most in favor with wheat-growers in all parts of this extended republic. A variety called Mediterranean is particularly commended for its early maturity and hardiness, and consequent exemption, in an unusual degree, from injury by rust and insects. It is, however, a cereal of inferior quality, and little cultivated in the best wheat-growing districts, because millers much prefer white wheats that yield whiter and more saleable flour. So far as gluten and strength of staple are concerned, the flour made from Mediterranean wheat is, probably, equal to the best produced under similar circumstances; but the intrinsic value of flour for nutrition has very little influence on the market price of the article. Seeds that contain a large per cent. of starch, which is whiter than gluten, and have a white and thin cuticle, or bran, are uniformly preferred by millers. Such grain yields the maximum of superfine flour. The wheat plant is attacked by so many insect depredators and parasite fungi, and is subject to so many casualties, from frosts in winter and spring, from sudden alternations of wet and dry weather, defective soils and bad tillage, that the more delicate varieties are not popular among the mass of farmers. In Western New York, Pennsylvania, Ohio, Michigan, Wisconsin, Northern Illinois, Indiana, and Iowa, the most extensive growers of wheat prefer the improved white flint, Soules, bald and bearded red-chaff, Hutchinson, Talavera, blue-stem, and other kinds, similar in character, but known by local names. At the South, Virginia May wheat and the Mediterranean are, perhaps, the most popular, although the above named varieties are also cultivated. In New England, spring wheat is grown much more than winter grain. The kinds usually cultivated are tea spring wheat, Italian, Black Sea, red-chaff, club wheat, Whintington, Canada, and others known by mere provincial names. Mr. Moses Newell, of West Newbury, Mass., says, that "little spring wheat has been sown here for four or five years, because the insects have nearly destroyed the crop.

The kinds in use here have been the red, the Black Sea, the tea, and the white bald." He adds: "Winter wheat, sown in August and September, is beginning to take the place of spring wheat. Upon some lots in this vicinity, nearly 40 bushels per acre have been obtained; and 20 bushels are not above an average crop. It has succeeded well upon sward land turned over, applying compost manure, spread on the sod after ploughing, and immediately sowed and harrowed. In some instances, the seed has been covered by a light one-horse plough, in some, by a cultivator, but more generally by the common harrow. The plough or cultivator is preferable to the common harrow, as it covers the seed deeper, and renders the young plants less liable to injury from frost. August sowing has given the best crops, other things being equal." In regard to the use of compost manure, guano, and other fertilizers, applied at the time of seeding, the practice is gaining favor in all districts where the soil is somewhat impoverished by previous cropping, or naturally not well adapted to wheat culture. A compost, consisting of well-rotted stable manure, wood ashes, gypsum, and a little common salt, is preferred. Mr. W. Fisher, of Franklin, Mass., says, that the Black Sea variety is most cultivated in that section; but, owing to a lack of mills for grinding, and other causes, little attention is paid to the production of this grain. Mr. Joshua Smith, of Hanson, in the same State, informs us that the legislature, some fifteen years since, paid a bounty on wheat; but the business proved unprofitable. The crop is now much neglected, and the bounty discontinued. Mr. Elisha Edwards, of Southampton, says, that the white flint is found to be the most profitable wheat for autumn seeding. Of this kind, he has raised 24 bushels per acre; but it was an extraordinary crop. About 12 bushels is the average yield. He prepares seed by "soaking three days in strong brine; pour off the liquid, and roll in as much air-slaked lime or plaster as the moist seed will receive, to make it fit for sowing. Time of seeding, early part of October; use two bushels of seed per acre; plough first in June, six inches deep; cross-plough the last of September. Not troubled with insects; average price, $1.38 a bushel." [Our correspondent soaks his seed too long in a "strong brine," and runs a great risk in destroying its vitality altogether. Five or six hours are quite long enough to keep seed wheat in any steep. It imbibes too much salt, which injures the growth of the plant for months after the wheat comes up, if the seed be long kept in strong brine, as the writer has found by experience.—Ed.]

Mr. Cyrus Holbrook, of Worcester, says that the average yield of spring wheat in that county is from 17 to 20 bushels per acre; amount of seed sown, 1¼ bushel; time of seeding, middle of April; time of harvesting, second week in August; plough twice; wash and lime seed; price of wheat, $1.25 a bushel.

Mr. Thomas Lincoln, of Washington county, Maine, writes, that "spring wheat is almost exclusively raised; varieties, bald and Black Sea. Winter wheat has been tried in a few instances lately, and succeeded so well as to increase the culture of this crop. Annual product per acre about 17 bushels." Mr. L. prefers to sow on land planted and manured the previous year; if green sward is used, the manure is spread before breaking, and is ploughed in spring; grain is sown about the 1st of May, at the rate of 1½ bushel per acre. The yield has diminished on the whole for a good many years. "Crop of late years much troubled with rust. Black Sea wheat is exempt from this malady, and is least injured by insects. Have never had the Hessian-fly, and seldom the weevil, in grain. Within seven or eight years, we have in some instances lost a large part of the crop by an insect called here the 'wheat-fly,' (probably the *cecidomyia tritici*,) which deposits its eggs on the end of each grain just after the blossoming, and stops the growth of the kernel by sucking its juices, without gnawing it like the weevil. Average price, $1.50 a bushel." Mr. J. S. Keith, of Oxford county, Maine, writes: "The average yield of spring wheat in this county for seven years past has not been above seven or eight bushels to the acre." "Winter wheat is being introduced into several counties with success." "Seed is soaked in brine from 48 hours to four days; best farmers have abandoned fall ploughing, and plough all they can in spring—the more the better, till the surface becomes light and porous."

Mr. Elijah Burrell, of Greene, in the same State, says: "In this vicinity, the culture of spring wheat has been for three years past nearly abandoned, owing to the ravages of the weevil, although in 1849 and 1850, wheat sown on light land produced well, and sustained but little injury from the fly. Red-bearded wheat is preferred, producing from 10 to 25 bushels per acre. Time of seeding, from 10th to 20th May. Seed usually washed or soaked in brine, and rolled in lime, to prevent smut. Quantity of seed from one to two bushels per acre. The crop is usually followed by corn. Wheat, corn, clover or timothy are grown in succession. Winter wheat is sown in August on a green sward fallowed. On land manured before breaking the sod, 30 bushels are sometimes harvested from an acre." Mr. Pruinton, of Portland, estimates "the average product per acre at about 35 bushels" in Cumberland county. His attention, probably, has been directed mainly to the crops of good farmers who make their lands rich by manure or clover, and cultivate their wheat fields in a superior manner. He says that "seeding takes place about the 25th of August; harvesting, the 1st of July." Very little wheat is cut so early as the 1st of July, so far north as Portland, we imagine. On light, warm land, well manured, wheat will ripen from 19 to 20 days earlier than on poor, heavy, cold soils. This fact is worthy of consideration by wheat-growers in Maine, and all the States where rust and insects attack the crop as it approaches maturity. One soil in the same field may be ten degrees warmer than another; and if so, the warmer earth will advance vegetation or growing wheat plants as much in 90 days as the colder in 100. The study of the temperature of soils and of the atmosphere just above the earth is too much neglected in all parts of the United States. Mr. Pruinton adds, on the subject of wheat culture: "Old ground should be ploughed twice, deep, with a subsoil plough. The yield per acre is increasing; spring sowing is going out of practice. Spring wheat is subject to blight and Hessian-fly. The average price in Portland of wheat is $1.40 a bushel." Mr. W. D. Dana, of Washington, says: "Wheat, which for a few years past, has almost ceased to be cultivated on account of the ravages of the wheat-fly, has this year proved remarkably good.

"The fly has left these parts; none having been seen this year, so far as I can learn, either in this State or the neighboring provinces of New Brunswick and Nova Scotia. The Black Sea wheat is almost the only variety in use—average product, 15 bushels per acre. Time of seeding, from April 20th to May 20th; of harvesting, from 20th to 30th August.

I prefer to cut it before the grain is hard, and let it ripen in the stock. Winter wheat is beginning to be cultivated as an experiment, and promises to become profitable. The preparation of seed usually practised here is to put it into a strong brine, and skim off what floats; then mix lime sufficient to dry it. I have never known *smut* where this course has been adopted. We sow 1½ bushel per acre. Hessian-fly and weevil not known. The wheat-fly does its mischief in the growing grain, for which we have no remedy but either early or late sowing—hoping that one or the other will escape. Price, $1.50 a bushel."

In Somerset county, as Mr. Edward Rowe informs us, the spring wheats most cultivated are a bald white-chaff, called tea wheat, and a bearded red-chaff, known as Malaga wheat. Owing to the depredations of the Hessian-fly and weevil, and injury from rust, the growing of wheat has been nearly abandoned for a few years; but the harvests of 1850 were more encouraging. Amount of seed, 1½ to 2 bushels per acre; harvest last of August or first of September. The growing of winter wheat is beginning to attract considerable attention. From reliable sources, information has been obtained that more than 10,000 bushels have been grown in 1850 in the two counties of Somerset and Kennebec, nearly all of which is sown for another crop; kinds in use are white flint, Kloss or banner, and Oregon. Sown in September, 1 bushel per acre; yield this season, 25 bushels per acre. Mode of culture: ground well ploughed once, harrowed fine and smooth, seed sown and covered with a small plough. Price, this season, $2 to $2.50 a bushel; price of spring wheat, $1.25 to $1.50. Mr. Elijah B. Stackpole, of Penobscot county, writes, that the crop of wheat is better in that county than usual; insects not so troublesome, and the average yield of spring wheat 15 bushels per acre. Time of seeding, middle of May; of harvesting, the last of August. Plough twice—first in autumn, six or eight inches deep, and again in spring.

Mr. John D. Lang, of Kennebec, writes, that wheat he imported from Poland, yields from 20 to 30 bushels per acre; this is a winter wheat. Black Sea and bald yield from 16 to 20 bushels. Winter wheat is sown from the 20th to 30th August; harvested from the 20th to 30th of July. Spring wheat is sown from 20th to 30th May, and harvested about the 1st September. Mr. L. ploughs green sward from 10 to 12 inches deep the first time; and instead of harrowing for winter wheat, the seed is ploughed in 3 or 4 inches deep, and not harrowed afterwards. Lime and plaster are applied to wet seed before sowing, which has been washed in simple water to free it from foreign and imperfect seed. For spring wheat, the ground is ploughed about 10 inches deep, and the seed harrowed in. The most successful dressing for winter wheat is a crop of clover turned under with the plough; in default of that, a compost of leached ashes, salt, and lime, spread evenly over the field. By sowing spring wheat on or after the 20th of May, the ravages of the Hessian-fly and weevil are avoided. Rust sometimes affects late-sown wheat, except the Black Sea variety. Mr. L. has sown as late as the 10th of June with good success. Wheat generally sells at $1.20 per bushel; seed wheat at $2. Mr. Ezekiel Combs, of Upper Freehold, Monmouth county, New Jersey, informs us that Mediterranean wheat is most extensively cultivated in that county, being less liable to rust and smut than other varieties. The next in public esteem is the Genesee wheat, which he regards as most prolific on rich, heavy land. The red-chaff is cultivated to a limited extent, and is considered best for late seeding, on a moist soil. Average yield per acre, 12 bushels; time of seeding, between September 25 and October 10. Mediterranean should be sown a little earlier than other kinds of wheat; early sown wheat, however, is frequently attacked by the Hessian-fly and yellows, while late sown suffers more from the fly in the spring, winter and spring frosts, and rust. Mr. C. calls attention to the well-known importance of letting seed-wheat stand till fully ripe before it is cut, and thinks, that wheat shrinks somewhat in weight by harvesting before maturity. He regards washing in strong brine and liming as a positive preventive against smut. White wheat, he sows from 1½ to 2 bushels per acre; Mediterranean, 2 to 2½ bushels; with Pennock's drill, 1 to 1¼ of white and 1½ to 1¾ of Mediterranean are sufficient. Plough deep; which is followed by a regular increase of product. Price, $1.10 a bushel.

Mr. Andrew Watterson, of Beaver, Pennsylvania, writes that the yield per acre of wheat in that region is increasing. Time of seeding, from 10th to 25th of September; harvesting, from the 4th to the 20th July. One ploughing is preferred, a little deeper each time. On land in good state of cultivation, a second crop is immediately taken after the first; then seed with timothy or clover. On poor land, a crop of oats succeeds wheat; and sow clover. Price, at the nearest market, 75 cents. Mr. Orange Johnson, of Franklin county, Ohio, informs us that there is very little variation in the yield of wheat in that section. He ploughs twice, not deep, sows 2 bushels to the acre, and gets about 20 as an average crop. He changes from wheat to corn, and from corn to wheat; is not troubled with flies or weevils, and obtains, at the nearest market, 62 cents a bushel for wheat.

Mr. Peter Fruttchey, of Northampton, Pennsylvania, says, that Whitehall, blue-stem, and Mediterranean wheats are most cultivated in that county; the first named is thought to yield the best, the crop being from 15 to 20 bushels per acre. Sow about the 15th September, and harvest near the 10th July. Plough three times about six inches deep. Yield per acre rather increasing of late. Wheat is generally sown on corn stubble; no preparation of seed except to have it clean. Price, $1 a bushel.

Mr. Jabez Bostwick, of Hamden, Delaware county, New York, says that since the appearance of the weevil, which destroys the berry of the head before it comes to maturity, we have nearly dispensed with the raising of either winter or spring wheat. The destruction of crops by the weevil within a year or two, has not been experienced, and the growing of wheat is increasing. Winter wheat is sown in the latter part of August, on summer fallowed meadow or pasture land, and yields from 15 to 25 bushels per acre. If spring wheat is sown so late as the 15th of May, it will escape the weevil; the egg-hatching season of that insect having passed by before the heads are sufficiently developed for the support of its larvæ; but in common seasons, the rust is very apt to attack late wheat. The white bearded is considered the best. Mr. B. sows 1½ bushel per acre.

Mr. Peter S. Reist, of Lancaster county, Pennsylvania, says that is a great wheat county—not because it brings sure crops, but on account of the great number of industrious people engaged in growing wheat, as a staple production. "We raise, as an average crop, from 20 to 25 bushels per acre; and not unfrequently, harvest 30 bushels. Sometimes we fail to get the amount of seed sown, from the effects of Hessian-flies, rust, and winter-killing. For insects and rust we know of no remedy. Late seeding keeps the flies off in the fall, but they often attack the crop in the spring, while rust and frost are usually more severe on late than early sown grain. Average price, $1 a bushel. Mediterranean and blue-stem are most cultivated." A correspondent, who signs "L. S. B., Warwick," in the same county, says, that the Mediterranean wheat is more cultivated than any other, because it ripens earlier, and is less subject to mildew and rust. The Hessian-fly rarely, if ever, attacks or injures it. The red blue-stem is a fine wheat, and much cultivated in the county, but it is a great favorite with the flies. The same is true of the white blue-stem, which is even less successfully grown than the red variety. Average product, about 15 bushels.

Mr. George Craft, of Brownsville, Fayette county, Pennsylvania, writes there was almost an entire failure of the wheat crop, except the Mediterranean, in 1850; owing, as I believe, to some two or three days of intensely hot weather about the 22d of June, when the berry was filling, or making. Many contend that the rust destroyed the crop, when there was, in fact, no rust upon it. The smooth Mediterranean is a white wheat, with large grains, yields well, and weighs 64 pounds per bushel. Average crop, from 15 to 20 bushels per acre. Sowing is done from September 20 to October 10; harvest begins about the 25th June; seed thoroughly cleaned, and sown at the rate of 1¼ bushel per acre. On fallow ground, plough and harrow twice; first ploughing from 6 to 8 inches deep. Lime is much used as a fertilizer.

Mr. Charles Ruggles, of West Vermilion, Ohio, who resides in a wheat-growing region, has the following sensible remarks on the production of this staple:—

"The varieties most in use are the white kinds—such as the Soules, Hutchinson, Crate, white flint, &c., with some Illinois and Mediterranean. There is but little of the latter, as it is a poor variety, a little superior to rye in quality, while the yield is good. The average product per acre, in this vicinity, is 20 bushels. This year it has gone far above that. Taking one tier of farms on the lake shore, six miles in extent, 548 acres were sown, from which 20,317 bushels were harvested and *measured*, being an average of 27½ bushels per acre. Little or no pains are taken in the preparation of seed, further than to clean it well. On strong lands, 2 bushels are sown per acre; the usual amount, 1½.

"Summer fallows are not often ploughed more than twice, and from 5 to 7 inches deep; but a few run a second plough in the furrow made by the first, and the two turn the soil from 12 to 15 inches. The result is *one-third more wheat per acre.* I think the yield is steadily on the increase. But little system of rotation of crops is observed—many sowing wheat after wheat for several years in succession, until the ground becomes so foul that it will no longer bear grain fit for market. It is then seeded to clover and timothy, and kept in meadow a year or two, or till it will do to undergo another series of cropping.

"This, however, is not done by good farmers. A great deal of wheat is grown after corn. The ground is well manured, ploughed deep, and the corn cut up at the root so soon as it is ripe enough for that purpose, and the ground well ploughed and sown immediately. This, when well done, gives a good crop, and is profitable; but the practice demands more manure than summer fallow. I know of no remedy for the Hessian-fly, only to sow early, and prepare the ground well."

The idea of Mr. R., doubtless, is not to escape the fly in autumn, but to have the wheat plants so vigorous that its larvæ can do but little injury. If this view of the case be correct, and sustained by experience, then early sown grain will have the additional advantage of standing winter freezing better, and of coming earlier to maturity in summer, and thereby escape injury from rust.

Mr. S. S. Boyd, of Jacksonburg, Wayne county, Indiana, writes that wheat has become a principal crop. It is oftener sown among corn than all other modes of seeding, when it yields about 12 bushels per acre. By breaking a fallow or clover field in June or July, ploughing again and sowing in September, harrowing in the grain, 25 bushels per acre is a common yield. The greatest enemy to wheat is rust: the Hessian-fly and weevil are seldom feared in this country.

To avoid the rust, the earliest varieties are selected, and sown about the 1st of September, so that it may ripen as early as possible.

Mr. Henry Daggett, of New Haven, Oswego county, New York, says that it pays to plough corn ground twice instead of once, in preparing it for seeding with wheat. It is quite subject to heave by frost, which often does great injury to the crop. Draining is the proper remedy for this evil.

Mr. F. D. Kingman, of Bergen, Genesee county, New York, says that his "crops of wheat for the last five years have averaged thirty-two and a third bushels per acre." We commend this fact to the notice of those who have been led to believe that the "Genesee country" was failing to produce the great staple for which it has long been celebrated. Mr. K. has the following remarks on wheat culture:—

"Time of seeding, from 1st to 16th September; of harvesting, from 20th to the last of July. Brine and lime the seed, and sow 1½ bushels per acre: sometimes I sow two bushels, but find it too thick. Plough three times: have this year procured one of Nourse & Mason's subsoil ploughs, and subsoiled a part of each wheat field. It takes three heavy horses to haul the surface plough 7 inches deep, which is my gauge. Subsoil with a yoke of oxen and a pair of horses, driving the plough 6 inches below the cut of the surface plough. The increase is from 8 to 10 bushels per acre. Within the last 10 years, I have not been troubled with the Hessian-fly but once. Price of wheat, from $1 to $1.12. At least one-third of my wheat is sown after spring crops, and clover always follows, being sown in April, at the rate of 10 pounds of seed per acre, with 100 of plaster. I turn nothing into clover fields in the spring; and when it is half in blossom, turn under with the plough. I now raise too much straw, and feel the need of understanding chemistry, to learn what to apply to increase the berry. We once had a chemist at Rochester, (Dr. Lee,) who would give the desired information, but I did not then know that it was needed by me. I have never kept any account of my corn crop, but it averages not far from 50 bushels per acre."

How to grow more wheat, and less straw, to the acre, is a problem not so easily solved as some may suppose. If the enterprising farmers of Western New York would maintain an experimental farm to test, in a thorough and satisfactory manner, the suggestions of chemical science, we have no doubt that the same land and amount of labor now employed in wheat culture might give them a quarter more grain at each harvest, on an average. Time will work out this improvement, when more agriculturists discover, as Mr. Kingman has, that additional knowledge is desirable.

Mr. Loring K. Tyler, of Lee county, Virginia, writes that the average yield in that county does not exceed 8 bushels per acre. Wheat brought from the North invariably does badly for seed; while the Mediterranean, brought from South Carolina, is succeeding well, after 4 years' trial. Time of sowing, from 20th October to 10th November.

Mr. William Mulks, of Cold Spring, Jefferson county, Wisconsin, writes that the "wheat crop in this section of the State has been exceedingly light this year, both spring and winter grain; the decrease below last year is probably 40 per cent." The culture of spring wheat is increasing, owing to the failure of winter wheat. The last-named averages about 12 bushels, the former 14, per acre. Average price at Milwaukie, 75 cents a bushel.

Mr. G. De Neven, of Fond du Lac county, in the same State, says:—"More winter wheat was sown in the autumn of 1849 than in previous years; but the yield was very poor, and of an inferior quality, owing to an exceedingly dry spring, cold winds, and continued rains during harvest. The average yield this year is about 9 bushels per acre; last season about 20. More spring wheat is grown this year than usual."

Mr. Ephraim Pickins, of Dodge county, Wisconsin, says that the average yield of wheat there is 15 bushels per acre, and that the crop is sadly injured by rust on low ground. Farmers are turning their attention to other crops, stock-growing, &c. Wheat is sown from 5th to 25th September, and harvested from July 15th to 25th. Quantity of seed per acre, 1½ bushel. Plough but once, 6 inches deep. Yield per acre diminishing.

Mr. James H. Gill, of Mount Pleasant, Ohio, after naming the varieties of wheat generally cultivated in that State, says that "defective crops originate from several causes: 1. The seed is thrashed by machines which break and injure the grain, so that it fails to germinate. 2. Seed harrowed in, leaves at least one-fifth on the surface, which never come to maturity, if they grow at all. 3. The want of proper draining. 4. Shallow ploughing, seldom going deeper than 7 inches, and scarcely ever subsoil. Frequently we plough but once; but generally lose the crop, from the fact that blue-grass takes possession of the ground and destroys the wheat. Our system of cropping is various; but the method of cropping should be—first, corn; second, oats or barley; third, wheat; then clover."

Mr. Stephen G. West, Jr., of Troy, Wisconsin, writes:—"The season just passed has been an unusually hard one for farming in this country. Winter wheat is generally a good crop; usual product, per acre, from 25 to 30 bushels on new land, where the yield is much more certain than on land long cropped. Method of putting in a crop on new land is as follows:—Break the ground between the 1st of May and the 1st of August; harrow once before sowing, and twice after. By seeding the 1st September, harvest will ensue about the 20th July. After the first crop, the yield is generally less, except on clayey land, which yields more the second and third crops than at first. We usually sow spring wheat after winter grain, with good success. The hedge-row variety is preferred."

Mr. James D. Bell, of Walden, Caledonia county, Vermont, states that the eastern range of the Green Mountains passes through that town, from south-west to north-east, forming the highlands between the Connecticut and Lamville rivers, being in latitude 44½° north, and having an elevation equal to any in the State. It snows there eight months in a year, and July is the only month exempt from frost. Fair crops of grass and grain are produced; crops come to maturity in about ninety days. Wheat is sown from the first of May to the first of June; harvested from 15th August to middle of September. Average yield, twelve bushels per acre. Best remedy for weevils, late seeding. Wheat is worth $1.25 a bushel. Mr. Bell estimates the cost of growing corn at only 20 cents a bushel in that cold, elevated region; yield, 40 bushels per acre. It is manured in the hill with a compost of muck and hog manure. It is worth $1 a bushel.

Mr. Coles Cook, of Addison county, in the same State, writes, that but little winter wheat is grown in that county; while spring wheat is raised in considerable quantities. Black Sea is the variety mostly cultivated; average crop, about 20 bushels per acre. Time of seeding is the month of May; harvesting, in the month of August. Quantity of wheat sown, 1½ bushel; prepared by soaking 24 hours in strong brine, adding as much recently-slaked lime as will cover every kernel. Excellent spring wheat is raised on green sward, either with or without manure. This crop also does well after corn, peas, and potatoes. Some prepare land in the fall for spring wheat, and seed as early as the ground will permit.

Mr. Joseph Parker, of West Rupert, Vermont, says:—"This formerly was a great grain growing country; but, owing to several causes, the consumption of wheat at present far exceeds the product. Our former method of growing wheat was to summer-fallow, and sow, from the 15th to the 20th September, 1½ bushel per acre; but that practice is now nearly abandoned, save occasionally on a piece of land recently cleared. Black Sea and tea are the kinds of summer wheat mostly grown. The seed is soaked in brine 12 hours and rolled in lime. Crops vary from 15 to 30 bushels per acre."

Mr. M. F. Palmer, of St. Albans, Franklin county, Vermont, writes that "the production of wheat is increasing both in the quantity sown and the yield per acre. Spring wheat of the Black Sea variety is mostly grown. This variety is preferred, especially for late seeding, as it is less liable to rust than other kinds. One bushel and a half is usually sown upon an acre, from the 1st to the 20th of May, mostly after corn or potatoes. I have, for eighteen years, prepared my seed by washing it in strong brine, and mixing it with fresh-slaked lime in sufficient quantity to render it dry enough to sow. From seed thus prepared I have never had wheat to smut in the least; and I regard it as an effectual preventive. The best and only remedy known here for the grainworm—sometimes called weevil—is late seeding. In this climate, we sow from 17th to 25th May, and the grain is not in blossom till the season in which the insect deposits its eggs has passed."

Mr. Jacob Shallcross, of Frankford, Pennsylvania, writes, that the Mediterranean wheat is preferred in that district, because it is least subject to injury by insects and rust. Farmers there plough but once, in preparing ground for seeding, and that but a few inches deep. The annual yield per acre is diminishing. Mr. S. recommends the following system of rotation:—First, plant corn, and sow clover-seed in February, instead of oats; plough in the clover when fully grown, (not ripe,) instead of manuring for wheat; then plant corn, in place of growing hay, which is the most unprofitable crop a farmer can raise in this part of the country. The average price of wheat in 1850, was $1.15, and the average product per acre, 25 bushels, with good farmers.

Mr. George H. Bucher, of Cumberland county, Pennsylvania, says the soil of that county is exceedingly variable in quality; some parts being strong limestone land, others slate, clay, or sandstone. The yield of wheat per acre differs as much as the fertility of the land and the skill of its cultivators. Mediterranean wheat is preferred, being more hardy, ripening earlier, and is less injured by mildew, freezing and thawing in winter, and insects. Mr. B. highly commends using a drill in seeding, rather than sow broadcast. Seed is placed at a uniform and proper depth when drilled, ripens evenly, is less injured by the heaving of frost, endures the winter better, and yields considerably more grain at harvest.

Mr. Asa Manchester, of Washington county, Pennsylvania, says that wheat ground is ploughed early in spring, so that it will freeze, frost being regarded as the best pulverizer. It is then sown early with oats; which being harvested, the stubble is turned in 8 or 10 inches deep, the land further cultivated, and seeded with wheat about the 20th September. Soil, a strong limestone clay. Crops harvested vary from 15 to 40 bushels per acre. He adds:—"Immediately after sowing wheat, and harrowing both ways, we sow timothy-seed, a bushel and a half to ten acres, for pasture, and bush it in, crossing the harrow marks, which fills them and prevents washing—a matter of some importance in a hilly country, liable to be cut up into unsightly gulleys. The bush is made by boring 10 or 12 holes in a beam 7 or 8 feet long, and filling them with brush. We have never missed a crop of timothy put in after this manner. The peculiar advantages are that it pulverizes the ground very fine, and buries the seed at just the right depth, so that it all grows. To keep our land, we plough it only once in 8 or 10 years."

[Bushing in grass-seed, including clover and flaxseed, is a practice universally commended by farmers who have fairly tried it.—Ed.]

Mr. George T. Powell, of Uniontown, Fayette county, Pennsylvania, writes that white wheat is worth from 10 to 20 per cent. more a bushel than Mediterranean and other dark varieties; but the first named is less prolific and more injured by insects, rust, and mildew. The average yield in Fayette county is estimated, by Mr. P. and several experienced farmers, at 13½ bushels per acre, which is obviously increasing. In seeding, they sow 1½ bushel of Mediterranean per acre, and 1¼ bushel of other kinds of wheat: knows of no remedy against Hessian-fly; but keeps weevils out of a mow of wheat by sprinkling the grain lightly with salt while mowing it away at harvest. "It is efficacious against weevil; and if it were not so, the salt in the straw would not be lost."

Mr. R. P. Stevens, of Cerestown, McKean county, Pennsylvania, informs us that the soil in that county is not well adapted to the culture of wheat, it being deficient in lime, and formed mostly of decomposed shales and sandy slates, underlying the conglomerate of coal measures. Whatever of lime the soil contains is derived from calcareous rocks at the north of us, in the State of New York. "We are, however, improving in the culture of wheat. Varieties grown are white bearded, Michigan flint, and Soules." The average yield is not far from 15 bushels per acre. Land is ploughed twice from sward, and once when buckwheat is ploughed in; depth of ploughing eight to ten inches. The yield is increasing. System of rotation from grass is wheat, oats or corn, buckwheat, and seed down with timothy or timothy and clover. We are not troubled with either fly or weevil; average price of wheat, $1.50. Wheat is not our principal crop.

Mr. Jeremiah Brown, of Luzerne county, Pennsylvania, writes that old land yields about 10 bushels of wheat per acre, and new 20, in that county. Sow 1½ bushel per acre in September, and harvest in July. Price, $1 a bushel.

Mr. Benjamin J. Passmore, of East Nottingham, Chester county, Pennsylvania, writes that the Mediterranean wheat yields much the best in that county. At the last harvest, other kinds were much injured by rust and mildew, while the first-named nearly escaped without damage. Average crop per acre, 18 bushels; time of sowing, latter end of September; average price, $1.

Mr. James A. Such, of New Lebanon, Mercer county, Pennsylvania, says the average yield of wheat in that county is 15 bushels per acre; and in preparing land for this crop, they plough twice, seven inches deep. The yield per acre is increasing; price per bushel, 85 cents.

Mr. John Blackfan, of New Hope, Bucks county, Pennsylvania, describes the larvæ of an insect, probably the true wheat-fly, (*cecidomyia tritici*,) developed in the seed of wheat when in the milk and dough state, which is less than a timothy-seed. When not preyed upon by insects, wheat turns out 20, and sometimes 30, bushels per acre in that county. Mr. B. is a great friend to frequent change of seed, having found it highly beneficial. In speaking of "plaster as a manure," he says: "Large quantities are yearly sown on grass fields in the spring; about a bushel is mostly sown. It is found, by experience, that its effects on grass are much increased by adding an occasional dressing of lime; and, if applied plentifully, a number of years in succession to land without liming, it almost entirely fails to have any effect. Plaster, mixed in the proportion of one part to ten of leached ashes, and a small handful dropped at every hill of corn before covering it, has been found by many of our farmers of great benefit."

Mr. John McSparran, of Fairfield, Lancaster county, Pennsylvania, writes that Mediterranean wheat yields 22 bushels per acre; white bluestem, 25 bushels; and "mountain" also 25 bushels. Time of seeding from September 1 to October 1; and of harvesting, from June 25 to July 15. Plough but once, four or five inches deep, and sow from 1¼ to 1½ bushel if put in with a drill, and from 1½ to 2 bushels when scattered broadcast. Price, 95 cents.

Mr. John G. Landis, of Lancaster county, Pennsylvania, speaks of that county as first in agricultural improvement and mineral resources, particularly iron, in the State. Its iron interest is greatly depressed. Wheat crop is 20 per cent. better than in 1849; his crop averaged, in 1850, 26½ bushels per acre, being about the usual harvest this season; yet an acre or so often yields from 30 to 40 bushels. Land is ploughed but once, eight inches deep, early in August; then cultivated with the harrow and cultivator. Time of seeding, from the last of August to the middle of October. The kind of wheat most successful and generally cultivated is the Mediterranean. Quantity of seed used, from one to two bushels per acre.

Mr. Thomas Stocks, of Oak Hill, near Greensboro', Georgia, writes:—"We break up our ground and put about 10 bushels of cotton-seed as manure per acre, and sow about a bushel of wheat any time before 10th December. Ground thus prepared will yield from 15 to 25 bushels per acre, according to the quality of the land. The only preventive against the weevil is sunning the wheat before it is stored away in the granary." [Mixing lime with it is said to be a sure remedy.—Ed.] Mr. S. says that the best rotation is for corn always to follow cotton; and wheat, corn; and after wheat, let the land lie idle a year, then plant cotton again, so making three crops in four years. A plantation well ditched on hill-sides and cultivated as above will never cease to make a remunerating return to the planter, particularly if he puts what manure he can raise on galled spots only.

Mr. Albert Hill, of Le Roy, Genesee county, N. Y., says that the average product of white flint wheat in that county is 27½ bushels per acre. This is a better account of wheat-growing in Genesee than has been given by gentlemen who knew next to nothing of the land and excellent farmers of that region. They sow from 1½ to 2 bushels seed per acre. Earth ploughed 8 inches deep yields better, as tested by experience, than when ploughed 6 inches.

Mr. A. A. Huntingdon, of Columbus, Wisconsin, writes that in that new country, 1½ bushel of seed is sown per acre; and that the crop of 1850 was quite poor. Early seeding does the best. Seed is washed and soaked in strong ley to prevent rust.

Mr. Ashbel A. Hosmer, of Riga, Monroe county, New York, a good farmer, sows his wheat without ary preparation, except to have it perfectly clean or free from other seeds, at the rate of 1½ bushel per acre. Clover and plaster are mainly relied upon to keep up the fertility of the soil—turning the clover when in blossom.

WHEAT AND OTHER CROPS IN OREGON.

Sir:—I have just received one of your circulars, and hasten to give you what information I am possessed of, in compliance with your request.

WHEAT.

We have three varieties in common use:—First, what we call the white fall wheat, which is considered the best for market, on account of making the whitest flour; but it is not generally preferred by farmers for bread, as it dries up in one or two days in summer, so that it is hardly eatable. But mixed in about equal parts with the red-bearded or Mediterranean wheat, a better article of bread is formed. White wheat is open and porous; consequently, it gathers moisture in the rainy season in this country, making it difficult to grind. The red-bearded or Mediterranean is very hard and flinty, and generally weighs from 8 to 7 pounds per bushel more than the white, which is better to grind in the dry season, and the red in the rainy season. The third kind is a bald red wheat, and there is a bald white spring wheat coming into use. The first mentioned variety is most common, having the advantage of producing the largest crops, and those most marketable. The time of sowing white wheat in September and October; and it may be sown any time during the winter when the ground is in condition, *i. e.* dry enough for seeding. I sowed, the last of February one year, on bottom land, and obtained a larger crop than on upland, sown in autumn, harvesting 38 bushels per acre. One of my neighbors sowed the same variety in May, (from the 8th to the 10th,) and reaped in August, about 27 bushels per acre; but it is not safe to seed so late, for it is not properly a spring grain. Our crops of white wheat may be 27 bushels, in ordinary seasons; but, taking all the land cultivated in wheat into the account, I do not think that the average exceeds 25 bushels per acre.

One year, I sowed about 4 acres with a mixture of white and red bearded, in April, hoping to obtain a crop of hybrid wheat. It all grew apparently well until about a foot high, when the red bearded shot up and headed most beautifully; but the white remained, and spread out over the entire ground in a perfect mat, and did not come to maturity that year. Some of my neighbors have sown the white wheat in August, but it did not come up till the showers of September, when it grew well, and produced a fine crop. The red bearded has a wider range, as to the time of seeding, than the white. It may be sown in August, September, and all the months of winter and spring. One of our neighbors sowed it on the 17th June, and gathered, the same season, about 18 bushels per acre. This, however, is an extreme case. I generally sow this grain about the 20th April—sometimes a little earlier. A good crop may be generally expected, if the seed is in the ground by the middle of May. This is naturally a spring wheat; but grows equally well in this climate, if sown in autumn, and sometimes yields better. In 1846, I sowed 15 acres in April, and, the season being dry, I got only about 16½ bushels per acre. The crop was uneven in ripening, owing to the drought coming on soon after it was sown. In harvesting, it shattered considerably, and the fall rain caused it to germinate and take root; and, without either plough or harrow, it gave a yield of 25 or 26 bushels per acre. This volunteer crop ripened in July, and the straw was from 5 to 5½ feet in length. A neighbor tried the experiment, and obtained 25 bushels per acre. No smut or chess was the result of this self-seeding crop, as we term it; but the ground was found to be more foul with weeds than that which had been cultivated.

Our harvest usually occurs in the latter part of July and fore part of August; although, I have seen wheat stand till October before it was ripe enough to cut. We make no preparation of seed, more than to have it free from other kinds of grain. The quantity sown per acre varies from 1 to 2 bushels; but most farmers sow from a bushel and a peck to a bushel and a half, according to the kind of wheat and season. The white, having a larger berry than the red, requires more to the acre. I always sow 1¼ of the red, and 1½ of the white.

We seldom plough more than once, sow on the furrow, and then harrow well. We plough from 4 to 7 inches deep, and sometimes 9 inches. No particular system is, as yet, adopted as to depth or time of ploughing, each one satisfying himself; yet those who are particular in preparing their ground, and putting in their grain well, are the most flourishing. No doubt, a few agricultural periodicals would benefit Oregon. Where crops are grown in rotation, with wheat, peas are the best. The fact that oats seldom winter kill in this country, renders this crop entirely unfit to either follow or precede wheat in rotation. The plan now generally pursued, is to let the land remain without any crop one or two years and pasture it, when it is ready for wheat again.

The climate of this country being so cool in summer, makes it a natural wheat-growing region. This alone, no doubt, has a great influence in respect to Hessian-flies and weevils. The former I have never known in this country; and the latter, I have not heard of but one season, and they were confined to two or three granaries of the Hudson Bay Company. I can give no other than hearsay information concerning the weevils. The general opinion at the time was, that the grain had been threshed and stored in the granary before it had undergone the sweating process, which always takes place in the mow or chaff subsequent to threshing. I have never known weevils to get in grain in this country while it remained in the field; and in only one instance anywhere. There have been large quantities of wheat stored in granaries, in different parts of Oregon, and particularly at the time those of the Hudson Bay Company were affected. Great fears were entertained by most of those having wheat in storage; while no apprehension was felt by such as had wheat in fields, or in the mow. The rust sometimes appears on wheat in Oregon; but I have never seen it injured by this malady. In the summer of 1845, in particular, as I walked through my wheat-field, my clothes would become entirely colored with the rust; but, during the season, I did not find a stem or head injured by it. The cause of the rust was frequent warm rains in June, and a hot sun shining upon the grain immediately after. The average price of wheat at Oregon City (our nearest market) is $1.50 per bushel; the range being from $1 to $2.

CORN.

So little corn is raised in Oregon that I shall say but few words on the subject. The climate is too cool for this crop to do well; and I have not seen a failure of frost in the fore part of May any year since 1839. Frosts are not uncommon in June, such as materially injure corn, but not wheat, rye, nor oats. If wheat happens to be in bloom then, it is seriously injured. One of my neighbors raised 15 to 20 bushels of corn to the acre; but it can never become a staple crop, owing to the climate.

OATS.

This crop is generally good, though not very extensively cultivated; and, therefore, we have a good home-market at a better price than wheat. Forty bushels is the average yield per acre. Oats are frequently sown in autumn, at the rate of two bushels per acre; the winter having but little effect on them. They grow self-sown, and are apt to come in wheat, if not guarded against. I have grown this grain on the same piece of land five successive years; but the last crop was a poor one, on account of the dry weather, yielding only about 16 bushels per acre. The fourth crop was 65 bushels, the season being very favorable.

Barley, rye, and beans grow very well, but are little cultivated. Peas are cultivated to clear the ground for wheat, and are admirably adapted to that purpose. They yield about 18 bushels to the acre, and leave the soil in a good condition for any crop. The ground appears much renovated by this crop in many cases, and, in truth, I may say, in all cases, though more perceptible in some than in others. We find the same soil will always produce a better crop after peas than without them.

CLOVER AND THE GRASSES.

This being a northern latitude, it is probably expected that quantities of hay are made to subsist the herds of cattle and horses found here; but information only is wanting to show that Oregon, at present, needs but little winter food prepared for cattle or horses. In the fall of 1849, I prepared about seventy dozen sheaves of oats to winter thirty head of cattle and six horses, which was sufficient to winter them, and all in good order in the spring. The winter was a hard one for this country. This fall, my oat crop being poor, I have prepared about two-thirds as many for my stock. This leads to another observation, which may not be out of place here, viz. that whenever we have a dry season and a light crop, we are sure to have an open winter. On the other hand, a wet season, which produces large crops, is always followed by a comparatively severe winter. But little hay is made in the Territory, in comparison with any of the Northern States. Timothy, red-top, and blue-grass all flourish here, and clover in some portions of the country. I have seen timothy, the second year from the seed, grown 6 feet, bearing a head 10 inches in length. The soil is generally of a close, firm texture, and better adapted to herds-grass than clover. I have seen about 2 tons of timothy hay cut from an acre. Hay is little used, as cattle in hard winters are fed mostly on wheat straw.

NEAT CATTLE.

In this country, we usually raise all our calves, and give them a part of the milk until they are six months old, and some have milk until the cows naturally wean them, in the fore part of the winter. My usual method is to give the calf from one-fourth to half the milk, according to the quantity which the cow gives and the size of the calf, up to the time it is four months old, and then gradually diminish the ration till it is six or seven months of age, when it is in good condition to stand the winter rains. The amount of food necessary for winter is small, as cattle do not need feeding over three or four weeks, all told, during the winter. I express the opinion, after ten years' experience here, that it will cost about as much to winter cattle in this country as the same number of sheep in my native place in New York, *i. e.* about a ton of hay to ten head, taking open and close winters together. Horses will be in about the same ratio, although many horses and cattle are never fed, particularly the Spanish breed. The actual cost of rearing, until three years old, is mostly while sucking-calves; and, as near as I can calculate, the milk and care, before weaning, are equal to $15; to which add the cost of wintering, and a little for salt and attention, and the expense of rearing a three-year-old steer is not far from $25. The value at that age is generally from $35 to $40 for steers, and $25 to $35 for heifers. Another consideration places heifers in quite a different light. With few exceptions, they produce calves when two years of age, thus becoming cows with second calves when three years old. Many have their first calves when eighteen months old; and some even as young as fifteen months. In some cases, instead of becoming a dam at three years of age, they are really *grandams*. There are more that produce calves under two years than there are that go till they are three; but these young cows are not at their best for dairy purposes before they reach four or five years of age, when they are valued at from $50 to $75. Some sell as high as $100. It will be understood that the prices above named are paid for American, not Spanish cattle; the difference between the two being about twenty per cent. minus the Spanish.

I have never known beeves stall-fed in this country, and yet the beef fattened on grass is quite as good for fresh as any stall-fed. For salting and foreign consumption, the difference is sometimes very great; inasmuch as the fat of the animal (the tallow included) is not so hard, and frequently appears quite oily. Trials have been made in salting for foreign markets, when it was found that the beef of American cattle, *i. e.* stock brought from the Atlantic States, would keep in a sound condition, while that of Spanish cattle would be so injured, after having been packed two or three months, as to be unfit for use. This difference is supposed to arise from the hardness of the former and the softness of the latter. Beef cattle on foot, are worth from 6 to 10 cents per pound; butcher's meat, from 7 to 20. Steers, from 3 to 4 years of age, usually weigh from 600 to 800 pounds, quarters only.

DAIRY HUSBANDRY.

As before observed, calves are nearly all raised in this country; and the quantity of butter and cheese produced is proportionably less on that account. Taking our dairy-cows together, I estimate the average yield per cow at 50 pounds of butter, and a corresponding ratio for cheese, when made. Butter has averaged, the past year, about 50 cents a pound; cheese, 40 cents. Labor is so high here that the cost of making these articles is nearly equal to the prices which they bring. It is very difficult to get at these things with any exactness; but I have formed as just an estimate as practicable, under circumstances so fluctuating.

HEMP.

Previous to the discovery of California gold, hemp was experimented upon by my neighbors who were acquainted with its culture in the Western States; and they reported the growth to be better and of a firmer texture than any produced where they were acquainted. It has not been cultivated since.

ROOT CROPS AND VINES.

The potato crop has been free from the rot until this season. I discovered that a small piece of potatoes, which I had manured in the hill, had black specks through them, of the appearance of particles of earth, which alarmed me; and, on inquiry, I found that the crops of my neighbors were similarly affected. I have tried experiments, by putting a few alone in the open air, and together in a body, and the tubers remain the same, without being more or less affected. It is worthy of notice, that potatoes immediately adjoining, manured in the new manner, were entirely free from those specks. Onions, parsnips, carrots, beets, turnips, cabbages, tomatoes, &c., all grow most prolific, but are not extensively cultivated. I usually grow a small portion of each for family use only, and I am not prepared to give any useful suggestions in reference to these crops. Squashes, pumpkins, and melons are not sure crops here, owing to the late frosts in the spring, unless covered at nights. When planted as late as the 10th May, in rich ground, they grow finely and bear well. The best way to prepare ground for culinary vegetables, in this country, is to make a yard, or fence a plot of ground by itself, and in the summer, when it is dry, say from June until fall, yard cattle on it at nights, instead of putting them into the barn-yard. This will give the soil a good coat of manure; and as soon as fall rains moisten the ground, plough well, about seven inches deep, still letting cattle run upon it so long as it is dry enough not to injure the ground by treading it. This plan of manuring I think highly of, where it can be done, and is preferable to hauling out stable manure. The earth receives all the urine as well as dung, which is a matter of more importance than many suppose. I have found, instead of injuring cattle to put them into a yard at night, rather than leave them in their pasture, it is an advantage. In the first place, they must have time to chew their cuds, which, of course, may be done as well in a yard as elsewhere: secondly, when cattle lie down in the pasture, the places occupied by them have received the peculiar smell or effluvia of their bodies, which, with their excrements, gives them a distaste for that part of the field or pasture. On the other hand, when shut up during the night, and especially where they have fresh yards occasionally, as they should have, every thing is fresh for them in the morning as they go forth with good appetites to graze and gather their needful food. This new process of manuring I have never seen in full operation, except in this country.* Last year, I raised about 4 large wagon-loads of squashes on a piece of land 26 yards long and 8 wide; and the largest kidney potatoes I ever saw, grew when manured in this way.

Yours, truly,

WILLIAM GEIGER, Jr.
Quality, Washington County, Oregon.

Hon. Thomas Ewbank,
Commissioner of Patents.

CORN.

The crop of corn harvested in 1850 was very unequal in different States. At the South, the yield was unusually small; the injury being done mainly by protracted dry weather in May, June, and July. In the Middle and Western States, the yield was not far from an average crop; some districts producing more and others less than an average. In New England, this grain was somewhat injured by dry weather, the depredations of

* The plan of manuring described by our correspondent is quite common in all the Southern States; and it was, doubtless, introduced into Oregon by emigrants from Missouri. Yards should be oftener ploughed than he suggests, to fix all the volatile matters voided by stock in the soil.—Ed.

insects, and other casualties to which corn culture is subject. Mr. H. H. Watson, of New Haven, Oswego county, New York, writes that the usual crop there is from 40 to 50 bushels. He gives "the preference to manuring in the hill," as a given amount will go farther than when applied broadcast to the land. The market price of corn there, is generally 50 cents. Mr. G. Bowdish, of Montgomery county, in the same State, says that yellow corn is sweeter than white, and generally preferred, from the popular belief that the meal of the first named is more nutritious. "Of the various kinds cultivated, perhaps there is none equal to the small eight-rowed yellow." It is generally sounder than larger kinds, and often weighs more than 60 pounds per bushel. Average yield per acre, 35 bushels. Corn and cob ground together is the favorite way of feeding domestic animals on this grain.

Mr. Asa Carter, of Champion, Jefferson county, New York, says:—"After trying all the various kinds I could obtain, a variety known as the 'red Blair' has proved to be the best. The ear is long, the kernel large and well set, the color white, with a red blaze on the tip of the ear, and the average product on my farm, for several years, has been from 40 to 50 bushels." Some of Mr. Carter's crop, this year, turned out 80 bushels.

Mr. Seth Severence, of Oswego, writes that crops of 135 bushels per acre have been several times grown in that county; and fifty bushels are not far from an average, among good farmers. Poor farmers harvest not more than half that amount. Increased attention is paid to the saving and application of manure, and to tillage. The Dutton corn (a 12-rowed variety) is commended by Mr. S. as valuable, and worthy of more extended cultivation.

Mr. J. Y. Berry, of Stafford Corner, New Hampshire, applied 4500 bushels of "marl mud" on 3 acres of land, in 1846, and harvested therefrom 100 bushels of corn in 1847. In 1848, the crop measured 140 bushels; and, in 1849, the yield was 60 bushels of oats and 25 of barley; and, in 1850, the crop was 6 tons of clover hay, with nearly the same quantity of after-math, mown in the middle of October. Another piece marled not only produced large crops of corn, but each stalk became more prolific in the number of ears that set and came to maturity.

Dr. Wm. Johnson, of Prospect Hill, Iowa, describes corn-growing in that State, as follows:—

"Corn is reckoned, and doubtless is, the most certain crop of this region. Some break the land in the fall; but the general practice is to plough early in the spring. The ground is listed with a plough each way, and the seed planted in the intersections, at the rate of from 2 to 4 grains in a hill. The usual method of covering seed is with a hoe; but many cover with a harrow. With but little attention, 25 to 30 bushels are the average yield; and hence this is, *par excellence*, the lazy man's crop. Where the land is well tilled and kept clean, the average is about 50 bushels; and it is no uncommon thing to gather from 60 to 70. The price, the past year, has been 25 cents per bushel."

Mr. H. Little, of Stoystown, Ontario county, New York, says that the small yellow corn is the only kind cultivated in that climate, and it yields about 30 bushels per acre.

Mr. Jonathan Talcott, of Rome, Oneida county, New York, informs us that the average yield of corn, in that vicinity, is 50 bushels, among good farmers—70 being often harvested. Planted in rows of from 3 to 4 feet

each way. Best method of feeding is ground into meal and cooked. Mr. T. advises seeding after corn with grass seed, (hardsgrass,) at the rate of 12 quarts per acre, sown with or after wheat, rye, or oats, adding 8 quarts of clover-seed. Previous to seeding, the ground should be manured, ploughed nine inches deep, and, when seeded, thoroughly harrowed.

Mr. Homer H. Winchell, of Shelby county, Missouri, writes that on land well cultivated, the average yield of corn there is 60 bushels per acre. Best system of culture, is to plough deep in the fall, harrow the ground well in the spring, and furrow off at the distance of 4½ feet. Plant the first week in April, keep the ground in good order by repeated ploughing, until the first of July, and an abundant crop will most generally be harvested. "Cost of production, as nearly as possible, 10 cents." The New England yellow flint corn has been tried, and proved a failure.

Mr. Wm. Zimmerman, of Keokuk county, Iowa, writes that more corn is cultivated there than any other crop. "We raise both the yellow and white. Manure is not used. Plough once, plant, and, if well tended, (ploughed four or five times,) it will produce 60 or 70 bushels per acre. The cost may be estimated as follows:

Rent of land	$1.25
Ploughing half day	1.00
Planting	75
Tending	1.00
Gathering	1.50
Total cost per acre	5.50"

Mr. George Groves, of Knox county, Tennessee, says that the large white corn is most esteemed in that section; and the yield per acre varies from 25 to 50 bushels. Often the extremes in crops are more distant.

Mr. Henry Merrill, of Marion county, Western Virginia, writes that "corn was never better than in 1850." Mr. M. describes, in glowing terms, the energy with which the Baltimore and Ohio Railroad is pushed forward to its completion. This great work will be invaluable to the farming interest of that fertile but sequestered region.

Mr. John H. Tarr, of Fayette county, Pennsylvania, informs us that the most esteemed variety of corn in that county is "the large rough gourd-seed, with from 12 to 16 rows. Cob white, seeds long; and the average yield is from 40 to 50 bushels per acre." "We generally plant on a clover ley; with long manure ploughed in; follow corn with oats and manure, and this crop with wheat." Previous to seeding with wheat, lime and coal-ashes are freely used as fertilizers. Corn is usually planted on or near the 25th April, in squares 4 feet from centre to centre. After-culture is done with cultivator and double-shovel plough. *Crop is kept free of weeds and grass till harvest.*" [A capital practice, and one too much neglected.—Ed.] "Price of corn in December, 1850, 40 cents. Cost of production, 8 to 10 cents a bushel, exclusive of interest and taxes on land."

Mr. Alonzo Dutton, of Windham county, Vermont, writes that "corn is considered one of the best crops" in that region. Average yield, 45 bushels per acre; cost of production, some 48 cents a bushel. Best system of culture is to spread manure broadcast, plough in, plant in rows 3 feet apart; four stalks should stand in a hill, and the ground should be kept free of weeds and light by tillage.

Dr. John H. Weir, of Madison county, Illinois, says: "Corn is produced in great abundance on the American Bottom. The yellow, and a mixture of the white flint and gourd-seed, are the best, and most productive. The Bottom averages 50, and the high prairie 40 bushels per acre. The cost of production is from 10 to 12 cents a bushel. Ground should be ploughed 6 inches deep, furrowed both ways 4 feet apart, planted with three grains in a hill, to be covered with fine earth 2 inches in depth, on or near the first of May. Cultivate with a plough, running the bar next to the corn; and, so soon as it can bear it, turn mould to it. Corn should be ploughed at least four times, breaking all the ground between the rows each time. It is fed here whole and raw; but whether the gain from grinding and boiling will pay cost in this part of the country, I cannot say. Corn sells in our market at 35 cents a bushel."

Mr. J. H. Harrison, of Sangamon county, Illinois, writes that corn is much more cultivated than wheat, and is of more value to the farmers in that region than all other crops. In preparing the land for a corn crop, the stalks of the previous year are cut up with a sharp hoe, at the rate of five or six acres per day. They are then raked into rows by a rake drawn by two horses, and burnt. A pair of horses will rake 30 acres in a day.

[This is a valuable hint to corn-growers at the South, where hands spend a good deal of time in picking up and carrying dry cornstalks into heaps, with a view to burn them, or let them rot.—Ed.]

Mr. Harrison says "the ground is well ploughed 3 inches deep," which is too shallow by at least 3 or 4 inches. "It is furrowed off 4 feet each way, and four seeds are planted for each hill, and covered from 1½ to 2 inches deep, with dirt from the furrow. When the corn is 3 or 4 inches high, it is ploughed with a small plough, throwing dirt from it. In eight or ten days it is cross-ploughed, with three furrows in a row; and in ten or fifteen days repeat the operation the other way, and so make the crop. The most esteemed varieties are a kind of yellow corn, very near the gourd-seed, and a white gourd-seed, which is about fourteen days earlier in maturing than the yellow. Average product per acre, from 45 to 60 bushels; better culture easily increases the yield to 80 or 90 bushels. Labor is now so scarce and high, that we cannot afford to expend more on a crop till there is some change."

Mr. A. Cleaveland, postmaster at Yankee Hill, in the same State, writes that the cost of growing corn in that region is about 10 cents a bushel, and the crops vary from 40 to 60 bushels per acre.

He recommends, in tillage, to turn the earth from the corn in the first operation, and to it afterwards. "Corn should be ground before feeding, and soured, for hogs."

Mr. Ralph Ware, of the "Buel Institute," in Northern Illinois, writes that the "corn crop is good, if not the best ever raised since the settlement of the country. We place the average at 45 bushels per acre. One field of 10 acres produced 110 bushels per acre; a number of pieces averaged from 70 to 80." Mr. A. Job, of Cass county, Illinois, estimates the cost of growing corn at 7 cents a bushel. He raises both white and yellow—the former for bread, and the latter for feeding stock. Feeds raw and unground, and husks the corn on the stalk.

Mr. Amos A. Hilliard, of Macoupin county, Illinois, says: "All that is required to grow 60 bushels of corn on an acre of common prairie land is to plough deep, pulverize the soil, and keep the weeds down—all done with the plough or cultivator. Here, where mills charge high for grinding, and labor is dear, we do not grind or cook feed for stock. Our best method is to cut up and shock the crop as soon as the grain is hard, and while both the stalks and leaves are green. In winter, the corn is daily hauled into a lot, to be first fed to fatting cattle; which being turned out, stock cattle follow to eat up the fodder, and these by hogs."

Mr. Joseph H. Merrick, of Franklin, Delaware county, New York, says that the Dutton corn is much approved, and that the average crops, with good culture, range from 40 to 60 bushels per acre. Greensward, well turned after it is manured, gives usually the best harvests. Seed is covered with tar, and then rolled in plaster, before planting, to keep off insects, birds, and squirrels. Before feeding, corn is boiled or steamed, so as to render it soft. In this condition, both seeds and cobs may easily be crushed and mixed together.

In his report of the products of agriculture for Delaware county, Ohio, in 1850, Mr. Henry Hodgden writes: "The average yield of corn this year is 40 bushels per acre—25 per cent. less in the western part, owing to a severe drought. Our best method of raising is to plough as early as the season will permit, and deep; plant by the first of May, and tend thoroughly with the cultivator and shovel-plough. Corn is generally fed to stock, and is worth 25 cents a bushel. Amount probably grown this year, 650,000 bushels. In favorable seasons, many portions of our country will average 50 bushels per acre. Defective farming is the main difficulty."

Mr. Elijah B. Stackpole, of Penobscot county, Maine, writes that "corn has been good the present year." The small eight-rowed yellow corn is preferred. Average crop, 40 bushels per acre; time of planting, 20th May; harvesting, 10th October; cost of production, 50 cents a bushel.

Mr. John D. Lang, of the same county, (Penobscot,) informs us that "the yellow eight-rowed corn, with long ears and small cob, called the early Canada, is most esteemed. The seed is occasionally renewed by importing it fresh from Canada. There is another kind, called the "brown," having a larger kernel, and ripening about two weeks later. The former averages about sixty, and the latter about seventy-five bushels per acre; and I raise from six to eight bushels of white beans in addition. The cost of production is not far from sixty cents a bushel. One method of cultivation is to turn in a crop of grass in the seventh month (July) from ten to twelve inches deep, cross plough in the spring, spread twenty-five to thirty cart-loads of manure to the acre, plough eight inches deep, and harrow well. Soak the seed in brine, and mix with plaster; plant ten kernels in a hill, which should be three feet apart in the rows, and the latter three and a half to four feet apart: add a spoonful of plaster to each hill. At the second time of hoeing, remove all but four of the healthiest plants; these will spread over the hill. Hoe twice or three times, top the stalks after blossoming, and let the crop ripen in the field."

Mr. W. S. Sparks, of Somerset county, Maine, writes that the crop in that county now averages about forty bushels with good farmers, and the yield might be considerably increased. He gives a decided preference to the yellow eight-rowed corn, and adds: "The drill system, as far as I have learned, is considered a great improvement in corn culture, although it is not practised here. I have seen the effects of it in other parts of the State, and the results were good. Compost manure is excellent for corn, especially if composted in the hog-yard—perhaps the best that can be applied to corn ground. Our farmers are much in the habit of manuring in the hill. Long manure is spread sparingly upon the ground, and ploughed in. Some plough first, spread manure, and harrow or cultivate it in, which, in my opinion, is the poorest kind of economy; and crops so raised are apt to run the farmer in debt. Lime, plaster, and ashes are used as a top-dressing, and in compost heaps; and they are found to be very beneficial. The method of feeding corn is ground and cooked. I should think the gain is at least 10 per cent. In my opinion, from fifty to eighty bushels might, with more care and skill in saving manure, and culture, become our average crops, in place of forty."

Mr. Peter S. Reist, of Lancaster county, Pennsylvania, estimates the average yield of corn in that county at fifty bushels. Some crops have been grown that gave eighty and one hundred per acre. The crop of 1850 was injured by dry weather, and sold at 50 cents a bushel. To destroy worms and insects in corn-ground, plough in the fall, and let the earth freeze through the winter.

Mr. James Harkness, of Jacksonville, Illinois, says that the large yellow corn is best for horses, mules, and hogs, the small yellow for neat cattle, and the large white for the consumption of man: average product, about thirty bushels per acre; cost of production, from 12 to 14 cents. Cultivation: "Break up the ground with a two-horse plough as early as it is fit for ploughing in the spring, then harrow, lay off the rows four feet each way, drop from three to five grains at each intersection, being careful to place the seed near the land-side of the furrow; then cover with a bull-tongue plough. As soon as the corn is fairly up, harrow it; then use a one-horse plough or cultivator, and go over the field three or four times. In the mean time, it should be weeded and thinned out to three stalks in a hill."

Mr. James Edgerton, of Belmont county, Ohio, says that the range of the yield of corn in that county is exceedingly variable, reaching the extremes of from ten up to one hundred bushels per acre. Mr. E. states that the Agricultural Society in Belmont county awarded a premium for a crop of sweet potatoes which measured eight hundred and forty-two bushels from an acre. The average of this crop is said to be about four hundred bushels per acre. "Sweet potatoes are usually worth 75 cents a bushel." In climates adapted to it, this esculent tuber is much less cultivated than it deserves. It is one of the best crops grown in the South for feeding milch-cows and other stock.

Mr. J. Widney, who dates his letter "Ohio Farm, Illinois," says: "Our corn crop is good and sound, but does not turn out so well to the acre as people generally expected." As we have no means of learning where his "Ohio farm" in Illinois is, (the envelope of his letter not being preserved, which might show the post-office at which it was mailed,) Mr. Widney is informed that the "keg of pure China wheat," which he says he forwarded to the Patent Office, was destroyed by weevils.

Mr. W. A. Bacon, of Bourbon county, Kentucky, writes that their average crop of corn is 50 bushels: but the present year it is about 40. For early feeding, large kinds are preferred, but they do not keep so well

through wet winters as smaller varieties. A severe drought during the month of June injured the corn crop in that State. Expense of production, about 15 cents a bushel. Culture: "Plant 4 feet apart; plough twice in a row each way; seldom use a hoe; some use a roller after planting, which, no doubt, is advantageous, if the ground is cloddy. Feed in the ear."

Mr. George W. Harrison, of Salisbury, Sangamon county, Illinois, estimates the cost of growing corn at 6 cents a bushel, and says that the crop might be made to average 100 bushels per acre.

Mr. Amos Benton, of Ross county, Ohio, says that "considerably more than 100 bushels have been harvested from an acre in large fields which received only ordinary cultivation." The manure made from corn and cornstalks seems to be the best for the growth of corn. Fields in which cattle are fed, although tramped until, from appearance, they would not produce any sort of a crop, yet, when the ground is broken early, so as to have it mellow, yield corn in the largest quantity. Manure made by fatting-hogs is the best, perhaps, that can be used; and its beneficial effects may be seen much longer than those of other manures. Mr. Charles Ruggles, of West Vermillion, Northern Ohio, writes that corn averages there 60 bushels per acre, and is grown at a cost of 12½ cents a bushel. Mr. Ezekiel Combs, of Monmouth county, New Jersey, writes as follows:—"The yellow gourd-seed corn is principally cultivated in this section, yielding from 30 to 35 bushels per acre. Some good farms produce from 60 to 75 bushels. The average cost of production, I estimate at 37 cents. A clover ley, with or without manure, according to the strength of the land, deeply ploughed, well harrowed, marked out four feet by four and a half, kept clean and mellow in the first stage of the crop, and tilled with the cultivator in the latter part of the season, is the management most successful. The best method of feeding hogs, that I have ever witnessed, is to have corn and cob ground together; boil the meal; let it cool and sour before feeding it. By this process, I have found not only great economy in the use of food, but also great gain of flesh. It is sweeter, more juicy, and of fine marbling. For cattle, it seems almost indispensable that corn be ground, except the offal at husking-time; but I have doubts as to the economy of grinding corn for horses, unless their teeth begin to fail."

Mr. Orange Johnson, of Franklin county, Ohio, says corn is grown at the rate of 60 bushels per acre in that county, and at a cost of 12½ cents per bushel. Easiest way of raising is on turf ground ploughed twice. For feeding, he uses a mixture of corn and potatoes cooked. Mr. J. G. Tyler, of Hillsdale county, Michigan, prefers the white dent corn to any other, for that climate. It yields from 30 to 40 bushels per acre. Cost of production, 25 cents a bushel; hoes the crop twice. Mr. Alexander Hamilton, of Penn Yan, New York, says:—"The yield of corn is much better than formerly," owing to the use of plaster applied in the hill, better tillage, and improving land with clover.

Mr. A. J. Willmarth, of Athens, Ohio, says that corn is grown there at a cost not exceeding 10 cents a bushel. He cultivates in drills, having a plant every 10 or 12 inches in the row, and these 4 or 4½ feet apart.

Remarks similar to the foregoing might be extracted and extended to almost any length from the great number of letters received at this office. There is not a State in the Union, east of the Rocky Mountains, in which corn is not an important crop; and it is rare to find a cultivator of the soil who is not familiar with the production of maize. We have elsewhere given all that our correspondents in the cotton-growing States have had to say on the subject. We are happy to know that this grain is produced cheaper per bushel, and more per acre, now, than at any former period in our history, by those farmers who keep pace with the increase of agricultural knowledge in the United States. The gradual improvement of all cultivated lands is an object which cannot be too often nor too earnestly pressed upon public attention. On rich soils, corn may be grown to an indefinite extent, at a price which will force its consumption by the millions in Western Europe. No other crop, not even cotton, has equal commercial importance, provided corn-culture be reduced to a perfect system, based on true scientific principles. As an article of every-day consumption, by man and beast, the seeds of Indian corn are without a rival. Slowly, but certainly, it must force its way into common use in England, Scotland, and Ireland; and to this end its most economical production in this country is a matter of the highest importance. One might suppose that commercial cities, which draw all their wealth from the soil, would be willing to establish agricultural schools for the purpose of diminishing the cost of producing the breadstuffs, provisions, cotton, tobacco, rice, grass and lint-seeds, which they export to foreign nations. But, somehow, the denizens of cities fail to see that they have a deep pecuniary interest in the productiveness of rural industry. They never consider the important truth that, when the natural fertility of land is impaired, the loss injures commerce, injures manufactures, injures professional occupations, and injures all educational institutions, quite as much as the farmer. It is a sad mistake to suppose that agriculturists are alone concerned in the practical results of tillage and husbandry. They have no more than a common and equal interest in maintaining or increasing the natural fruitfulness of the earth. Hence, all classes should unite to increase the professional knowledge of American farmers. All the sciences which illustrate the principles of agriculture should be placed within the reach of every youth who is to direct the cultivation of an acre of ground. Sciences are best taught and easiest learned in schools having all the appliances to develop and explain their elements and combinations. If an increase of knowledge would save only 5 cents in the cost of growing a bushel of corn, on an average throughout the Union, the aggregate annual gain would exceed twenty millions of dollars. We have given the names of intelligent practical farmers who vary in their estimates of the expense of producing this great American staple from 6 up to 60 cents a bushel. What is most needed, particularly in all the Atlantic States, is those elements of this crop which are least abundant in common soils. The raw material for making corn, and the professional knowledge how to obtain it in the cheapest manner, are the weak points in this branch of agriculture. The manufacture of manure in cities and villages, from animal and vegetable substances, and the importation of guano, are remedies for the evil which are beginning to attract considerable attention. Marling, liming, turning in green crops, and subsoil ploughing, aided by draining and greater care in saving and using manure, are efforts in the right direction, and rarely unsuccessful.

THE STUDY OF SOILS.

BY DANIEL LEE, M. D.

A General View of the Subject.

If four-fifths of the persons employed in agriculture, in the United States, work 250 days in a year, their aggregate labor exceeds one thousand millions of days in twelve months. The compensation realized for this immense amount of industry depends in a large degree on the fruitfulness of the soil under cultivation. Hence, the study of the sources of fertility, and of the causes of barrenness in improved land, has a direct bearing on the every-day employment of more than two-thirds of the labor and capital of the republic. It is almost impossible to over-estimate the importance of understanding all the elements and circumstances which affect the natural productiveness of the earth. To show what American soil and climate have done, and are capable of doing, we give below a statement of the premium crops of corn grown in Kentucky, in the year 1850. There were nine competitors; and the surface in cultivation, ten acres by each competitor. Their names, and the product of each per acre were as follow:—

J. Matson, 37 barrels, 4 bushels, and 1 quart.
Peter Pean, 37 barrels and 4 bushels.
S. H. Chew, 27½ barrels.
J. Hutchcraft, 23 barrels.
A. Vanmeter, 21 barrels and 3½ bushels.
H. Hedges, 21 barrels and 2 bushels.
E. W. Hockaday, 20 barrels.
Dr. B. W. Dudley, 20 barrels.
H. Varnon, 19 barrels and 3 bushels.

Mr. James Matson took the first premium; and his crop was certified to by Mr. Peter Pean, who was his close competitor—Mr. P.'s crop being only *one quart less.* The reader, not familiar with the barrel measurement of corn, is informed that a "barrel" is five bushels of shelled corn; so that Mr. Matson produced 189 bushels and 1 quart per acre, or, 1890 bushels and 10 quarts on 10 acres.

The 90 acres cultivated for premiums, yielded 10,960 bushels and 10 quarts; being an average of 121 bushels and 24 quarts per acre. Make all reasonable allowance for shrinkage in drying, and throw in something for the natural tendency of man to strain a point in a keen competition, and still the productiveness of the soil is most extraordinary.

CHAPTER I.

ORIGIN OF SOILS.

All *soils* are formed by the intimate mixture of the *debris* of rocks, in the condition of sand, gravel, or clay, with remains of plants and animals in the shape of *mould.* Earth that contains no mould, or combustible matter, is not a *soil;* nor will vegetable or animal substances *alone* form one. The proportions of sand, clay, and mould in a soil, vary indefinitely. Not only is this true; but the nature, composition, and value of different kinds of sand, clay, and mould vary in an equal degree. A very slight change in a soil is often adequate to double the reward of every day's labor expended in growing crops thereon. Hence the necessity of studying closely all defects in the surface which a farmer has to operate upon, whether his land be in tillage, pasture, or meadow. As the division of soils into *mould, sand,* and *clay,* is the most natural, we will discuss the subject under these three heads.

Vegetable and Animal Mould.

If the forest-leaves that annually fall to the ground did not rot, and become ultimately dissolved and return to their original elements, they would soon accumulate to the depth of many feet. The progress of decay in all vegetables and animals and their products, is governed by fixed natural laws; and these organized bodies decompose in that way which will best promote the growth of new generations of living beings. *Mould* is the half-way house between the living and the dead in the organic and inorganic worlds. It covers the surface of islands and continents like a carpet, and is a treasure of inestimable value when properly used by the husbandman. The fertilizing power of mould depends partly on its peculiar mechanical and porous structure, and partly on its chemical composition. All porous substances, like charcoal, platinum sponge, and well pulverized clay or loam, have the property of condensing *gases* and retaining *odors.* This is shown in the practice of burying dead animals in mould, charcoal, or earth, to prevent the escape of offensive odors and gases to poison the atmosphere. This property in mould is purely mechanical; but it is none the less useful in the economy of nature on that account. When intimately mingled with compact earths, by the use of the plough, harrow, and cultivator, mould increases their friability, and promotes the chemical action of atmospheric air and the development of all the latent elements of fertility in the soil.

The dark color of mould favors the absorption of solar heat, and thus warms the ground, while it is peculiarly calculated to imbibe dews and a large quantity of rain-water. That both heat and moisture are indispensable to the growth of vegetables, is known to every one; and to secure these, mould plays a conspicuous part. It is, however, as the food of cultivated crops, that the farmer should study the remains of former plants and animals with the greatest care. That the several atoms contained in one corn or wheat plant are well adapted to form another plant of the same kind after the first is decomposed, is a truth too obvious to be seriously questioned. But why is it that the remains of a turnip or potato form mould or manure adapted to the natural wants of all other crops?

This is the reason: all crops, including, of course, turnips and potatoes, consist mainly of three elementary bodies, called *carbon, oxygen,* and *hydrogen.* Thus, if we carefully burn, with the air mostly excluded, wood, starch, sugar, oil, gluten, fat or lean meat, *coal* may be produced. The essential element in this coal is *carbon;* and it is the prominent element in all mould. Carbon, whether derived from the decaying carcass of a dead horse, from rotting wood, or a diamond, is ever the same. It forms not far from half of the dry solids of all plants, and some 40 per cent. of all animal tissues. It is carbon that imparts the dark color to swamp-muck, mould, vegetable and animal coal. The supply of carbon in nature is abundant for all useful purposes. In every 100 pounds of lime-rock and marble, there are about 12 pounds of pure carbon; and, admitting these rocks to exist in the crust of the planet to the extent stated by geologists of high repute, the carbon locked up in the form of carbonate of lime would suffice to cover the whole globe with a stratum of pure coal to the depth of 400 feet. In mineral coal, the amount of combustible carbon is large; but the quantity of coal in the earth is altogether unknown. Ten thousand parts of atmospheric air contain four parts of carbonic acid, and over one of pure carbon.

The farmer's stock of available carbon in mould is rapidly consumed by tillage, just as a manure heap becomes smaller by constantly turning it over. When green crops of a luxuriant growth are suffered to rot on the ground, or are ploughed in, his stock of carbon and mould is renewed to a certain extent.

Oxygen is the next most abundant element in mould, forming ordinarily some 40 per cent. of the combustible matter in all soils. In the solid part of all plants and animals, it exists in a little larger proportion. When organic substances decay, they give off the elements of water (oxygen and hydrogen) faster than carbon is converted into carbonic acid gas. Oxygen is so abundant in nature that it forms more than half of the earthy minerals in the crust of the globe; and it constitutes eight parts in nine of all water and vapor, and 21 per cent. of the atmosphere. When wood or coal is burnt, under ordinary circumstances, 16 parts of oxygen in the air combine chemically with 6 of carbon in the fuel, and the two elements form 22 parts of a heavy invisible gas, called *carbonic acid.* From the same elementary bodies the same gas is produced in all fermentation, and during the decay of organic substances and the breathing of all animals. Oxygen is often called vital air, because it supports animal life; and it is equally indispensable to the life of plants. It derives its name from two Greek words, which signify to generate sourness or acidity. Oxygen is truly an "acid generator," but not the only one known.

Next to carbon and oxygen, an element called *hydrogen,* or "water generator," is the most abundant ingredient in mould. It is, when pure, the lightest gas known, being sixteen times lighter than oxygen, and about fourteen times lighter than common air. Under favorable circumstances it unites with oxygen in the proportion of 1 to 8, and forms water. In wood, starch, gum, oil, and sugar, and in the fat of animals, hydrogen exists in the proportion, or nearly so, to form water, i. e. one part by weight of hydrogen to eight of oxygen; and it retains about the same relation in mould, as will be shown by several analyses. Mould contains another element, called *nitrogen,* which forms 79 per cent. of the air we breathe. When animals and plants are undergoing decomposition, hydrogen, in what is termed its *nascent* state, combines with nitrogen in the proportion of 3 parts of the former to 14 of the latter, and the two form a pungent alkaline gas called *ammonia.* This substance also exists in mould. In addition to what are denominated "the organic elements" of plants and animals, mould usually contains an appreciable quantity of soluble flint, (silica,) sulphur, phosphoric acid, iron, lime, potash, soda, magnesia, and chlorine. These minerals will be more appropriately described when treating of sand and clay.

Dr. Anderson, of Edinburgh, chemist to the Highland and Agricultural Society, has recently made several critical analyses of different wheat soils in Scotland, which are published at length in the July number (1850) of the journal of that society. These soils were generally distinguished for their productiveness. The first ten inches from the surface was regarded as "surface soil;" the next ten inches as "subsoil." 100 parts of the surface soil from Midlothian gave 6.789 of combustible dry matter or mould. It had the following composition:—

Carbon	4.500
Hydrogen	0.215
Oxygen	1.806
Ammonia	0.268
	6.789

Although two parts of ammonia in a thousand appear very small, yet when we recollect that an acre of soil ten inches deep weighs a thousand tons, it will be seen that there are over two tons of ammonia in the soil of an acre of rich wheat land, as is shown by analysis. A large crop of wheat takes less than 60 pounds of this volatile alkali from the earth in which it grows. Not an element required by nature in forming wheat, both stems and seeds, was lacking in these soils. In the one above alluded to, an acre contained 45 tons of carbon within ten inches of the surface. This fact indicates the vast amount of vegetation that must have decayed to produce so much carbon. Nor should the fact be overlooked that the plants which formed all this organized carbon were rich in nitrogen. It is doubtless true that a part of the two tons of ammonia was formed by the union of nitrogen in the atmosphere with nascent hydrogen; yet plants, rich in organized nitrogen, like cabbages, turnips, clover, and lucerne, yield richer mould than such as are known to contain very little of this element. Thus, 1000 pounds of wheat will yield 24 of nitrogen; while the same weight of wheat-straw yields but 3 pounds. No sensible farmer would prefer the manure or mould formed by 1000 pounds of straw to that produced by 1000 pounds of wheat or corn. Mould, like manure, is very unequal in value. Decaying wood, the stems of flax, and buckwheat straw, yield mould poor in nitrogen; clover, peas, and beans form mould rich in this important constituent of animal food. Before a soil can produce good crops of wheat, it must contain, in an available condition, every substance consumed in forming the stems and seeds of this bread-bearing plant. The poorest soil, so far as its organic elements were concerned, analyzed by Dr. Anderson, gave the following results:—

Carbon	0.714
Hydrogen	0.033
Oxygen	0.286
Ammonia	0.089
	1.122

Although the organic matter present is small, being a trifle over 1 per cent., yet the ammonia indicates the growth of fertilizing plants, or the

application of good manure, to form the mould that really exists. If the fertility of land depended mainly on the large amount of the remains of vegetation in the soil, then a black mucky earth should be the best for growing wheat, instead of the poorest. Light, sandy soils, almost destitute of mould, have produced fine crops of wheat and corn by the aid of a little guano. This fact demonstrates the possibility of drawing largely upon the atmosphere for carbon, oxygen, and hydrogen, if not for ammonia, in feeding cereal plants. When gypsum or wood-ashes produce a fair crop of clover, on comparatively thin land, it is safe to infer that not only carbon and the elements of water are drawn from the air, but ammonia, or nitrogen, in some other form, also. Nothing of a combustible nature is applied to the soil, while it yields several tons of organized matter, including all in the roots, stems, and leaves of the two or three crops which the ashes or gypsum will produce. Calling the aggregate yield five tons, and the nitrogen consumed will be 240 pounds, while not an ounce has been applied in fertilizers. Leguminous plants appear to possess a similar power to extract nitrogen in some way from the atmosphere, as well as carbon, and the elements of water. Unless one has a large supply of cheap manure at hand, it is doubtless sound policy to grow green crops, with a view to form a rich mould for the production of grain, cotton, hemp, tobacco, or sugar-cane. The farmer should have a full knowledge of the increase or diminution of organic matter in each field every year. If it is cultivated in a hoed crop, and that removed, he may safely assume that the aggregate of mould has been diminished through the agency of tillage. Where a crop of small grain has been grown, and the ground seeded, either by art or nature, to a degree which gives a good return in grass, clover, or weeds, and this vegetation be allowed to rot on the field, the loss of organic matter effected by tillage and cropping may be fully compensated. When forest-leaves, weeds, insects, and cultivated plants rot on the ground, or in the soil, it may interest some readers to be told what substances are formed in the operation. To have a clear idea of the products of vegetable and animal decay, or putrefaction, one must not forget the fact that all vegetables and all animals are formed of only *four* simple elementary bodies, of which pure water constitutes two, viz. oxygen and hydrogen. It is true that both plants and animals have other ingredients in their tissues and structure, such as sulphur, phosphorus, iron, lime, chlorine, potash, &c.; but these are not endowed with the same indefinite and, apparently, infinite power of combination which characterize carbon, nitrogen, and the elements of water. Had the possible combinations of these constituents of all living things in the vegetable and animal kingdoms been as limited as those witnessed in metals, the present Flora and Fauna of the world never could have existed. There are some 200,000 (more or less) different races of insects and larger animals, and nearly 100,000 different plants, formed essentially of water, atmospheric air, and carbon. It is on this account that when one plant or animal dies and rots, its atoms will feed and nourish any growing plant, and that in turn will feed and nourish growing animals. Infinite wisdom is not less displayed in the economy with which matter is repeatedly endowed with life in the systems of plants and animals, than in the infinite variety developed from different combinations of only four elementary bodies. There is probably not an atom on the surface of the planet, which is capable of organization, that has not been many times endowed with vitality. Every time we breathe, our bodies lose a part of their solids.

Humic substances are divided by Mulder into such as are soluble in alkalies, and may be precipitated by acids, and such as are insoluble in alkaline solutions. The former he divides into three classes, according to their composition: 1st, such as consist of carbon, and the elements of water in the proportion that these elements exist in water. 2d, carbon and the elements of water, in which there is more hydrogen than the oxygen requires to form water. 3d, those in which there is an excess of oxygen. In all these compounds of carbon and the elements of water, the combining number of atoms of carbon is 40. Thus, *ulmic acid* (first obtained from elm, *ulmus*) consists of 40 atoms of carbon, 14 of hydrogen, and 12 oxygen. *Ulmin* has the same composition, with 2 atoms more of water. In the above compounds, there is an excess of hydrogen, taking water as the standard. *Humic acid* has 40 carbon, 12 hydrogen, and 12 oxygen. This is simply carbon combined chemically with 12 atoms of water. *Humin* differs from humic acid in having 15 atoms of water in place of 12. *Geic acid* has the same composition, with an excess of atoms of oxygen. *Formic acid*, (first obtained from ants,) differs widely from the above in having 2 atoms of carbon combined with 1 of hydrogen and 2 of oxygen. *Crenic* and *apocrenic acids*, which exist in all good soils, contain nitrogen in addition to carbon and the elements of water. These acids were first found by Berzelius, in spring-water, and took their name from *krene*, the Greek for spring. The following is the composition of these acids:

Apocrenic acid...........................	C 38	H 12	O 24	N 5
Crenic acid	C 24	H 12	O 16	N 4

C stands for carbon, H for hydrogen, O for oxygen, and N for nitrogen. Chemists disagree as to the atomic composition of these acids. Sir Robert Kane, at page 640, gives the following description of them:—"Crenic acid is a pale-yellow, gummy mass, of an astringent taste, very soluble in alcohol and water. Its formula is NC 14, H 16, O 12. By exposure to air it changes into apocrenic acid, which is brown, of an astringent taste, reddens litmus, and is much less soluble in alcohol and water than crenic acid; its formula is N 6, C 28, H 14, O 7." Mulder seems to regard whatever of nitrogen there is combined with these acids as a base or ammonia.*

The natural process, called "nitrification in soils," is more important, in a practical point of view, than many suppose. In this operation, atmospheric air, which costs nothing, and water, which is equally cheap, play conspicuous parts. The hydrogen in the water, and the nitrogen in the air, form *ammonia*, an article worth some 10 cents a pound for making wheat. Nitre, or saltpetre, consists of potash and nitric acid. The last named substance is composed of nitrogen and oxygen, united in the proportion of 14 parts of nitrogen with 40 of oxygen. How the alkalies, potash and soda, and alkaline earths, lime and magnesia, promote the formation of nitric acid or nitrification in porous soils, will be explained hereafter. At present we desire to give the agricultural reader a correct impression of the nature and properties of the organic or combustible elements of his

* The substances above briefly described all result from the slow decomposition of plants and animals on the surface of the earth and in the soil.

crops. In his Chemistry of Vegetable and Animal Physiology, at page 170, Mulder remarks:

"It deserves particular notice that hydrogen is *always liberated* whenever those substances which are the most generally diffused in the vegetable kingdom are changed into constituents of the soil—that is, when *cellulose*, starch, gum, sugar, &c. are in a state of decay. First, these substances are converted into ulmic acid, and that again becomes humic acid; from this, geic acid is formed, which again produces apocrenic acid; and from that, finally, crenic acid is derived. This whole series of transformations must be passed through before the organic substance is converted into carbonic acid and water. The whole process consists in an oxidation, (combining with more oxygen,) and so may be called a slow combustion. It is evident, from the composition of the five substances mentioned, that, during the formation of humus, a new quantity of oxygen is continually fixed."

The products of this slow combustion are partly soluble, and in a condition to enter the roots of growing plants to nourish them, and partly insoluble. If all mould was soluble in water, it would disappear in a heavy rain as readily as a mass of snow melts in a warm day. On the other hand, if the residuum of vegetables was quite insoluble, it could never enter the minute pores in the roots of plants, and would be worthless as food for all succeeding generations. Providence has made the solubility of the remains of all living beings *just right*.

Change but slightly the general law which governs their dissolution, and the extinction of all plants and animals would soon follow. Increase or diminish in any sensible degree the vital air which surrounds the planet, and all vitality must shortly cease to be. Change the relative proportions of oxygen and hydrogen in water from what they now are, and it would no longer be *water*, and all plants and animals must perish. Improvements in husbandry can only be effected by the more careful and diligent study of the laws of nature, and ever complying with all their requirements. Some plants and forest-trees are much better adapted by nature to live on a thin, sterile soil than others, and will, in skilful hands, augment the organic matter in the earth where they grow. In forest culture, a barren soil is often planted with small pines, which in the course of time create a covering of black mould. This mould is drawn from the atmosphere by the decomposition of carbonic acid and water. The economical production of a rich mould where little exists, is a point to be investigated with great care. To effect this purpose, one needs to understand the *mineral* or *incombustible* elements of plants, and the various conditions in which they exist in the soil. Although these elements may be found in the residuum of decaying vegetables and animals, yet they most abound in *sand* and *clay*.

CHAPTER II.

SAND IN SOILS.

Any earthy mineral in a granulated form in the soil is called *sand*. Grains of sand can be produced by the breaking up of almost all kinds of rocks, by frost, and other mechanical forces, and grinding and rolling their fragments over one another in moving water. In studying sand and clay, it is important to bear in mind the fact that all islands and continents have long been the beds of seas or oceans, and subject to the mechanical action of vast bodies of moving water for indefinite geological eras, or ages. The thickness of sedimentary rocks, which contain fossil plants and animals, is between six and seven miles. In Pennsylvania, fossiliferous rocks beneath the highest coal measures are 40,000 feet, or more than seven and a half miles in thickness. (See Professor Rogers's Report on the Geology of Pennsylvania for 1838, page 82.)

In the peninsula of Tauris, Pallas describes a continued series of primary strata inclined 45° over a distance of 86 miles, which would give a perpendicular thickness of more than 68 miles. (Lyell's Principles of Geology, volume 2, page 443.)

In New England, primary rocks have been measured to the depth of 20 miles. (Hitchcock's Geology, page 70.)

The same volcanic forces, deep in the bosom of the earth, which now elevate volcanic mountains, have, in the course of time, forced up from the depths of the sea all stratified and primary or igneous rocks. Volcanic heat, and the immense mass of water that surrounds the globe—a quantity sufficient to cover every part of it a mile and a half in depth—have been the prominent physical agents of Providence, acting in unison with other causes, to bring our planet into its present condition. As all sand and gravel are derived from the abrasion of rocks, the readiest way to learn the nature of the sand in one's soil is to trace it back to the parent rocks from which it came, and study their composition. All rocks have been formed either of melted minerals, cooled under greater or less pressure, or of sediment deposited in water. The former are denominated *igneous* rocks, from *ignis*, "fire;" and the latter *sedimentary* rocks. The latter are frequently called *aqueous*, from *aqua*, "water," and *fossiliferous*, or "fossil-bearing," because they contain an incalculable number of fossil animals and plants, and were deposited in water. Dr. Buckland estimates the thickness of fossil-bearing rocks over the continent of Europe at ten miles. (Bridgewater Treatise, volume 1, page 37.)

Nearly all sand in soils is derived from water-formed sandstone, or fire-formed granite and other rocks of an igneous origin. The purest and sharpest sand is called *silica*, from the Latin *silex*, "flint." Silica is a simple mineral, which has acid properties, and is formed by the chemical union of two atoms of oxygen with one of a simple elementary base called *silicon*, or *silicium*.* Silica is often denominated *silicic acid*, because it combines readily with potash, soda, lime, alumina, iron, and magnesia, to form permanent chemical compounds, called *silicates* of potash, soda, &c. In 100 parts of pure flint sand, there are 52 of oxygen and 48 of silicon. As some three-quarters—perhaps 80 per cent.—of all rocks, taken in the aggregate, are silica, the reader will see that the crust of the earth is more than half oxygen, or vital air. This fact will more clearly appear when we come to study the composition of clay. Every farmer knows that pure sand is remarkably insoluble in water; yet about 67 per cent. of the ash of the stems of wheat, rye, oats, barley, maize, and sugar-cane is pure flint, or silica. While a little sand is found in soils in the form of pure silica—derived, perhaps, from crystallized quartz or flint—its mass consists of silicates of alumina, lime, iron, potash, soda, magnesia, and

* Fresenius's Quantitive Analysis.

manganese, and usually in a condition to resist the solvent power of strong acids.

A knowledge of the character of the rocks which formed the sand will enable the agriculturist to judge of its probable composition. If the soil has been washed down from highlands, either mountains or hills, by a river or smaller streams, it is called *alluvium*, or *alluvion;* and the owner must study the nature of the rocks upon which the rains and snows fell that washed the sediment down to his farm. If this soil can be traced to no such source, and lies on an elevated plain, a hill, or mountain, it is probably *diluvion* in its origin, and must be traced either to the action of glaciers, as maintained by Professor Agassiz; to ancient tidal currents and icebergs, as contended for by Sir Charles Lyell; or to the upheaval of the earth at some point far north of the United States, which caused a sudden rush of waters southward, bearing with it granite boulders and a vast mass of loose earth, as is believed by Professor Emmons. It is foreign to our purpose to discuss, in this connection, the various theories advanced by geologists of the highest distinction to account for what is known as the "*drift formation*." That the loose earthy matter, which in many places has a thickness of several hundred feet, came from the north, both on this continent and that of Europe, is conceded by all. Thus the deep basin of Lake Ontario is mostly scooped out of a soft sand rock called Medina sandstone. Boulders of this rock, which is peculiar and well known, are found ten, twenty, and even thirty miles south of its bed, scattered over the earth in great profusion, and upon lime and slate rocks hundreds of feet in thickness. So much of the Medina sandstone, ground into fine sand, is spread over large areas of lime-rock, from one to ten feet deep, that the soil is as destitute of lime as it would be if the lime-rock were fifty miles distant. There is, however, a marked difference in the sandy soils north and west of the Alleghany mountains, and those lying on the Atlantic slope, from Maine to Alabama. The sand of the latter is derived mostly from rocks of an igneous origin, the former from rocks of an aqueous origin. The poorest sands can be found in the Atlantic States, where granite abounds; the richest in Western New York and Pennsylvania, and in the Western States, where the rocks are all fossiliferous, or abound in the remains of plants and animals. The extent or quantity of these remains in solid rocks and drift deposites, from which the surface of the earth is mainly formed, often imparts to it high and enduring fertility. There are districts in the Southern Atlantic and Gulf States where this fact is strikingly exemplified. When the earthy elements of crops happen to abound in a dry sandy soil, it is remarkable for productiveness; but the misfortune is, that such soils are usually too porous, open, and inclined to leach and part with their elements of fertility. Hence the importance of *clay* and *lime* to mix with sand in forming an arable soil. Vegetable mould alone will not answer a good purpose.

All sandstone rocks were once in the condition of fine loose sand. This was consolidated, partly by the pressure of a mountain weight to which beds or strata of sand are subjected in the depths of the ocean, and partly by the infiltration of soluble minerals, as iron, lime, or manganese, which are precipitated or crystallized among its particles. All sedimentary rocks were derived from those of an igneous origin, which atmospheric air, frost, electricity, water, solar light, and vegetation have disintegrated and converted into sand, or clay, or dissolved minerals. When we consider the fact that portions of the earth's crust subside as far below the common level of its surface as any part is elevated above in mountains, the opinion expressed by Lyell, that fossiliferous strata often sink deep enough to be melted and finally crystallized into granite again, seems not improbable. If this view be correct, then we may say that granite and all plutonic and volcanic rocks are formed by the subsidence, melting, and cooling of sedimentary strata. There are now some 300 volcanoes on the globe which are known; and so numerous are extinct ones, or their effects, that geologists find no reason to believe that the planet has ever been exempt from their powerful action. For the crust of the earth to be always rising up, and nowhere subsiding, must obviously create immense vacancies below its surface. No such spaces are believed to exist; and the evidence of the sinking of the surface, over extensive districts, below the level of the sea, is abundant and conclusive. (See Lyell's Elements of Geology, volume 1, page 430, and before.)

Rocks, the elements of which were melted by internal heat, are divided by this author into three classes, viz. *plutonic*, of which granite and sienite are types; *metamorphic*, of which marble and some slates and sandstones are representatives; and *volcanic*, which are subdivided into *ancient* and *modern*, and appear in a variety of forms. *Basalt* and *trap* belong to the ancient family; while the recent or modern volcanic rocks are found in the vicinity of all active volcanoes. When decomposed, all rocks yield either sand, clay, or both, besides other minerals. Plutonic rocks are *unstratified*, and often denominated "primary," because they were once thought to be in all cases older than sedimentary and stratified rocks. More careful and extended researches have shown that granite has been forced up, and, as it were, injected into masses of fossiliferous strata, in a way to prove that the latter are the older of the two. Indeed, metamorphic rocks are nothing but stratified, aqueous deposites, *metamorphosed*, (changed by heat,) from the action of plutonic or melted matter into a crystalline form. Thus common lime-rock, it is believed, may be transformed into marble, if it be placed in contact with a mass of intensely-heated granite, and both cooled under great pressure. In this operation, all traces of the remains of shell-fish and other animals in the limestone will be effaced. Few studies are so interesting as the phenomena exhibited by different rocks, whether we trace their origin and present condition to the action of fire, or water, or to the joint agency of both. The elevation of granite and other mountains is as slow an operation as their wearing down through the corroding influence of oxygen, carbonic acid, the growth of mosses, the expansion of freezing water, and the washings of rain and melted snow. In large districts of Auvergne, in France, the decay of granite is so rapid that Dolomieu called it the "*la maladie du granite*." The disintegration is produced by the escape of carbonic acid gas from numerous fissures in the rocks, which attacks the silicates of potash, soda, lime, and magnesia in granite and sienite, and liberates the silica or silicic acid. In this operation the silicate of alumina is not decomposed, but remains as pure pipe or porcelain clay, called *kaolin*. All organic substances which yield carbonic acid promote the elimination of potash and soda from their before insoluble combinations with silica; but the time comes when all the alkalies that can be separated by decaying vegetation or manure are consumed in the growth of cultivated plants, or washed out of the soil by tillage. The first decompounding of granite is

to separate it into three minerals, called *feldspar*, *mica*, and *silica*. Sienite differs from granite in having the mineral called *hornblende*, in place of mica, in its composition. The three minerals—feldspar, mica, and hornblende—are very complex substances, which yield not only alumina, (the base of all clays,) but iron, manganese, lime, potash, soda, magnesia, phosphorus, sulphur, chlorine, and fluoric acid, and doubtless other elementary bodies like copper, gold, and other metals. The elementary substances found in plutonic rocks are very variable. Their analyses ought to be repeated by some skilful chemist, with all the improved processes for detecting minute quantities of chlorides, sulphates, phosphates, and other salts, which in the old way were not noticed, or vaguely estimated. Mineralogists describe two kinds of feldspar: 1st, *potash feldspar*; 2d, *soda feldspar*, which is also called *albite*, from its whiteness.

	Potash feldspar.	Albite.
Silica	65.21	69.09
Alumina	18.13	19.22
Potash	16.66	
Soda	—	11.69
	100.00	100.00

Feldspar and albite are readily distinguished from quartz by the circumstance that they do not scratch glass, and generally may be marked by the point of a knife. In sienite, feldspar is the predominating mineral. *Porphyry* is a hard rock, having numerous crystals of feldspar, which give it a beautiful appearance when worked. Feldspar being an abundant mineral, and the source of much of the clay in soils, we give the formula of several varieties, as calculated by Berzelius:—

Feldspar............ $KO\ SiO^3 + Al^2\ O^2.3(SiO^3)$.
Albite............... $NaO\ SiO^3 + Al^2\ O^3.3(SiO^3)$.
Porcelain spar..... $NaO\ SiO^3 + Al^2\ O^3SiO^3 + 3CaO\ 2(SiO^3)$.
$+2(Al^2O^3SiO^3)$.

KO stand for potash; the words mean that the substance referred to consists of an atom of potassium (*kalium*) chemically combined with one of oxygen. Hence, the letters *k o* mean simple potash. SiO^3 mean silicic acid, or a substance formed by the chemical union of an atom of silicium or silicon with three atoms of oxygen. Fresenius makes silicic acid to consist of silicon and 2 of oxygen, instead of 3. Al^2O^3 stand for *alumina*, and mean that two atoms of *aluminum* unite with three of oxygen to form that substance. NaO stand for soda, and mean that an atom of pure soda is a compound of sodium (*natrium*) and oxygen. CaO stand for lime, and indicate the fact that an atom of lime is formed by the union of one of calcium (its metallic base) with an atom of oxygen. Divested of technicalities, potash feldspar is simply a silicate of alumina and potash, just as *alum* is a sulphate of the same bases. Soda feldspar (*albite*) is a silicate of alumina and soda; and porcelain spar is the same mineral united with lime and two additional atoms of silicate of alumina.

Mica is often called "isinglass," and is distinguished by its bright, shining appearance, and the ease with which it may be split into exceedingly thin scales. It is found of different colors, from coal-black to perfect whiteness. Mineralogists divide it into potash-mica, magnesia-mica, and lithia-mica. Rose has analyzed the first, Klaproth the second, and Gmelin the third, with the following results:—

	Potash M.	Magnesia M.	Lithia M.
Silica	47.50	42.50	49.060
Alumina	37.20	11.50	33.611
Oxide of iron	3.20	22.00	
Oxide of manganese	0.90	2.00	1.420
Potash	9.60	10.00	4.186
Magnesia	—	9.00	0.408
Oxide of lithium	—	—	3.594
Hydrofluoric acid	0.56	—	3.445
Water	2.63	1.00	4.184

The chemical composition of mica in any of its forms is not uniform. The above will give a fair idea of the general constitution of this mineral. It contains more alumina than feldspar, and forms very tenacious clay soils. Mica, however, is less abundant in granite than feldspar, and yields magnesia, which feldspar does not.

Hornblende is a dark-colored, weighty mineral, which is tough and not easily wrought under the chisel. It is sometimes found in regular crystals of various colors, and may be distinguished from mica by refusing to split when heated in the blaze of a candle, and from quartz and feldspar by its darker color. It abounds both in *basalt* and *sienite*. The following are the results of two analyses:

	Basaltic hornblende.	Sienitic hornblende.
Silica	42.24	45.69
Alumina	13.92	12.18
Lime	12.24	13.83
Magnesia	13.74	18.79
Protoxide of iron	14.59	7.32
Oxide of manganese	0.33	0.22
Fluoric acid	—	1.50
	97.06	99.53

We have only to assume the decomposition of a large amount of hornblende to account for the existence of the vast quantities of *lime*, *iron*, and *magnesia* known to all who have paid any attention to the minerals in the earth's crust. Before we proceed to study these and the other earthy elements of cultivated plants, it is proper to consider some of the peculiarities of *clay*.

CHAPTER III.

CLAY IN SOILS.

It has already been stated that the simple mineral called *alumina* is the base of all clay. In 100 parts of alumina there are 53.3 *aluminum*, (a simple metal,) chemically combined with 46.7 oxygen. Alumina contains, according to Sir Robert Kane, 5.3 per cent. less oxygen than silica. The effect of this seems to be that, while silica has *acid* properties, alumina has an *alkaline* reaction. Hence, these two most abundant minerals in nature have an affinity for each other, and, when united, form the purest porcelain clay, known in chemical language by the name of *silicate of alumina*. Pure clay (kaolin) is composed exclusively of silica and alumina, and usually in the following proportions.

	(1.)	(2.)	(3.)
Silica	54.5	57.4	53.4
Alumina	45.5	42.6	46.6
	100.0	100.0	100.0

Clay usually contains from 13 to 20 per cent. of water. The above figures indicate the composition of three samples of pure clay, after all the water was expelled. Ordinary clay in soils contains far more silica and less alumina. It is rare in the clay soils of this country that one finds so much as 10 per cent. of alumina. This mineral is easily obtained from alum and from aluminous earths. It is as white as lime or white earthenware, and has a remarkable affinity for water and organic substances. It combines readily with phosphoric, sulphuric, and other acids, and retains all alkaline minerals in solution with extreme tenacity. Not only all soils, but all sedimentary and igneous rocks, yield alumina on analysis. Even crystals of flint have been found to contain alumina, lime, iron, and potash, by Berzelius. *Greenstone*, a rock of ancient volcanic origin, has the following composition, according to Bendant:—

Silica	63.3
Alumina	14.2
Oxide of iron	5.8

It is rare, if ever, that one meets with either sand or lime rock which yields no alumina on analysis, while all slates and shales abound in this mineral. Few rocks form so productive a soil as *basalt*, which is of volcanic origin, and has the following composition, (by Gmelin):—

	Part soluble in acids.	Part insoluble in acids.
Silica	35.741	48.500
Alumina	11.121	6.792
Oxide of manganese	1.487	—
Oxide of iron	—	9.383
Protoxide of iron	16.015	—
Strontian	0.112	—
Lime	11.914	17.395
Magnesia	10.434	13.131
Soda	3.264	—
Potash	1.204	—
Water	6.530	—

The above figures show the interesting fact that basalt contains a large amount of silica, alumina, iron, lime, and magnesia, in a condition insoluble in acids. Not only these minerals, but potash and soda exist in soils in a similar condition, as will be shown when we come to study the latent resources of poor soils. It is generally known that alluvial clay lands are both durable and productive. *Why* they are so is a matter not so well understood. It arises from the fact that they possess all the elements of crops in an available condition, and so intimately blended with clay (which is not the food of plants) as to endure without exhaustion for an indefinite number of years. These elements are silica, lime, potash, soda, magnesia, chlorine, sulphur, phosphorus, iron, carbon, oxygen, hydrogen, and nitrogen. Other minerals are occasionally found in cultivated plants; but they are not regarded as indispensable constituents in their composition. It is known that neither of the four organic elements called carbon, oxygen, hydrogen, and nitrogen, can be dispensed with in the growth of any plant; nor can any of the others, except, perhaps, soda, in a few vegetables grown on the farm. Mulder gives very minute analyses of three specimens of clay taken from the Zuyder Zee, which were performed by E. H. Von Baumhauer, with the following results:—

	First.	Second.	Third.
Insoluble sand, with alumina	57.646	51.706	55.372
Soluble silica	2.340	2.496	2.286
Alumina (soluble)	1.830	2.900	2.888
Peroxide of iron	9.039	10.305	11.864
Protoxide of iron	0.350	0.563	0.200
Lime	4.092	5.096	2.480
Magnesia	0.130	0.140	0.128
Potash	1.026	1.430	1.521
Soda	1.972	2.069	1.937
Ammonia	0.060	0.078	0.075
Phosphoric acid	0.466	0.324	0.478
Sulphuric acid	0.896	1.104	0.576
Carbonic acid	6.085	6.940	4.775
Chlorine	1.240	1.302	1.418
Humic acid	2.798	3.991	3.428
Crenic acid	0.771	0.731	0.037
Apocrenic acid	0.107	0.160	0.152
Humin, vegetable remains, and water, chemically combined	8.324	7.700	9.348
Wax and resin	trace	trace	trace.
Loss	0.542	0.611	0.753
	100.000	100.000	100.000

Few river flats, or alluvial bottoms, show soils so rich in the raw material for making bread and meat as the above. It is unusual to find arable soils in which 45 per cent. are soluble in boiling acids, including the organic matter and water of absorption. It would have been instructive to be informed what elements, and how much of each, were soluble in rain-water, or in distilled water; but no information of this kind is given. The quantity of soluble alumina is small. The first specimen gives less than 2 per cent., and the second and third less than 3 per cent. It is generally characteristic of strong fertile soils to abound in the peroxide or red rust of iron. The river bottoms of the Zuyder Zee, so famous for their durability and fruitfulness, contain an average of more than 10 per cent. of this mineral. Of lime, the percentage is unusually large. An acre of common earth an inch in depth weighs about 100 tons; so that, estimating a soil to the depth of only 10 inches, we have 1000 tons of earthy matter to operate upon in tillage and husbandry. The average of lime in the samples given is near 4 per cent. At this rate a ton of soil will contain 80 pounds, and, of course, 1000 tons 80,000 pounds, or 40 tons. Allow 200 pounds of this mineral to be washed out of an acre in a year by leaching rains, and removed in crops, and the quantity above named would last 400 years. A soil, however, will cease to produce grain long before the last particle of lime is taken out of it. The supply of magnesia, though much less abundant, is sufficient for all useful purposes. Most crops consume more magnesia than lime, as will be hereafter demonstrated by trustworthy analyses.

The soils under consideration are remarkably rich both in potash and soda, and it is doubtless owing to this circumstance that so large an amount of silica is set down as "soluble." Estimating the potash at one per cent. only, and there are 10 tons of this alkali within 10 inches of the surface on an acre. By examining the figures, it will be seen that the supply of soda is nearly twice as large as that of potash. Consumed at the rate of 100 pounds each per annum, the soda would last four centuries, and the potash two. But before the alkalies in the soil were exhausted, subsoiling would be practised to render those 20 inches below the surface entirely available to needy crops. Particular attention is invited to the ammonia found in these soils.

The amount is not peculiarly large, but is an element of fertility too often overlooked in studying the sources of productiveness in cultivated lands. Probably the earths analyzed by Von Baumhauer have been cropped some two thousand years. One hundred thousand parts of these soils contain respectively sixty, seventy-eight, and seventy-five parts of ammonia. This gives 1200 pounds to the acre, estimating the weight of available soil at 1000 tons in the earth that contains the least of this volatile alkali. Doubtless the principal source of ammonia is the decay of organic substances in the soil, such as manure, plants, and insects; some is also derived from the atmosphere through the fall of rain and snow. There is another source which is worthy of consideration. Critical readers will see that both the protoxide and peroxide of iron figure in the composition of these fertile lands. The protoxide is literally the first oxide, and consists simply of an atom of oxygen chemically combined with one of iron. The scales that fly off from a heated bar when hammered on an anvil by a blacksmith, are the first oxide or protoxide of iron. The peroxide is the red rust of this metal, and consists of two atoms of iron chemically united to three of oxygen. Now, in converting the protoxide of iron into a peroxide in a moist soil, (a result greatly promoted by tillage,) water is decomposed. Its oxygen unites with the iron to form rust (peroxide), and its hydrogen combines at once with nitrogen in the atmosphere, and is always present in soils, to form ammonia. Most farmers have observed that soils often change their color within a few years after they are first broken up, assuming a darker hue, and sometimes a deeper red. Such soils contain a good deal of iron, and, if lime is not wanting, they grow more productive by tillage. In the virgin earth, more or less of this iron is united with sulphur, forming a mineral of a bright yellow color, called iron *pyrites*, or sulphuret of iron. Tillage decomposes this compound. Oxygen combines with the sulphur and forms oil of vitriol, called sulphuric acid. Oxygen also unites with the iron and converts it into the first oxide, when the oil of vitriol and oxide of iron combine and form a very soluble salt called copperas, or sulphate of iron. If the soil contains a sufficient quantity of lime, or the farmer applies it when needed, this mineral takes the sulphuric acid away from the iron by a stronger affinity, and forms gypsum, or sulphate of lime. The protoxide of iron, thus deprived of its oil of vitriol by lime, is soon changed into a peroxide, in which condition it is not only harmless to all crops, but a valuable condenser of fertilizing gases by reason of its porous nature.

In well-drained and long-cultivated soils, sulphuric acid is never abundant, because all its salts, except gypsum, are exceedingly soluble, and readily washed away in all water that passes over or through the soil into springs or creeks. When the oil of vitriol unites with soda, it forms glauber salts, which, as every farmer knows, are very soluble. With magnesia, this acid forms epsom salts, which are equally liable to be washed out of tilled earth. Alum, or the sulphate of alumina and potash, is subject to the same operation. It takes nearly 500 parts of water to dissolve one of the sulphate of lime, or gypsum. Hence, this is the best compound of sulphur for all agricultural purposes.

Phosphoric acid is an element of fertility of great importance, and one which is never wholly absent from any soil that yields either food or clothing for man. Baumhauer found from a third to a little less than half per cent. of this acid in the Zuyder Zee clay lands. In ordinary soils, most of this acid (which is formed by the union of an atom of phosphorus with five of oxygen) is combined with iron and alumina. The salts are called phosphate of iron and phosphate of alumina. In this form, the acid is sparingly, if at all, available as the food of plants. It is the phosphate of lime, not alumina nor iron, that forms the *bones* of all animals; and it is the phosphate of lime that they require in their vegetable nourishment. Of course, no crop can extract *bone-earth* from a soil in which no bone-earth exists. But, fortunately for the farmer, bone-earth can be formed by simply applying lime to a soil that contains phosphoric acid in combination with iron or alumina; for the more alkaline mineral, lime, will take the acid from iron and alumina, and thus produce the phosphate of lime, or bone-earth. Let us suppose that all the phosphoric acid had been consumed by previous crops, and by the long-continued washing and leaching of an arated soil; would the application of simple lime, or gypsum, create an atom of phosphoric acid where none existed? Certainly not. Hence the necessity of applying *bones*, or phosphates in some other fertilizer, when this acid is lacking. The *carbonic acid* found in the soils under consideration was doubtless mostly combined with the alkalies, potash and soda, and the alkaline earths, lime and magnesia, forming carbonates of those minerals. A part, however, must have been diffused through the porous mass in an uncombined state. When vegetables and animals complete their decay in the soil, carbonic acid, water, and ammonia are the ultimate products, not to name the incombustible minerals which exist in organized beings.

Chlorine, which abounds in the soils under consideration to an unusual degree, is a heavy gas, of a deep sea-green color, very pungent, and irrespirable. It forms not far from 60 per cent. of pure, dry (anhydrous) common salt, which is a compound of chlorine with the metallic base of soda, called *sodium*. Hence the chemical name of salt is *chloride of sodium*. Chlorine is an important element in the vegetable and animal kingdoms; and salt has been used as a fertilizer since before the time of Moses, and also with human food. We read of salt not fit for the dung-heap, in the Bible, indicating one use to which it was applied. "Ye are the *salt of the earth*," expresses a high popular appreciation of this compound of chlorine, many centuries before the chemical nature of salt was known. Chlorine combines readily with hydrogen, and forms a strong acid, called *hydrochloric*, formerly muriatic acid.

All the salts formed by this acid or chlorine in the soil, are quite soluble, like common salt, chloride of lime, magnesia, and potash, and therefore we seldom meet with so much as 1 per cent. of this element in any tilled land. One-tenth of 1 per cent., or 1 in 1000, is nearer the average in ordinary soils of a fair quality. *Humin*, *humic acid*, *crenic* and *apocrenic acids*, and *vegetable remains*, have already been described.

Several thousand specimens of soil have been analyzed by reputable chemists in Europe, the United States, and in Canada; and from the facts thus elicited, the following deductions may be fairly drawn:—

1. All the elements of vegetables, whether in the atmosphere, in water, or in solid minerals, are the same in all countries.

2. The elements of all matter, endowed with vitality, and performing varied functions in an organized condition, must for ever continue the same, without change, so long as the existing physical laws govern the mineral, vegetable, and animal kingdoms.

3. The *raw material* for making all crops being known, the accumulation of such raw material is as simple as to make brick, and lay them up into the walls of a house.

4. All the elements of human food and raiment must be well understood by the consumers thereof before these elements can be husbanded with reasonable economy.

5. It is unreasonable to expect that people will preserve from loss and waste any things, no matter how valuable in themselves, so long as they remain in profound ignorance of such value.

6. The least abundant and most precious elements of crops annually thrown away through sheer ignorance of their value involve a needless loss to this country, equal to two or three hundred million days' labor by the cultivators of the soil. When a farmer gives as much work for 50 bushels of corn raised on poor land as 100 would cost if grown on rich land, it is plain that he and the public lose half his labor if he needlessly impoverishes his soil, or neglects to improve it when or where he can.

7. Until he knows what are the things in the surface of the earth which render it, when present, exceedingly fertile, and, when absent, perfectly sterile, the husbandman can hardly *begin in the right way* to save and accumulate these elements of fertility.

8. There is reason to believe that good Peruvian guano (the dung of sea-birds) is the best known expression of the most valuable elements of crops, from the fact that practical farmers are able and willing to pay from $40 to $50 a ton for this manure to produce breadstuffs and provisions in this republic, where virgin soils may be cultivated to any extent, without buying the land, or paying taxes or rent of any kind.

CHAPTER IV.

THE CRITICAL STUDY OF THE ELEMENTS OF FERTILITY IN SOILS.

Having taken a general view of mould, sand, and clay, and incidentally explained the origin and chemical composition of soils, we propose, in this chapter, to investigate the science of fertility, in order to discover what portion of the constituents of plants the farmer should husband with the greatest care, and what part nature will supply in water and air to his needy crops. To be a skilful husbandman, one should know *what* to husband, and *why* he husbands it. The true principles of agriculture are found to be simple, like all the operations of nature, when fully comprehended. In forming a new plant or animal, no one has reason to suppose that a particle of new matter is created for the purpose. Whatever may be its weight, or form, or substance, every atom in its system existed before the life in the seed of the plant, or in the egg or young of the animal, had a being; and when its life ceases, and its body is dissolved into its original elements, not an atom will be annihilated. Having satisfied ourselves that in the growth of plants and animals nothing really new is created, we may reasonably assume that nature always consumes the same kind of elementary bodies to form the flesh and blood, bones, nerves, fat, and cellular tissues of animals; and hence, that their food should always contain substantially the same elements of nutrition.

If we examine the skeletons of the human family, as preserved in mummies for thousands of years, and the fossil bones and shells of inferior animals met with in rocks which appear to have been thirty or forty thousand feet in thickness, there is abundant evidence that the minerals used for making shells and bones are the same now that they were in the beginning; nor does it require any elaborate research to satisfy one that all the so-called organic substances in plants and animals, such as starch, sugar, gum, gluten, albumen, oil, fat, muscular and nervous tissues, have ever had the same chemical combinations which exist at this day. It is inconceivable how plants and animals can be organized and live, if formed of other elements than carbon, oxygen, hydrogen, and nitrogen, which alone the Creator has fitted to display all the complex and wonderful phenomena of vegetable and animal life. The things that feed and nourish plants and animals, that constitute their whole weight and substance, are substantial and ponderable matter. If these things were equally abundant in all soils, and equally consumed in forming all crops, then all land in the same climate would be equally fertile. But soils are not of equal fertility, nor are the elements of plants consumed in equal quantities, or supplied in equal parts.

Hence the study of soils, in their connection with cultivated plants and domestic animals, presents a wide field for experiment and critical research. The six most valuable elements of all crops, and valuable only so far as they chance to be deficient in any soil, are *ammonia*, *phosphorus*, *sulphur*, *potash*, *chlorine*, and *lime*. It may happen that lime is abundant, and magnesia is lacking, or that potash is more abundant than soda, and sulphur may be less lacking than soluble silica. When the facts are fairly considered, that a soil only five inches deep contains some 500 tons

of earthy matter to the acre, and that 200 pounds of guano will often add two tons to the weight of dry matter in a crop of corn, and nearly as much in several other crops, it seems but reasonable to conclude that the 500 tons of earth lack some elements which corn plants greatly need, and that guano supplies the lacking ingredients. The analyses of the fertilizer, of corn, and of soils, lead to this conclusion. If this reasoning be sound, then it is the guano in soils and in crops that the farmer ought to husband with the greatest care; for guano sells in market at $5 for 200 lbs., or at the price of good flour, and is brought by the cargo 10,000 miles, for no other purpose than to feed hungry plants now starving in the soils of the United States. Phosphoric acid, ammonia, and potash are doubtless the most important elements in guano, and these substances are least abundant in nearly all cultivated lands.* If we study the natural products of the earth in connection with the elements of fertility, we shall find that large, long-lived, and thrifty forest-trees grow only in soils which are rich in potash. When the farmer has occasion to burn maple, elm, oak, walnut, hickory, beech, and other hard-wood forest-trees, he finds them rich in this alkali; and he also finds that soils which produce this kind of timber are always good for agricultural purposes. Their productiveness is not to be ascribed to potash alone, for all the other elements of crops are equally present in an available form; but the existence of an abundance of magnificent potash-yielding forest-trees, will never deceive the farmer as to the natural capabilities of the soil. Hence, when a farmer can learn what amount of potash 100 pounds of his soil or subsoil contain in an available condition, (for this alkali exists in combination with flint or silicic acid in an insoluble form,) he may judge with considerable safety of the natural resources of his land. This alkali exists in some soils in a proportion as high as two per cent.—a quantity, however, rarely found—and in others, ten thousand parts of earth yield not one of potash. Such soils are always nearly barren. How far soda can perform the functions of potash in the growth of cultivated plants, there are no data in the practice of agriculture sufficient to settle the question. There is reason to believe, from a few experiments, that it may serve as a substitute in many cases; but to what extent, and in the organization of what crops, future experiments must decide.

To obtain a clearer idea of the importance of this element in farm economy, let us briefly examine the amount of it in good soils, and the quantity taken therefrom in ordinary crops. The report of the Geological Survey of Canada for 1849 and 1850, made by W. E. Logan, Esq., provincial geologist, (the analytical part of which was performed by T. S. Hunt, Esq.,) contains the following among other analyses of soils. First sample is taken from a rich clay soil, having an unusual quantity of vegetable mould; the original forest was maple, elm, and birch:—

* The London Gardener's Chronicle, of April 19, 1851, after stating that 18,000 tons of guano were imported in 1850 more than the year previous, adds:—"Mr. Way has demonstrated, in the Journal of the Agricultural Society, that the money value of a ton of good Peruvian guano was, in 1849, £12, 2*s*. 5*d*.; the ammonia being worth £9, 14*s*., the phosphate of lime £1, 13*s*. 9*d*., and the potash 14*s*. 8*d*."

When wheat is worth 5*s*. a bushel, a pound of ammonia is worth 6*d*. for making a bushel of wheat. A pound of bone-earth is worth about a cent and a half, and one of potash over six cents.

Sand	49.2
Clay	23.4
Vegetable matter	20.8
Water	6.6
	100.0

One hundred parts of this soil gave to hydrochloric acid—

Alumina	4.820
Oxide of iron	3.240
Lime (part carbonate)	1.033
Magnesia (part carbonate)	.749
Potash	.435
Soda	.795
Chlorine	.080
Sulphuric acid	.144
Phosphoric acid	.557
Soluble silica	.075

The quantity of ammonia is not stated; but, as the organic matter is large, there is doubtless a fair supply of this element of fertility. The above is an excellent soil. Wheat growing upon it would be subject to fall and to rust, from the lack of soluble silica or flint, and from the excess of mould. In a good climate, it would be remarkable corn land. Owing to the excess of organic matter, an acre of this soil, a foot in depth, would weigh not much over 1000 tons. In that quantity, there would be over ten tons of lime; seven of magnesia; four of potash; nearly eight of soda; sixteen hundred pounds of chlorine; about one and a half ton of sulphuric acid, (oil of vitriol;) five and a half tons of phosphoric acid; and fifteen hundred pounds of soluble silica. One hundred parts of this soil gave to distilled water .786 of soluble matter, principally organic. By burning, it left .104 of alkaline ash. 100,000 parts of this ash gave 8 of chlorine, a small portion of nitrates, and a trace of sulphates.

The soluble bases were potash and soda, lime and magnesia. The next sample of soil analyzed was at the other extreme, in point of vegetable matter, containing "but a trace." Rough analysis gave—

Sand	56.0
Pebbles	8.0
Clay	27.8
Water	8.2
	100.0

One hundred parts of this soil gave to hydrochloric acid the following substances.

Alumina	1.440
Oxide of iron	3.780
Lime	.650
Magnesia	1.036
Potash	.276
Soda	.840

Chlorine	.134
Sulphuric acid	.034
Phosphoric acid	.215
Soluble silica	.150

The above analysis shows a soil in which vegetable mould became exhausted sooner than the mineral constituents of crops. It contains less oil of vitriol (sulphuric acid) than of any other ingredient. Gypsum and clover, turned in with the plough, will bring up the land with good profit. Gypsum is a compound of lime and oil of vitriol. 2000 parts of the above soil gave 1 of soluble matter, three-fifths of which were incombustible, consisting mostly of the chloride and sulphate of lime, magnesia, and the alkalies. No trace of nitrates was detected. Organic substances favor the formation of nitrates. The small percentage of alumina in this soil is a defect.

Soils too poor to grow clover to any advantage in Canada, have been brought up by the aid of peas and gypsum. A similar result has been attained in the United States—a fact that should be universally known.

Soils in which alumina predominates are usually richer in the incombustible constituents of plants after the mould is consumed by excessive tillage, than such as contain but little of that mineral. The following facts stated by Mr. Hunt, at pages 81 and 82, elucidate this point:—On the farm of Major Campbell, the original layer of vegetable mould has, by long tillage, entirely disappeared. The general character of this clay seems to be nearly the same for the depth of five or six feet, except that it is a little lighter on going down—a difference, perhaps, due to the fact that organic matters have not infiltrated thus far. When brought to the surface, it breaks into hard, angular fragments; but, by the influence of the weather, it crumbles down into a comparatively mellow soil; still, however, becoming hard and dry in the heat of summer. In laying out a railroad, a bank of the clay was cut down and uncovered to a depth of six feet. The surface thus exposed (denuded) was entirely free from any organic matter; but was found, after a dressing of plaster, to yield an *excellent crop of peas and clover* upon the clays, generally. 100 parts of this clay yielded to hydrochloric acid the following substances:—

Alumina	12.420
Oxide of iron	7.320
Lime	.697
Magnesia	1.490
Potash	.591
Soda	.231
Phosphoric acid	.390
Sulphuric acid	.022
Soluble silica	.105

One may take the best authorities, and examine the analyses of soils in this country, England, Scotland, France, and Germany, and he will hardly find one sample in a hundred that yields so much alumina as the above. When associated with a good deal of the oxide of iron and silicious sand, it lays the foundation for an enduring and excellent soil. When combined with exceedingly fine sand and little iron, the earth becomes altogether too compact and impervious to air and water. Exhausted or naturally sterile lands usually lack phosphoric acid or other essential elements. The following is a case in point, (analysis by Professor Way, consulting chemist of the Royal Agricultural Society, England:)—

Water	20.56
Vegetable matter	6.17
Clay and sand	59.00
Phosphoric acid	—
Carbonate of lime	5.49
Magnesia	—
Oxide of iron and alumina	7.90
Potash	0.31
Soda	0.12
	100.00

The above was a "worn-out soil" on Mr. Pusey's estate, and yet it has an abundance of vegetable matter, lime, and the usual amount of potash and soda. In clay and sand, iron and alumina, the proportions are such as we find in many good soils; but as not a plant can grow without phosphoric acid, and few without magnesia, the absence of these ingredients induces sterility. Instances of this kind might be multiplied to almost any extent; but their repetition is deemed unnecessary. To suppose that one can produce a root, tuber, seed, or stem from other ingredients than such as Providence fitted for the purpose, is to assume that there is no difference between lead and gold; or that an atom of water and one of iron are the same thing. Finding, as we do, many different elementary bodies in all fertile soils and in all cultivated plants, and that they are the same in both, it is alike unphilosophical in science and unsafe in practice, to assume that any one mineral can perform the functions of other minerals in the economy of plants and animals. We may be profoundly ignorant of the office performed by an atom of lime, iron, sulphur, carbon, phosphorus, chlorine, nitrogen, potash, or magnesia, in any of the phenomena of vegetation or animal life; yet direct experiments and universal experience have proved the necessity of having all these substances in the soil, as well as silica in a soluble form, before it can be productive of cereal and other valuable plants. As a general truth, it may be stated that land which will bear good crops of wheat, will also yield all other crops adapted to the climate. Hence, to study the composition of wheat plants when ripe, will lead us at once to all the essential elements of fertility. In 100 parts of wheat, nearly 98 are combustible; in straw, from 90 to 96 per cent. is also combustible. The combustible or organic part of wheat has the following composition, (Boussingault:)—

	Grain.	Straw.
Carbon	46.10	48.48
Hydrogen	5.80	5.41
Oxygen	43.40	38.79
Azote (nitrogen)	2.29	.35
Ash	2.41	6.97
	100.000	100.000

The greatest difference in the combustible part of wheat and straw is in azote, or nitrogen, which is regarded as the flesh-forming element in the plant. One must multiply the nitrogen in wheat-straw by 7 to give as much as there is in wheat. Hence, if a wheat-grower had to rely on decaying straw for nitrogen to form his grain, it would require 700 pounds of straw to make 100 of wheat. If he depended on clover or peas, the case is widely different, as their organic analysis indicates:—

	Pea-Straw.	Clover-Hay.
Carbon	45.80	47.40
Hydrogen	5.00	5.00
Oxygen	35.57	37.80
Azote (nitrogen)	2.31	2.10
Ash	11.32	7.70
	100.00	100.00

It will be seen that pea-straw, or haulm, contains as much nitrogen as wheat; and, when timely cut and properly cured, it makes the best of hay and the best of manure. Clover contains a fraction less nitrogen, but is nearly equal as forage and for manure. By regarding carbon as charcoal, and oxygen and hydrogen as one form of water, we may proceed to consider the inorganic, mineral, or incombustible part of wheat and other crops, in their relation to the soil. The ash left on carefully burning the seeds and stems of cultivated plants is not perfectly uniform in its chemical composition in all varieties of wheat or straw grown on different soils, in different seasons and climates. The variations, however, are no greater than one might reasonably expect under the influence of a change of circumstances. The ash, or incombustible part of the plants, resembles the bones in animals. A poor animal, like a very lean pig or horse, has a larger per cent. of earthy matter in his system than a fat one—that is to say, his bones will bear a greater proportion to the weight of the whole carcass. Plants of the same species yield unlike quantities of starch, sugar, oil, gum, albumen, gluten, and other (so-called) protien compounds. The incombustible earthy matter in them differs in an equal degree. The following table contains the results of an analysis, made by Professor Way, of Hopeton wheat, (ash,) which is near an average of some 60 performed by that chemist at the Royal Agricultural College, Cirencester, and published in the journal of the Royal Agricultural Society, vol. 8, p. 624:

Silica	2.28
Phosphoric acid	45.73
Sulphuric acid	0.32
Carbonic acid, none.	
Lime	2.06
Magnesia	10.94
Peroxide of iron	2.04
Potash	32.24
Soda	4.06
Chloride of sodium	0.27
	99.94

The reader will see in the foregoing all the elements of fertility named in the preceding pages, as shown in the analysis of productive soils. By taking the results of the 60 analyses of the ash of wheat together, it will be found that *the amount of lime in the seed of this plant is about one-third as large as the amount of magnesia, and one-tenth that of potash.* The phosphoric acid is larger at all times than any other substance, and is chemically combined with lime, potash, magnesia, and with soda when present, as it generally is, but in less quantity than in the foregoing table. The silica is confined to the cuticle, or bran, and varies from 1 to 8 per cent. The amount of sulphuric acid is small, as is that of chloride of sodium, or common salt. The iron, set down at over 2 per cent., is unusually large.

The following is the mean of several analyses of the ash of wheat, performed by Boussingault:—

Phosphoric acid	47.00
Sulphuric acid	1.00
Silica	1.30
Potash	29.50
Lime	2.90
Magnesia	15.90
Chlorine, traces.	
Soda, traces.	
Oxide of iron, none.	
Charcoal, and loss	2.40
	100.00

Although no iron appears in the above, yet, when searched for critically, Boussingault did not fail to find it; but as nearly all soils abound in this element of crops, no one is under the necessity of applying copperas, or other salt of iron, to his land as a fertilizer. The reader will see that the per cent. of potash is ten times larger than that of lime, and that magnesia is more than five times as abundant. The best natural wheat soils in the Genesee valley yield a good deal of magnesia and potash on analysis. The ash of wheat-straw has the following composition:

	Per Cent.	Removed from an Acre.	
Silica	69.94	107 lbs.	5$\frac{5}{10}$ oz.
Phosphoric acid	8.53	13	1$\frac{4}{10}$
Sulphuric acid	2.33	3	9$\frac{1}{10}$
Carbonic acid, none.			
Lime	4.94	7	9$\frac{2}{10}$
Magnesia	1.43	2	3
Peroxide of iron	0.06	0	5$\frac{1}{10}$
Potash	12.48	19	2$\frac{4}{10}$
Soda	0.25	0	5$\frac{4}{10}$
Chloride of sodium, none.			
	99.97	153	5$\frac{2}{10}$

This crop was at the rate of 30 bushels per acre, and the grain contained 32$\frac{2}{10}$ pounds ash, which, added to that in the straw, gave 186$\frac{2}{10}$

pounds as the incombustible minerals taken from an acre in a single crop. It is worthy of particular attention that over 100 pounds of soluble flint, or silica, are required to form an acre of wheat-straw. Too little attention has been paid to this substance by the wheat-growers of the United States.

A judicious rotation of crops favors the accumulation of soluble silica in the soil, and how this result is attainable every farmer should understand. The system consists in making a wise use of all the silica contained in all straw, cornstalks, and hay grown on the farm, and in increasing the solubility of the finest particles of silicious sand in the soil. The former is simply a matter of good husbandry, i. e. carefully saving all straw, stalks, and grass or hay, or the manure derived from the same. There are farmers in England who make land, which is naturally poor, yield an average of 36 bushels of wheat per acre, take one year with another. In this operation, straw, hay, and turnips supply most of the raw material for making so large an average yield of wheat. The solubility of flint-sand, or silica, is increased by the aid of potash and soda. When these alkalies combine with silica in small quantities, insoluble silicates are produced, like common glass; but, if glass be ground fine and boiled in a concentrated solution of potash or soda, it will be dissolved in the water, the silica having combined with a large amount of the alkali. Wood-ashes and salt, abounding in potash and soda, have been found, by experience, valuable fertilisers for wheat; and even salt and lime, or salt alone, will greatly benefit the crop, as many wheat-growers in western New York have demonstrated. One reason why peas, beans, and clover rotate so successfully with wheat, is, that these crops extract comparatively little silica from the soil, and, of course, leave the more for cereals.

Composition of Peas and Beans on Clay Soil.—Analyses by Professor Way.

	1 ton of Peas.	1 ton of Beans.	2989 pounds of Pea-straw.	2270 pounds of Bean-straw.	Entire crop Peas.	Entire crop Beans.
Silica	0.42	0.22	4.62	2.95	5.04	3.17
Phosphoric acid	14.43	15.23	2.93	0.55	17.36	15.78
Sulphuric acid	2.93	1.62	5.38	1.58	8.31	3.20
Lime	2.28	2.75	86.80	22.25	89.08	25.00
Magnesia	3.48	3.66	13.62	2.85	17.10	6.51
Protoxide of iron	....	....	1.74	0.69	1.74	0.69
Potash	20.75	27.40	30.18	36.96	50.93	64.36
Soda	2.51	0.23	0.57	3.18	3.08	3.41
Chloride of sodium, (salt)	2.15	....	23.00	13.88	25.15	13.88
Total	53.16	51.16	168.84	84.84	207.79	136.00

It will be seen by the above figures that a ton of peas (2240 pounds) and 2989 pounds of pea-straw contain only 5.04 pounds of silica, and beans still less. Hence, an acre of arable land might yield a crop of 5229 pounds of peas one year, and one of 4510 pounds of beans the next, and not part with $8\frac{1}{2}$ pounds of silica in the two crops. Pea-straw consumes a large amount of lime and considerable potash. Land should be well stocked with lime for these crops. 3698 pounds of perfectly dry clover gave Boussingault 284 pounds of ashes, equal to 7.7 per cent. In these ashes, or, more properly, in this ash, there were 18 pounds phosphoric acid, 7 pounds sulphuric acid, 7 pounds chlorine, 70 pounds lime, 18 pounds magnesia, 77 pounds potash and soda, 15 pounds silica, and 1 pound oxide of iron. To the foregoing must be added 71 pounds carbonic acid, to make the aggregate 284 pounds. In the way that Boussingault burns clover, the ash contains 25 per cent. of carbonic acid. It will be seen that this plant, like peas and beans, draws slightly on the soil for soluble silica, but largely for the alkalies and lime. Scientific farmers realize great benefit in growing clover and beans in connection with wool-growing and wheat culture, because the first-named plants send down their roots in a permeable soil to a great depth, and bring up phosphates, sulphates, and chloride of lime, potash, and magnesia, which are ultimately consumed in forming generous crops of wheat.

The writer has frequently traced the roots of clover and beans to the depth of 34 inches into the earth in sandy and loamy soils. *Subsoiling and root culture* are profitable operations, when conducted on scientific principles. Care should be had that there is not an excess of moisture in the subsoil. Draining is the only remedy for this evil. The capacity of soils to take up and retain water without injury to crops by its excess, and the temperature of soils at different depths and under different circumstances, will be noticed before the close of this essay. The reader's attention is now invited to the minerals taken from the earth in the growth of potatoes, turnips, and carrots, which, under a good system of husbandry, are valuable crops.

About three-fourths of the weight of potatoes, when dug, are water; of the other fourth, twenty-four parts in twenty-five are combustible—the other part being ash. Estimating his crop at its dry weight, an acre gave M. Boussingault 2828 pounds of tubers, which yielded 113 pounds of ash—consisting of 13 pounds of phosphoric acid, 8 pounds sulphuric, 3 pounds chlorine, 2 lime, 6 magnesia, 58 potash and soda, 6 silica, 8 carbonic acid, and 1 pound oxide of iron. It will be seen that more than half of the ash of potatoes is pure potash, for it contains but a trace of soda. Dry potato tops yield 6 per cent. of ash. An acre (in which the growth of vines or tops must have been unusually large) gave to M. Boussingault 5042 pounds dry weight, and 303 pounds ash—consisting of 33 pounds phosphoric acid, 7 sulphuric acid, 4 chlorine, 7 lime, 5 magnesia, 135 potash and soda, 39 silica, 16 oxide of iron, and 57 carbonic acid. Taking the figures as they stand, there are few so exhausting crops as that of Irish potatoes, (*tuberosum solanum*,) when entirely removed from the soil. In the tops and tubers 416 pounds of incombustible matter are removed from an acre. Twenty bushels of wheat require 12 pounds of phosphoric acid for the grain, and 5 pounds for the straw; while an acre of good potatoes demands 13 pounds of this acid for the tubers, and 33 for the haulm or tops. This is equal to two large crops of wheat. In an acre of potatoes, 193 pounds of potash are consumed: one-sixth of that amount answers for an acre of wheat. Few farmers supply their growing potatoes with a sufficient quantity of potash and phosphoric acid.

Hence this plant and its tubers have become constitutionally deteriorated on most farms, and extremely prone to premature decay.

Professor Way gives the following figures to indicate the minerals required by nature to form twenty tons of bulbs and four tons of tops of the following root crops:

	Turnips. lbs.	Mangel-wurzel. lbs.	Carrots. lbs.
Phosphoric acid	45	21	39
Sulphuric acid	50	22	57
Lime	90	21	197
Magnesia	14	22	29
Potash	140	130	134
Soda	33	70	103
Chloride of sodium	57	160	85
	429	446	644

The above figures appear large; but it must be borne in mind that a crop of 24 tons of 2240 pounds to the ton is also large for an acre—at least, it would be so regarded in this country. Roots require rich land to do well; and, in turn, they yield a large amount of fertilizing elements. It will be seen that 24 tons of carrots consume 197 pounds of lime, and 287 of potash and soda, besides 85 of common salt, (chloride of sodium.) The large demands for phosphoric and sulphuric acids is also worthy of note.

The most successful improvers of soils and grain-growers in the world produce a vast quantity of roots, and mainly with a view to augment the stock of manure on the farm. The organic matter which 24 tons of roots furnish is immense; but many believe that the price of labor is too high, grain too low in the United States, and virgin lands too cheap, for the profitable adoption of the English system of husbandry. Before one can wisely adopt any system of farming, he must learn the natural capabilities of his soil, the elements of crops which he can command at the lowest price, and the cost of producing each article that the market calls for, as well as the probable compensation he is to receive for the same. Among the elements of production, *temperature* and *humidity* deserve the most careful consideration. The temperature of soils at different depths below the surface has been very little studied in the United States. Professor Emmons has made observations at Albany for twenty months, which are published in the second volume of his valuable work on the agriculture of New York, from which we condense the following:*—From May 14th to 22d, inclusive, 1847, mean temperature at the surface of the soil on grass land, at 5 o'clock, A. M., was 48°. At four inches below the surface, it was $53\frac{1}{3}$°; at nine inches below, 55°. At noon, the temperature at the surface was 85°; four inches below, $82\frac{1}{4}$°; nine inches below, 57°. At 7 P. M., at the surface, the heat was $77\frac{3}{8}$°; four inches below, $69\frac{3}{8}$°; nine inches, $59\frac{1}{4}$°. Four feet above the surface, the temperature, at the times above named was $49\frac{1}{3}$° at 5 A. M.; $68\frac{3}{8}$° at noon; 65° at 7 P. M. The above

* Albany is in latitude 42° 39′. Mean annual temperature, 48° 47′ at 130 feet above tide. Observations made 100 feet above tide.

figures reveal the interesting fact that the mean temperature was 29° higher at the surface than four feet above it, at noon; while the soil, four inches below the surface, at that time of day, was $17\frac{1}{2}$° warmer than the air four feet above the ground. At nine inches in depth, the mean is 10° below that of the air four feet above the surface. At 7 o'clock, P. M., the temperature is 2° higher than at noon.

From 23d to 31st of May, inclusive, the record is as follows:—Mean heat at the surface, $52\frac{1}{8}$°, four inches below, $55\frac{1}{2}$°, nine inches below, $56\frac{1}{2}$°, at 5 o'clock, A. M. These figures show a regular cooling of the soil during the night-time, from the surface to the depth of nine inches. At noon, at the surface, the temperature was $68\frac{1}{2}$°; four inches below, $61\frac{1}{8}$°; at nine inches below, $58\frac{3}{8}$°.* At 7 P. M., at the surface, the mean was $62\frac{1}{2}$; four inches below, $61\frac{1}{8}$°; nine inches below, $59\frac{1}{2}$°. During the same period, the mean heat four feet above the surface, at 5 A. M., was 54°; at M., $65\frac{5}{8}$°; and at 7 P. M., $63\frac{1}{2}$°. These figures indicate cooler weather than one would expect between the 23d and 31st of May, even at Albany.

From the 1st to the 7th of June, inclusive, the mean at the surface on grass land was, at 5 A. M., $54\frac{5}{8}$°; at four inches below the surface, $57\frac{3}{8}$; at nine inches, 58. At noon, at the surface, the temperature was $74\frac{3}{8}$; at four inches below, $64\frac{1}{4}$; nine inches below, $59\frac{1}{2}$. At 7 P. M., at the surface, 68; four inches below, $64\frac{3}{8}$; nine inches below, $60\frac{7}{8}$. At the period above referred to, the mean temperature of the air, four feet above the surface, was, at 5 A. M., $53\frac{1}{4}$; M., $66\frac{1}{4}$; 3 P. M., $69\frac{3}{4}$; 7 P. M., $64\frac{1}{4}$. From 8th to 14th June, the mean temperature, at 5 A. M., at the surface of grass land was 61; four inches below, 60; nine inches below, $60\frac{1}{2}$. At noon, the average was 69 at the surface, 66 four inches below, and $64\frac{1}{2}$ nine inches below. At 7 P. M. the thermometer gave a mean of 67 at the surface. In the air, four feet above the surface, at 5 A. M., the heat was $65\frac{5}{8}$; at M., $77\frac{3}{4}$; at 3 P. M., $78\frac{3}{4}$; at 7 P. M., $73\frac{1}{4}$.

The soil attained its maximum temperature in the third week of July, at the depth of nine inches, being $75\frac{3}{4}$ degrees. 81 degrees was the maximum mean at the depth of four inches, on grass land; and 85 at the same depth on naked soil.

In the fourth week of July, the mean, at nine inches below the surface, was near 72 degrees. In this week the mean, at 5 A. M., four feet above the surface, was $65\frac{1}{4}$; at M., $73\frac{1}{2}$; at 3 P. M., $70\frac{3}{4}$; at 7 P. M., $69\frac{1}{4}$.

During the first week in August, the mean temperature of the soil at nine inches below the surface, was $71\frac{1}{2}$ degrees. The mean, four feet above the surface, was 72.

During the second week the mean, at nine inches below the surface, was 73 degrees, being $1\frac{1}{2}$ higher than the preceding one. The mean in the air, four feet above the surface, was $75\frac{1}{2}$.

The third week gave a mean of $71\frac{1}{4}$ degrees, at the depth of nine inches in the soil; while the mean, four feet above it, was 69

In the fourth week, the soil had a mean of $70\frac{1}{2}$ degrees at the depth of nine inches.

The temperature fell to a mean of $64\frac{1}{2}$ degrees, at the same depth, during the first week in September.

* This footing is wrong in the table in the quarto volume from which we copy. The mean is there stated at $68\frac{3}{8}$°. It should be $58\frac{3}{8}$°.

The mean of the second week was 64 degrees; of the third, $62\frac{1}{2}$; fourth, $59\frac{1}{4}$.

In the first week in October, the soil, at nine inches, had a mean heat of 58 degrees; in the second week, of 55; in the third, of $52\frac{1}{2}$; in the fourth, of —. (*Note.*—This table is defective.)

At 2 feet below the surface, the temperature of the earth in Albany fell from 40 degrees, on the 1st of January, 1848, to 34 on the 31st of that month; and at four feet below the surface, the change, in the same length of time, was from 43 to 37.

In the month of February, at the depth of 2 feet, the reduction in temperature was from 34 degrees to 32; and at four feet, from 37 to $35\frac{1}{4}$.

In the month of March, the earth, at four feet, was cooled 1 degree, or to $34\frac{1}{4}$; at 2 feet, the variation was very slight.

During the first fifteen days in April, the temperature, at the depth of two feet, increased 11 degrees, or from 33 to 44; in the last fifteen days in April, the increase was from 44 to $47\frac{1}{2}$.

During the thirty days in April, the earth, at four feet in depth, had its heat increased from $34\frac{1}{4}$ degrees to 46.

During the thirty-one days in May, the earth, at the depth last named, had attained a temperature of $54\frac{1}{2}$ degrees; at two feet, it was $58\frac{1}{2}$; at nine inches, it was $60\frac{1}{2}$; and at four inches, 8 P. M., it was 62.

From the foregoing observations, it is obvious that the four months of June, July, August, and September furnish the warmest soil, to the depth of two feet, for the production of corn in the Northern States. There are many circumstances that modify the temperature of soils, such as being open, and permitting either warm or cold water to descend freely to a considerable distance into the earth. Standing water being a bad conductor of heat, a wet, compact clay soil may have boiling hot water poured upon it in large quantities, without heating either the water or ground below the surface to any depth. Solar heat encounters equal difficulty in penetrating a wet, compact clay, from the surface of which water evaporates and carries off much heat in a latent form. Different soils absorb unequal quantities of water, and retain it with unequal force. Dr. Sprengel, in his valuable work on soils, truly remarks that "the power of the earth to take up and hold back more or less water, mechanically, in its pores, is of the greatest importance for vegetation, not only because the water in and of itself contains the life of plants, but especially, also, because it carries to them means of nutriment from the soil." In the *want* or *excess* of moisture we frequently must seek the cause of the unfruitfulness of the earth. The capacity of the soil to hold moisture,* but especially the decompositions and combinations which take place, are of importance, since the decomposition of organic matter may be prevented either by an excess or the want of moisture.

The following table contains the results of experiments made by Professor Schubler, with such soils as usually come under the notice of the agriculturist:

* We have tried swamp-muck, or peat, which, when perfectly dry, would take up, without dripping, four times its weight of water.

Kinds of Earth.	Power of containing Water.		A Cubic Inch contains—		A Cubic Ft. contains—
	According to Weight.	According to Volume.	Grains of Water.	Cubic lines of Water.	Pounds of Water.
Silicious sand	25 per ct.	37.9 per ct.	121	655	27.8
Calcareous sand	29 "	44.1 "	141	763	31.8
Gypsum powder	27 "	38.2 "	122	660	27.4
Fine lime	85 "	66.1 "	211	1,142	47.5
Lime, precipitated	47 "	54.5 "	174	941	39.1
Fine magnesia	25.6 "	76.1 "	242	1,316	62.6
Sandy clay	40 "	51.4 "	164	888	36.8
Loamy clay	50 "	57.8 "	183	991	41.4
Stiff clay, or brick earth	61 "	62.9 "	201	1,088	45.4
Pure gray clay	70 "	66.2 "	212	1,145	48.8
White pipe-clay	87 "	66 "	211	1,142	47.4
Humus	181 "	69.8 "	228	1,207	50.1
Garden mould	89 "	67.3 "	215	1,164	48.4
Arable soil	52 "	57.8 "	181	980	40.8
Slaty marl	34 "	49.9 "	158	868	35.6

From this table we obtain the following general results:—

1. The sands have the smallest power of containing water, whether they are compared in weight or in volume with the other earths.

Silicious or flint sand has the least power of them all—the sands, moreover, differing according to the fineness of their grains. The finer the grains and particles, like precipitated lime, fine clay, and magnesia, the more water is taken up by the earth. Thus white pipe-clay absorbs 87 per cent. of its weight, and 66 of its volume of water, while common silicious sand takes up only 25 per cent. of water by weight, and 37.9 by volume. Coarse sand imbibes, when saturated, only 20 per cent. of water.

2. Gypsum powder very nearly approaches the sands in its hygrometric properties, taking up but 27 per cent. by weight, while fine lime absorbs 85 per cent. In this case the lime is specifically much lighter as well as finer. The lightness of fine magnesia is well known; hence the large per cent. of water absorbed by it. The same remarks will apply to humus, or pure mould.

3. It will be seen that 100 parts of arable soil take up 52 per cent. of water in weight, and over 57 in volume.

4. Slaty marl has a less capacity for containing water than one might infer from the fineness of its particles; it is, however, about 50 per cent., according to volume.

5. The large amount of water that a cubic foot of earth is able to hold, is worthy of note. We suspect that magnesia is rated too high. It is stated at 62.6 pounds per cubic foot, which is as much water as a cubic foot contains without any magnesia whatever. A cubic foot of common arable soil will hold over 40 pounds of water. The proportion of water which evaporates from the surface of leaves and the ground, and the proportion that penetrates the earth to appear again elsewhere as springs, and the part that runs off immediately from the surface when it rains, or soon after, are facts that have not been studied except to a very limited

extent. Considerably more water will evaporate even in the cool and damp climate of England from an acre of land than falls upon it, provided the earth is kept saturated all the time. One of the advantages of trenching—that is, of digging up the soil and subsoil to the depth of 18 or 20 inches over a whole field—is the increased quantity of water it will contain, and not be too wet for the healthy growth of cereal and other crops. On soils thus treated, they seldom suffer from drought, the supply of moisture from below being so enduring. Deep ploughing and subsoiling operate in a similar manner, only less in degree.

The Drying of Soils.

Kinds of Earth.	Ease of Drying.		
	Of 100 parts of Water absorbed, was evaporated in four hours, at 67° Fahrenheit—	Of 100 parts of Water absorbed, 90 parts evaporated at 67° Fahrenheit, in—	
		Hours.	Min.
Quartz sand	88.4 parts.	4	4
Lime	75.9 "	4	44
Gypsum, in earthy form	71.7 "	5	1
Stratified clay	52.0 "	6	55
Loamy clay	45.7 "	7	52
Pure gray clay	31.9 "	11	17
Carbonate of lime, in fine state	28.0 "	12	51
Carbonate of magnesia, in fine state	10.8 "	33	20
Humic acid	20.5 "	17	33
Loamy soil	32.0 "	11	15

On the drying of the deep layers of the soil in a longer or shorter time, the different looseness or consistency of the upper soil has also an important influence. Fine clay, for example, at 2 inches thickness, has a moist surface long after the surface of peaty soil is dried up at an equal depth.

If a soil contains many salts, particularly such as deliquesce, i. e. attract moisture from the atmosphere sufficient to dissolve them, like pearlash and common salt in damp places, it is characterized by peculiar hygroscopic power. All earths attract more moisture by night than by day; they also give back, through evaporation in the sunlight, the moisture absorbed at night. Schubler remarks:—"In order to ascertain how much moisture one kind of soil will absorb from the air, we laid a certain quantity of finely pulverized and fully dried earth on a plate, which was put under a glass bell made water-tight, and permitted to lie there 12, 24, to 48 hours, in a moderate temperature, (from 59° to 67° Fahrenheit,) and then weighed. The gain in weight shows the amount of water absorbed."

The following results were obtained in the manner indicated :—

Kinds of Earth.	100 parts of Dry Earth absorbed in—			
	12 Hours.	24 Hours.	48 Hours.	72 Hours.
Quartz sand	0 parts.	0 parts.	0 parts.	0 parts.
Lime sand	2 "	3 "	3 "	3 "
Gypsum	1 "	1 "	1 "	1 "
Carb. lime in powder	26 "	31 "	35 "	35 "
Carb. magnesia in powder	69 "	76 "	82 "	82 "
Potter's clay	21 "	26 "	28 "	28 "
Loamy clay	25 "	30 "	34 "	35 "
Pure gray clay	37 "	42 "	48 "	49 "
Humic acid	80 "	97 "	110 "	120 "
Plough land and corn soil	16 "	22 "	23 "	23 "

In commenting on the above table, Professor S. pertinently calls attention to the fact that "gypsum attracts scarcely no water from the air. But it is usually believed that gypsum, employed as a manure, especially promotes vegetation by attracting moisture from the atmosphere, which it transmits to plants. *Thus theories which are written down often fall to nothing when tested by experiment.*"

It is to be hoped that American farmers will soon see the importance of encouraging accurate experiments in the science as well as the practice of agriculture, and no longer dignify mere *theories* or *surmises* with the name of agricultural science.

Truth in the science, like truth in the art of tillage and husbandry, can only be established by numerous and reliable experiments.

The shrinkage of different soils in drying is thus given by this indefatigable worker. 1000 cubic lines were reduced to the following dimensions :—

Quartz sand	0 (i. e. no reduction.)
Potter's clay	940
Loamy clay	911
Pure gray clay	817
Humic acid, (mould)	800
Carbonate of lime, as powder	950
Plough land, loam soil	880

This table shows that the decrease in the volume of earth stands in direct proportion with its power of retaining moisture. The unequal contraction of earths in drying is a curious phenomenon, and produces the crumbling of clays, loams, and all compound soils, when turned up by the plough or spade.

According to Schubler's experiments, the following are the results as to the capacity of different earths to retain warmth for a longer or shorter time :—

Kinds of Earth.	Power of retaining warmth, that of limestone sand being fixed at 100.	Length of Time which 130 cubic inches of Earth need, at a temperature of 62° Fahrenheit, to cool from 145 to 70°.
Limestone sand	100	In 3 hours and 30 minutes.
Quartz sand	95.6	3 " 20 "
Gypsum earth	73.8	2 " 34 "
Potter's clay	76.9	2 " 41 "
Loamy sand	71.8	2 " 30 "
Pure gray clay	66.7	2 " 14 "
Carb. magnesia	38.0	1 " 20 "
Carb. lime	61.0	2 " 10 "
Humic acid	49.0	1 " 43 "
Plough-land loam	70.1	2 " 27 "

From the above table, it appears that limestone sand, and next quartz sand, excel all other soils in retaining warmth. In many climates, this is an advantage of great importance. Black mould (humic acid, or humus) radiates heat with the greatest rapidity. Hence, peaty soils, although sufficiently dry, being soonest cooled down to the freezing point, are the first to experience a frost in autumn. Carbonate of magnesia radiates heat with greater facility than mould, but no one meets with a soil all or nearly all magnesia; hence the radiating power of that mineral has little practical importance. In mixing soils to improve their texture and chemical properties, it is found by experience much better economy to add clay to a light leachy sand, to impart strength and tenacity to the soil, than to apply sand to stiff clay to render it more friable and porous. Experience of this kind gave rise to the old English doggerel maxims :—

> "Clay upon sand
> Makes land;
> Sand upon clay
> Throws money away."

Little land has been "made" in this country by adding a top-dressing of clay to sand; but in many localities the operation will pay well. The clay should be dug from the richest deposite within reach, and dried, to diminish its weight before it is hauled and spread. 100 tons will cover an acre an inch in depth, which will permanently improve any soil, whether sand or gravel, that is too porous and leachy. It is only, however, where land is valuable, that one can safely incur the expense of putting 100 tons of clay upon an acre; and the labor should be performed at times when the farmer has least work on hand for his teams, hired men, or servants. It is so much cheaper to grow crops on a soil that holds manure and other fertilizers well, than on a loose sand or gravel, that the skilful mixing of earths will pay better than one might at first suppose. Where lime can be had at a reasonable rate, it may be used as clay. This mineral is lacking in a large portion of the land under cultivation in the United States; but the misfortune is, that in sections where there is least lime in the soil, it is too expensive to apply an amount that will equal one per cent. of the mass, estimating the earth to the depth of ten inches. As the soil to this depth weighs 1000 tons, it will take 10 tons of slaked carbonate of lime, or 6 of caustic lime, to the acre, in case the earth lacks this mineral, to form one per cent. in the soil. There are very few soils on the limestone lands in Western New York that contain so much as two per cent. of lime. The writer has analyzed a great many of the soils that overlie limestone rocks, famous for producing good wheat, and he has found more that contained less than one per cent. of lime than that had over that quantity. A soil may, however, possess 30 or 40 per cent. of this substance, and still be productive. If it were quicklime, a much smaller amount would be fatal to vegetation; but as common lime (carbonate) is insoluble in pure water, requiring the presence of carbonic acid, or some other, to dissolve it, not enough of this alkaline earth is ever dissolved in its mild state to injure crops. On the chalk lands of England, and extensive marl deposites in this country, the fact has been abundantly demonstrated that the carbonate of lime is not otherwise injurious than in taking the place of soluble silica, potash, chlorine, or other elements of cultivated plants.*

CHAPTER V.

THE PHILOSOPHY OF IMPROVING SOILS.

It is a grave mistake to suppose that all soils can be improved with equal facility and profit. The best way to impart a high degree of fertility to any given area of earth, is a problem often very complex and difficult of solution. In some cases, a little gypsum scattered broadcast over a clover or pea field operates like magic to increase the crop; in others, this fertilizer produces no effect whatever. The same is true of bone-dust, common salt, lime, and potash. More compound fertilizers, like the dung of sea-birds, called *guano*, and stable manure, seldom, if ever, fail to improve the productiveness of land for one or more crops. Why this difference in favor of the latter?

While lime adds to the soil only one element, the excrements of domestic animals applied to it contain not only lime, but some twelve or fourteen other ingredients equally necessary to form cultivated plants. Now, unless a part of a thing is equal to the whole, the excrements of animals, no matter whether of birds, swine, sheep, neat cattle, or of the human species, must ever be more reliable to augment the productiveness of the earth than any one, two, or three simple elementary bodies, consumed in the formation of any crop. When a part of the necessary ingredients are present in the soil in an available condition, then the addition of the lacking ingredients, whether few or many, will effect the desired purpose. While this statement is strictly true, it does not militate in the least against the use of lime, bones, gypsum, salt, marl, greensand, and other popular fertilizers, whenever and wherever it can be done at a profit.

* Earths that contain a large amount of chalk or other calcareous matter are commonly very porous and dry, and support a feeble and stunted vegetation. Treading the surface with sheep, rolling it, and applying clay, are the principal remedies used on the chalk downs of England. Georgia contains a little, and Alabama a considerable area of land where there is an excess of calcareous mineral. Those that desire to study the economical value of lime in the Atlantic slope of the United States will find a vast fund of useful information in an extended "Essay on Calcareous Manures," by Edmund Ruffin, Esq., of Virginia.

In the very nature of the case, experiment or personal experience must decide this question for the farmer. Science can do no more for him than to establish general and correct principles to guide his practice and researches. But the agriculturist should weigh carefully all the facts that science and the large experience of thousands of other cultivators of the soil have recorded for his instruction and benefit.

In an able and interesting address before the Maryland State Agricultural Society, delivered at its third anniversary exhibition in October, 1850, the Hon. Willoughby Newton, of Virginia, gave the following as the results of his experience in the use of guano:—

"In the effect of *guano*, especially the Peruvian, I have never been disappointed. I have used it now for four years, with entire satisfaction, having each year been induced to enlarge my expenditure, until last year it reached $800; and for the crop of wheat this fall it exceeds $1000. I have observed with astonishment its effects in numerous instances on the poor 'forest land,' alluded to in a former part of this address. What the turnip and sheep-husbandry have done for the light lands of Great Britain, the general use of guano promises to do for ours. Lands a few years ago deemed entirely incapable of producing wheat, now produce the most luxuriant crops. From 15 to 20 bushels for one sown, is the *ordinary product on our poorest lands, from the application of* 200 *pounds of Peruvian guano.* I may remark, that it is not usual, in Eastern Virginia, to sow more than a bushel of wheat to the acre; and that I deem amply sufficient."

We regret that Mr. Newton does not state what quantity of wheat this "poorest land" in Eastern Virginia would yield without guano or manure of any kind. In the absence of such information, it is probably safe to assume that 5 bushels are about the average; if so, the gain is from 10 to 15 bushels by the use of 200 pounds of Peruvian guano. It is a philosophical question of great practical importance in farm economy to solve, *In what way does nature operate*, to make 200 pounds of manure produce 15 bushels of wheat, including, of course, the plants that bear this amount of seed?

Science, associated with practice, enables us to answer this question in a clear and satisfactory manner. Assuming the highest gain, or 15 bushels, the weight of that amount, at 60 pounds per bushel, is 900 pounds. From this 12 per cent. must be subtracted for water in merchantable wheat, which reduces the quantity to 792 pounds. Of this, 95 per cent., in round numbers, is water, or its elements, oxygen and hydrogen, and carbon, or coal. The other 5 per cent. is organized nitrogen and incombustible matter, called ash. This 5 per cent. is nearly 40 pounds in weight, and similar, in every respect, to the elements contained in the guano applied to the soil. If we may safely assume that growing wheat-plants can obtain most of their carbon from the carbonic acid in the atmosphere, and water from the same source, there is no difficulty in understanding how 200 pounds of a highly concentrated manure should supply 40 pounds of raw material for making this grain, and have 160 left for the benefit of the straw. To yield 900 pounds of wheat, requires from 1200 to 1800 of straw and chaff. As guanoed wheat usually contains less straw in proportion to the grain than wheat grown on ordinary rich land, probably 1500 pounds of straw and chaff are a fair estimate to 900 of seed. Of the combustible part of this straw and chaff, over 99 parts in 100 are carbon and the elements of water. The amount of nitrogen in straw is about one-third of one per cent. Guano supplies nearly all the wants of the stems of wheat plants in minerals, except soluble silica or flint. Potash is sometimes lacking in this fertilizer to a degree that impairs its value for growing wheat. As a crop of wheat is not taken year after year from the light sandy soils in Virginia and Maryland, soluble silica has an opportunity to accumulate, to some extent, between the large demands on the soil for this element. The power of wheat, corn, oats, and other cereal grasses, to extract carbon from the atmosphere, is one of the most pregnant facts in practical agriculture. If the essential elements of grain can be so much concentrated that 200 pounds of manure will produce 900 of wheat, *the fact* is of inestimable importance to the human family, and especially to all owners of arable land, no matter how sterile it is by nature, or poor by excessive cropping. Anxious to encourage investigations in this direction, we copy a few additional remarks from Mr. Newton's address:—

"I applied, last fall, $350 worth of guano, partly Peruvian and partly Patagonian, on a poor farm in 'the forest,' which cost, a few years ago, $4 an acre, and reaped 1089 bushels from 78 sown. Forty-six were sown on a fallow, (both guano and wheat put in with a cultivator, followed by a heavy harrow,) and yielded 790 bushels, or over 17½ per acre for one of seed. A considerable part of this was dressed with Patagonian guano, and was much inferior to the other portion. A lot on which 15 bushels were sown, and dressed with Peruvian guano, was threshed separately, and yielded 301 bushels, or over 20 for one. The cost of the farm was $1520, and I have good reason to expect, with a favorable season, from the crop now sown and dressed with guano, a bushel of wheat for every dollar of the prime cost of the farm. Many other instances from the use of guano, equally striking, have come under my immediate observation among my neighbors and friends, and I can vouch for their entire accuracy. It has been frequently objected to the use of guano, that it is not permanent. It would be unreasonable to expect great permanent improvement from a manure so active, and which yielded so large a profit on the first crop; yet, I have seen some striking evidences of its permanency in heavy crops of clover succeeding wheat, and in the increase of a crop of wheat on a second application. As an instance, I may mention that two years ago I sowed, upon a single detached acre of 'forest land,' one bushel of wheat, and dressed it with a barrel of African guano, costing $4, and the yield was 17 bushels. Last fall, the same land, after remaining one year in clover, was again sown with one bushel of wheat, and dressed with 140 pounds of Peruvian guano, costing $3, and the product was 22 bushels; yet I would advise no one to rely upon guano exclusively. Its analysis shows that it contains salts of ammonia, alkaline phosphates, and the other mineral elements necessary to produce the grain of wheat, but is deficient in most of the elements of the straw and roots of the plants."

If the last remarks were true, the dung of sea-birds and of common domestic fowls would be less valuable than experience proves it to be. Mr. E. F. Teschemacher, of Boston, gives the following as the result of an analysis of Peruvian guano made by him:—"One hundred parts consist of 9 parts of ammonia, combined with phosphoric, carbonic, uric, and organic acids; forming, of

Ammoniacal salts	40
Animal organic matter	6½
Sulphate and muriate of potash and soda	11½
Phosphate of lime and magnesia	29½
Sand	1
Water	11½
	100"

While there is but one per cent. of sand, or silica, and that insoluble, there is 11½ per cent. of salts of potash and soda, being about the same found in wheat straw.*

No fertilizers differ more in value and chemical composition than those imported and sold under the name of guano. We can no more judge from the analysis or practical effects of one cargo of this manure what the next will be worth, than from the composition of one man's soil in one locality what is the composition and what the value of a different soil in a distant locality. The true way to estimate the value of the excretions of any animal, is to learn the nature and constituents of the food on which it subsists. The mule that lives on sedge, thistles, and bushes, will yield manure vastly inferior to that of one fed on corn and oats. When a bird consumes 100 parts of dry organized fish, flesh, insects, or the seeds of plants, 80 parts, more or less, escape from its capacious lungs in the shape of carbonic acid and vapor; and 20 by the bowels, which constitute guano. It is because the food of birds is richer in the least abundant elements of plants, and their systems burn out nearly all the carbon and hydrogen in their aliment before it leaves the organs of nutrition and respiration, that the dung of this class of animals is so valuable. Every farmer knows that if 100 pounds of oats were rotted, they would form valuable manure; but how would the mass compare with 100 pounds of guano, suppose fowls had eaten oats enough to form 100 pounds of dry excrement? The composition of oats, according to Boussingault, is as follows:—

Carbon	50.38
Hydrogen	6.32
Oxygen	37.14
Nitrogen	2.24
Ash	3.98
	100.00

* Professor Way has demonstrated, in the Journal of the Royal Agricultural Society, that the money value of a ton of good Peruvian guano in England, in the year 1849, was £12 2*s.* 6*d.*; its ammonia being worth £9 14*s.*, the phosphate of lime £1 13*s.* 9*d.*, and the potash 14*s.* 8*d.* Ammonia is worth sixpence (11 cents) a pound for producing wheat at $1.25 a bushel; phosphate of lime is worth 1½ cent a pound, and potash about 6¼ cents, for agricultural purposes.

From a return printed by order of the House of Commons, it appears that 116,925 tons of guano were imported into the United Kingdom in the year 1850; being more than was imported in any year since 1841, excepting the year 1845, when 283,300 tons were imported.

It will be seen that nitrogen and ash or incombustible matter form only 5.22 per cent. of oats, and that 94.78 parts in 100 are carbon and the elements of water, carbon forming a fraction over half the weight of this grain.* Now, the best guano contains no more carbon than it does of nitrogen, and often not so much; but let us assume that the oxygen and hydrogen in oats are not estimated as fertilisers at all, and that guano made from the seeds of this plant contains as much carbon as the ash and nitrogen combined; then it is obvious that 100 pounds of oats will form but 10.44 of this most concentrated fertiliser; so that 1000 pounds of oats would yield only 104.4 pounds of guano. If a soil did not lack available carbon, oxygen, and hydrogen, but ammonia and the earthy elements of oats, who can say, in view of the chemical composition of this grain, that 105 pounds of the right ingredients might not produce 1000 of oats? To comprehend the philosophy of improving land, the farmer must have a clear perception of the existence and condition of the two tons of matter which forms that quantity of clover-hay and roots, when 100 pounds of gypsum are applied to an acre that needs sulphur, and, perhaps, available lime. When a mixture of wood-ashes, burnt bones, and common salt adds many thousand pounds to a crop of corn, where does all the carbon come from contained in the stalks, leaves, roots, cobs, and seeds of this luxuriant plant? Not a pound of carbon was applied in the fertilisers. In burning over prairies at the West, a thousand pounds or more of carbon from each acre are annually discharged into the atmosphere for centuries, while not an ounce is applied in manure of any kind. Instead of impairing the soil and robbing it of mould or carbonaceous matter, these prairies are remarkable for the dark color and richness of the earth. In this case, not only carbon and the elements of water are consumed in the annual burning of all vegetation, but whatever of nitrogen is contained in wild grass and other plants is also thrown into the air. Nothing but the ash remains to keep up the virgin fertility of the land, and that is sufficient for the purpose.

If these prairies had been *tilled*, as well as cropped by burning their products, there is no question but the exhaustion of the soil would ensue. Tillage *alone*, by increasing the solubility and solution of all the elements of plants, both organic and inorganic, hastens their removal from ploughed land. There is vastly too much land under the plough in the United States for the crops harvested. The proportion of the elements of crops which leave the soil without entering at all the roots of plants is much greater than is generally believed. No intelligent person can long study the combustible and incombustible matter that rain-water dissolves out of an arated or frequently stirred soil, in the course of the six warmest months of the year, and not be convinced of the truth of the above remark. The leaching and washing of tilled land are to be avoided by all practicable means, if one seeks to increase its productiveness from year to year. When manure enough to produce 17 bushels of wheat on poor, sandy land, can be put into a "barrel," and sold readily for "four dollars," farmers should contrast this operation with that of hauling and spreading tons of manure on an acre, which are not worth a dollar a ton. Facts like these are full of significance. We have long contended, and religiously believe, that the cultivators of American soil perform more unnecessary work every year, to obtain their crops, than the aggregate labor of all other classes combined. This prodigious loss of national industry and capital can never be prevented until the laws of nature, that govern the fruitfulness of the earth and the rewards of farm-labor, *are studied, understood, and obeyed.* The unwillingness of the people, of State legislatures, and of Congress, to foster the study of good husbandry, is the greatest marvel of the age. *Why* the dung of sea-birds is worth forty dollars a ton, and that of horses only the *fortieth part of that sum*, is a problem in farm-economy which every school-boy, fifteen years of age, should be able to solve at once. According to the analysis of the recent dung of a sea-eagle, made by Coindet, it contains uric acid and ammonia equal to 45 per cent. of that valuable fertilizer; while a horse, eating rations composed of two-thirds timothy and one-third oats or corn, would void manure that had less than one per cent. of ammonia. In all the higher animals, most of the nitrogen in their food escapes by the kidneys and not by the bowels. One hundred pounds of the dissolved salts contained in the urine of a horse or other domestic animal, dry, would be worth many times that amount of their dung.* It is not the *water* nor the *carbon*, in the liquid excretions of a cow, that make them worth $10 a year, in Belgium, for the improvement of land.

* There is reason to believe that no inconsiderable part of the carbon which enters the roots of plants from the soil comes from the atmosphere, absorbed previously by the soil, partly from the air, and partly derived from the carbonic acid contained in rain-water as it falls upon the earth. The fact, however, should be distinctly stated, that decaying plants and mould yield carbon to all growing crops.

The quantity of phosphates of potash, lime, and magnesia, of ammonia, chlorine, and other earthy constituents of crops, available to the farmer in his soil, is usually quite small. If this were not so, how could the application of only two hundred pounds of these salts in guano, to a thousand tons of earth in an acre, add fourfold to its productiveness? Estimating the soil as available to the roots of corn, wheat, clover, and other crops, to the depth of ten inches only, and it weighs two million pounds per acre. If we divide this sum by one hundred, (an amount of guano that often produces a great increase in a crop of corn,) it gives only one part in twenty thousand. The essential elements of crops constitute so small a part of the earth in which they grow, that it is not altogether improbable the time may come, when they will be carefully extracted and stored up for safe-keeping in vessels hermetically sealed, or as involatile salts. A fertiliser that will produce three pounds of wheat or six of corn for one on poor land, is as worthy of a granary as the grain itself. Why not? When two hundred pounds of guano have produced nine hundred of wheat, can the wheat be so managed, after its consumption in bread, as to form two hundred pounds of manure equal in ammonia and phosphoric acid to the original guano? Probably not; but, taken as a whole, the nightsoil may be quite as valuable as the guano. Researches in the preparation of nightsoil, and its economical value, are greatly needed in this country. Our cities and villages increase so rapidly in population, and draw so constantly from the soil its most precious constituents of human food and clothing, that unless we adopt the principle of restoring as much potash, phosphorus, sulphur, chlorine, and ammonia, as we take

* It is because 100 pounds of oats extract a little more nitrogen and earthy salts from the soil than a like quantity of wheat, that renders the former the more exhausting crop, estimating the yield in tons.

from it in breadstuffs, vegetables, cotton, tobacco, and provisions, it must become, at no distant day, too sterile for profitable cultivation. It is not necessary to return to the soil as many pounds of matter as it yields in crops; but there are few so rich in potash, chlorine, sulphur, and phosphorus, as to render it safe farming to take more of these substances in plants of any kind, than is restored to the earth. Soils often contain not over one part of phosphorus, in an available condition, in five or ten thousand; and to extract this mineral (without which not the first blade of grass, seed of grain, boll of cotton, leaf of tobacco, or crop of any kind, can be formed) and not make adequate restitution, is the extreme of folly. Pure phosphorus is worth from four to five thousand dollars a ton. This fact indicates the scarcity of the article, even in the richest virgin earths; for, like potash, it all comes from the soil. Whoever will examine the analysis of the ash of cotton-seed, or leguminous plants, will see that phosphoric acid and potash are large and indispensable elements. Except in cotton-seed, the fertilisers in most seeds are habitually wasted, or sent abroad to market. This practice, of throwing away in cities the most valuable food of plants, and then partially making up the loss by purchasing imported manure at $40 a ton, is discreditable to our national good sense and agricultural skill. If our crops need the elements of bones, ammonia, and potash, why waste these things by the thousand tons in cities and villages? If one-fourth of the weight sent to market in human food and raiment were returned to the country and the soil, (being the least abundant elements in the plants extracted from the land,) it would maintain for ever, under a good system of farm-economy, the highest fruitfulness of the earth. And who will say that the same vessels, railways, canals, and wagons, which convey four thousand pounds of breadstuffs and provisions to near or distant markets, cannot take back to the fields whence these products were drawn, one thousand pounds of the raw material for making similar organic substances? The 75 per cent. to be left in cities is essentially the carbonic acid and vapor thrown out of human lungs in ceaseless respiration night and day, which carbon and vapor came from the nutrient atoms in the blood-vessels, and from the food taken daily into the system.

All fermentation and decay in vegetable and animal substances, in town and country, discharge carbon and the elements of water into the atmosphere,—mould being the *residuum* of such substances, and containing less than 25 per cent. of the original organized matter. It is on this account that a rich mould formed from clover is worth more, pound for pound, than the clover which rotted to produce it; for four hundred pounds of the dry plants will yield only one hundred of dry mould. In the same way, a ton of dry forest-leaves is reduced to five hundred pounds of rich mould, when properly rotted and dried. Hence, five hundred pounds of good mould will suffice to grow at least a ton of cultivated plants, if it be not wasted by a cultivator who refuses to study the soil which he ploughs and hoes.

One may separate one hundred and fifty pounds of carbon and the elements of water from a barrel of flour, and still leave, with its nitrogen and incombustible matter, four times more of carbon, oxygen, and hydrogen, in weight, than of the other ingredients in the flour. If guano contained 95 per cent. of its weight in charcoal and water, as wheat does, it would never be worth $4 a barrel as a fertilizer. In one hundred pounds of dry corn there are ninety-seven of carbon and the elements of water; and it is generally easier to grow forty bushels of this grain on an acre than twenty of wheat. Experience shows that the same food of cereals which will produce twenty bushels of wheat will yield forty of maize. The prominent fact that guano and the best nightsoil operate equally to promote the growth of *all* cultivated plants, indicates that *all* require ammonia and phosphates; which is true. It also indicates that the things contained in nightsoil, and in the dung of birds, or in the excrements of flesh and fish-eating animals, are not abundant in ordinary soils; which is also true. As it takes not far from five pounds of corn to form one of beef, we should not be surprised to find that nature is as true to vegetable as to animal life, and so enables a pound of beef to produce five of corn. The quantity of different kinds of vegetable food consumed to form a given weight of flesh is an interesting study. Three and a half pounds of cooked cornmeal have yielded one of pork; or three hundred and fifty pounds have produced one hundred of the flesh and fat of swine. Thrifty sheep give quite as large a return; cattle a little less. This whole subject needs further investigation. The circumstance that some animal perchance eats the beef in advance of corn-plants affects not the purpose of nature in the least.

The reader may infer from the remarks offered on "the philosophy of improving land," that we regard good economy in feeding plants, and in saving the most valuable raw materials for making them, as the direct road to such improvement. We assume that the soil has been properly drained and limed, if it needs either, and that it does not lack vegetable mould. In addition to what has been said about the elements of crops, and their scarcity in ordinary soils, we desire to call attention to a few of the best plants for enriching land, which draw from the *subsoil and atmosphere* the most valuable atoms consumed in making human food and clothing. Some plants, like mosses, flourish on naked rocks; others can subsist on sterile sands; while by far the larger part of the vegetable kingdom would have no existence, unless the surface of the earth possessed nearly the degree of productiveness now exhibited. Destroy this productiveness by tillage or other means, and, in time, you make a barren, naked desert. But, instead of impoverishing the earth, a sound public policy demands that we should increase its natural fruitfulness, to meet the increasing wants of an ever-augmenting population. To achieve this result in the most economical manner, recourse must be had to the agency of growing vegetation. Among the plants best adapted to the improvement of land are the grasses, trifolias, legumes, turnips, and other root crops. In skilful hands, these can be so managed as to produce a great deal of cheap manure to enrich the surface of the earth, while the substance of the manure itself will be mainly drawn from the subsoil and the atmosphere. Peas have proved the best crop in the Southern States for the renovation of partially exhausted fields; but we are inclined to believe that a legume called *sainfoin*, *sanctum fœnum*, or "holy hay," which has long been cultivated in the South of Europe, and is remarkable for the length of its roots and the depth to which they descend into the earth, will be found, on a fair trial, a more valuable plant. The roots of the pea-plant do not descend so far as those of clover and lucerne, and, on that account, do not draw so much of the mineral food of crops from the deep resources of the earth as is desirable. In an interesting chapter on "St. Foin," Jethro Tull remarks:—

"The reason why St. Foin, *in poor ground*, will make forty times greater increase than the natural turf, is the prodigious length of its perpendicular tap-root. I have been informed, by a person of undoubted credit, that he has broken off one of these roots in a pit, and measured the part broken off, and found it fourteen feet. This tap-root has a multitude of very long horizontal roots at the upper part thereof, which fill all the upper stratum or staple of the ground; and of the thousands of St. Foin roots I have seen broken up, I never found one that was without horizontal roots near the surface, after one summer's growth."

In a note, the same author has these remarks:—

"There is a vulgar opinion that St. Foin will not succeed in any land where there is not an understratum of stone or chalk to *stop the roots from running deep:* else, they say, the plants spread themselves in the roots only, and cannot thrive in those parts of them which are above ground. I am almost ashamed to give an answer to this."

"It is certain that every plant is nourished by its roots as an animal is by its guts; and the more and larger roots it has, the more nourishment it receives, and prospers in proportion to it. St. Foin always succeeds where its roots run deep; and when it does not succeed, it never lives to have long roots," &c.

There is strong sense and plain Saxon in what this English farmer writes, who was about a century ahead of his time in agricultural improvement.

He says:—"Any dry ground may be made to produce this noble plant, be it ever so poor; but the richest soil will yield the most of it, and the best. If you venture to plant with the drill, according to the method wherein I have always had the best success, let the land be well prepared before you plant it." Tull was careful not to cover the seed over a half inch in depth, and not to have it thick in the drill, particularly on poor land. In France, with decent culture, two or three good crops of this "holy hay" are made in a year. In favor of thin seeding and the resources of the subsoil, Tull has the following remarks:—

"It is common to see a single St. Foin have a bigger tap-root than twenty thick ones, (thickly planted,) and their length is in proportion to their bigness; therefore, that single plant may well be supposed to have twenty times more depth of earth to supply it than all those twenty small roots can reach to. And though these under-strata are not so rich as the upper, yet, never having been drained by any vegetable, *they do afford a considerable quantity of nourishment to those which first enter them.*"

The above was written a hundred and thirty years ago, and before subsoiling and the analysis of soils were known. Science and experience have alike demonstrated the fact that the "under-strata" of an impoverished soil are richer than the earth or stratum at the surface. The following practical suggestions are worthy of attention:—

"Notwithstanding I commend the planting of St. Foin thin, that most of the roots may be single, yet I have fields that were drilled with but four gallons of seed to an acre, and yet, the rows being seven inches asunder, the roots are so thick in them that the ground is covered with the plants, which seem to be as thick (in appearance) as most sown St. Foin whereon seven or eight bushels are sown on an acre. I have other

fields that were drilled with about two gallons of seed to an acre, (which is five seeds to each square foot,) the rows sixteen inches asunder, *that produce better crops though the ground be poorer.* The drilled St. Foin, being regular, is more single, though as thick as the sown, and for that reason always makes a better crop, and lasts longer than the sown that is of the same thickness, but irregular." Again, he says: "I have now a great many single St. Foin plants in my fields that are near *thirty years of age*, and yet seem as young and vigorous as ever; and yet it is common for thick St. Foin to wear out in nine or ten years, and in poor lands much sooner, if not often manured with soot, peat-ash, or coal-ash."

Wood-ashes and lime would doubtless be the best fertilizers in most districts of the United States. We invite particular attention to the age or long life of this legume, or "holy hay." It reminds us of the "Tree of Heaven," (China tree,) whose multitudinous roots spread all over a small neighborhood, and whose leaves are devoured so greedily by cattle.

Tull learned to cultivate St. Foin in Languedoc, where he spent several years, and was able in England to cut his earliest crop in the beginning of May, before blossoming. He divides the crops into four sorts, viz: "1st, the virgin; 2d, the blossomed; 3d, the full grown; 4th, the thrashed hay." Although the following remarks are a little too ethereal, in the main they are true: "The first of these (virgin hay) is best of all beyond comparison; and, except lucerne, has not in the world its equal. This must be cut before the blossoms appear; for when it stands until full bloom, the most spirituous, volatile, and nourishing part of its juices is spent on the next generation; and this being done, all at once the sap is much depauperated, and the St. Foin can never recover that richness it had in its virgin state. And though in blossom, it be literally in the flower of its age, it is really in the declension of it. If it be said that what is not in the stalk has gone into the flower, it is a mistake, because the greatest part of its quintessence perspires thence into the atmosphere." The aroma, or "quintessence" of "holy hay" in blossom, is doubtless something very nice, but subsequent experience in hay-making and vegetable physiology does not sustain the practice of cutting forage plants before they blossom, to improve the food or crop. Our author says: "The owner of this hay, if he be wise, will not sell it at any common price, but endeavor to have some of it every year, if possible, for his own use." A full crop of this hay cut when in blossom, is three tons per acre. In stacking St. Foin, Tull recommends pulling up a basket in the centre of the stack, as the rick is made, to form a "vent-hole" for air to circulate through and carry off dampness. *Sainfoin* seed is cheap and abundant in France; and we should be happy to see the cultivation of this perennial, deep-rooted legume fairly tested in the Central and Southern States, where we believe it would be valuable. Its seed is worth more per bushel than oats, and is hardly inferior to peas as food for domestic animals.

Lucerne, the *herba medica* of the Romans, has maintained a high reputation in the South of Europe for twenty-five centuries. It has been successfully cultivated in Chili, Peru, and Brazil, and from the last-named country introduced into this, under the name of Brazilian clover.

If the Chilian clover-seed ordered from Valparaiso should turn out to be a variety of the *medicago sativa*, or sainfoin, we shall not be disappointed. Mr. Loudon, in his Encyclopedia of Gardening, says: "Lucerne is highly extolled by Roman writers; it is also of great antiquity in Spain, Italy, and the South of France; is much grown in Persia and Peru, and mown in both countries *all the year round.*"

We have traced the roots of this plant growing in the light, sandy soil of Georgia to the depth of 34 inches; and, like sainfoin, peas, and red clover, it draws largely on the atmosphere for its organic nourishment.

With a directness from the "well of English undefiled" which we cannot but admire, Tull speaks of its "tap-root that penetrates deeper into the *bowels* of the earth than any other vegetable she produces." He describes a plant on his farm twenty-two years old; and still in its youth. He says: "Its roots are abundantly longer than the roots of St. Foin; I have one that measures very near two inches in diameter; those which are higher than the ground have a bark like a tree. Upon this account, and by its stalks springing again just below the place where cut off, and by the woody hardness of its stalks when they stand too long without cutting, it seems that lucerne is of a nature nearly approaching to that of a shrub. It is the only hay in the world that can pretend to excel or equal St. Foin." This "medica" and classical hay, which was cultivated in beds by the Romans without iron-plough, hoe, or rake, is too well known to need any encomiums. It does best in a deep, permeable soil; and where the subsoil is compact, it must be broken, either by trenching or the use of the subsoil plough. Like St. Foin, it is best cultivated in drills, which should be far enough apart for a horse to walk between the rows to draw a hoe or cultivator.

If these plants shall prove as popular in this country as in Europe, it will be a very profitable business to raise their seeds for sale. After the farmers began to sow clover-seed in the Northern States for the purpose of renovating wheat lands, the production of this seed was for many years the most profitable branch of agriculture known in that region. At present, clover-seed is too cheap for the business to be very remunerative. We do not believe that lucerne or St. Foin is likely to take the place of clover in any district where the latter does well; but they are worthy of trial on "clover-sick" fields.

The pines that grow spontaneously on the impoverished and abandoned fields in the Southern Atlantic States, present a very instructive lesson to all that seek to understand nature's process for restoring fertility to the surface of the earth. Nature hauls no lime, nor marl, nor manure of any kind. She never ploughs, nor hoes, nor stirs the soil at all; yet she forms a black mould where man had robbed the ground of this necessary aid to the support of the higher orders of plants and animals. To study closely her operations in the process of enriching soils, is the highest wisdom of the practical husbandman. The seeds of pine-trees have a structure that peculiarly fits them to be carried a great distance by birds and winds, and scattered far and wide over the whole surface of the earth. Under favorable circumstances, these seeds germinate and grow into forests. We have studied only the sprouting and growth of the seed of the long-leaf pine on the poor sandy lands of Georgia. By the time its first two leaves have attained a length of 3 inches, its tap-root has descended 6 into the ground, and continues to penetrate into the earth, when unobstructed, any distance from 3 to 9 feet, and how much farther we know not.

Pines are endowed with a large quantity of foliage, and their leaves annually fall, to decay and form new mould. In 1000 parts of these leaves, when thoroughly dried, we found 40 of incombustible earthy matter; while the same amount of pine wood gave only 2½ parts of ash. If the trunks of pine-trees consumed as much of earthy minerals as their leaves do, these trees would always be very small, and could grow only on land rich in potash and the other elements found in wood-ashes. But while the exceedingly deep roots of this tree find the mineral constituents of vegetation far below the pasture of common plants, and the reach of the farmer's subsoil plough, these minerals, instead of being deposited in the substance of lengthened roots, in the trunk and branches of the tree, are nearly all contained in its innumerable and peculiarly long leaves, and with them, in the economy of Infinite Wisdom, go to enrich the surface soil, that it may again become fruitful in bread-bearing plants. No soil, naturally poor in potash, can grow a dense forest of oak, hickory, walnut, maple, beech, and elm trees; for all these store up potash in their trunks, limbs, and roots, to a large degree. But 100 parts of their leaves, which annually fall to the earth, contain from 7 to 15 times more of incombustible matter than a like weight of their wood. The bark of these forest-trees, and of all others so far as known, yields much more ashes than wood. In the tree called hemlock, this fact is strikingly illustrated; for, while its wood yields very little ash, its bark abounds in incombustible matter. This bark, like that on one variety of hickory, is cast off, and falls to the earth to rot, and feed vegetation. Professor Emmons has investigated this subject of the distribution of the minerals in forest-trees, in their heart and sap-wood, bark, &c. in a very satisfactory manner, and published the results in his "Agriculture of New York." Forest culture can be made more profitable in the United States than is generally supposed. There is very little land that will not grow the equivalent of a cord of good pine-wood a year, and much that will produce a cord and a half in twelve months. In connection with the improvement of soils, the cultivation of good timber can be prosecuted at a round profit. We are collecting facts on this too much neglected branch of rural economy, and hope to be able to furnish some useful information on the subject in our next Report. A forest cannot be grown in a day; and before seeds planted in 1850 can yield much valuable timber, the United States will contain fifty millions of inhabitants.

The overflow of rivers and smaller streams and artificial irrigation should not be entirely unnoticed in this review of the principal means employed by nature and man to impart fertility to cultivated soils. River bottoms like those of the Nile, Euphrates, and Ganges, which are annually inundated, were, doubtless, first cultivated in wheat, rice, and other cereals. Under the most favorable conditions, such bottoms or flats required neither tillage nor manure of any kind to yield an annual crop of grain. Pliny remarks: "How easy is the husbandry of Egypt; for there the Nile, serving the turn of a good husbandman, begins to swell and overflow at the first new moon after the summer solstice. He begins fair and gently, and so increases gradually, as long as the sun is in the sign of Leo, and rises to his full height. On entering into the sign of Virgo, his fury slackens, and then slowly decreases until he regains his wonted channel.

"It is always observed that, if he rises not above twelve cubits high, the people are sure to have that year a scarcity; and they make their account for the same if he exceeds sixteen cubits, for the higher he rises the longer he is before he is fallen to his level; by which the seedtime is past, and men cannot sow the ground in due season. It is generally understood that upon the subsidence of the deluge, they cast seed upon the flooded land, *and turn in their swine to trample it into the soil when moist.*"

Cereals are grown by the above operation without the aid of plough, hoe, or harrow. The water stood long enough over the bottoms to kill all ordinary weeds and grass; and the seed-wheat, trampled in by droves of hogs, had the advantage of all other plants. It is difficult to imagine a more primitive system of grain culture. But droves of swine could not always be at hand to tread in seed at the time when their services were indispensable. Some land would become too dry before the grain was covered, and the feet of hogs or cattle would fail to bury it in the earth. In this dilemma, the ancient Egyptian "*sarcle*," as the Romans called it, was invented for digging up the ground. This implement, from drawings and inscriptions, appears to have been something between a modern hoe and a pick-axe. A slight change in its structure converted it into a rude plough, which was first drawn by men and women. The subduing of cattle to field labor, hauling the plough by their horns or by their tails, was altogether an afterthought. Pliny remarks:—"In Lower Egypt, the straw is never a cubit long; the reason being that the seed lies *very dry*, having no other nourishment than the mud of the river; and there is nothing underneath but sand and gravel. But in Upper Egypt, about Thebes, they are far better farmers, and have better harvests; that part being, as indeed most of Egypt is, *low* and *flat*." He goes on to say:—"The same husbandry is practised in Babylonia and Seleucia, where the Euphrates and Tigris overflow their banks in like manner, but to better effect and greater profit, owing to their more general use of sluices and floodgates. In Syria, they have small, light ploughs on purpose for making these shallow furrows and stiches; whereas *with us in Italy*, in most places, eight oxen, at least, are required for one plough; and, indeed, to make speed with it, they must work till they blow and pant again."*

The breaking of American prairie of the West with eight oxen, panting and blowing, would, even now, look quite familiar to an old Roman, could he witness the operation. The early history of agriculture, and the kind of tillage that prevailed in Egypt when its husbandmen fed abundantly, through successive years of famine in surrounding nations, the population of such immense cities as Thebes, claimed a passing notice. It is a curious fact, that the comparatively independent wheat-growers of the inundated bottoms of the Nile, Euphrates, and Tigris cherished a sovereign contempt for the people who depended mostly on their herds and flocks for the means of subsistence. Joseph warned his brothers that, when they came before Pharaoh, they should say: "Thy servants' trade hath been in cattle, both we and also our fathers, that you may dwell in the land of Goshen; *for every shepherd was an abomination to the Egyptians.*" The rearing of "cattle" was more reputable than sheep husbandry; but corn culture was the glory of kings before the time of Abraham.

The science of agriculture and the true principles of tillage are no better understood now, by the mass of mankind, than they were five thousand years ago. Thirty years of unremitting labor to establish agricultural

* Pliny Hist. b. 18.

schools in the great State of New York have signally failed, from the lack of popular sympathy and countenance. Without the aid of chemical research, Jethro Tull, a century and a half ago, came as near to a correct knowledge of the use and value of mellowing frequently, and deeply stirring the soil, as one can. With all his genius, talents, and large experience, he fell inevitably into a false theory about "the pasture of plants," and "tillage being a perfect substitute for manure." No man in modern times has had a clearer or juster conception than Tull of the mechanical results which follow the deep and thorough "pulveration of the soil." Of the chemical effects of tillage, he knew next to nothing; and it was his lack of knowledge, as revealed by modern science, that led him into error.

"By tillage," says this distinguished writer, "we can enlarge our field of subterranean pasture without limitation, though the external surface of it be confined within narrow bounds. Tillage may extend the earth's internal superficies in proportion to the division of its parts; and as division is infinite, so may the superficies be. Every time the earth is broken by any sort of tillage or division, there must arise some new superficies of broken parts which were never broken before; for when the parts of earth are united and incorporated together, it is morally impossible that they or any of them should be broken again *only in the same places.*"

The above reasoning on mere mechanical principles is unquestionably sound; but when an indispensable ingredient for making a plant is absent from the soil, and not supplied by art nor by the atmosphere, how can any degree of stirring or pulverizing the earth create the lacking element? Can any human art or use of implements form a new atom by tillage? When all the available potash within reach of the plough is consumed, what then? While it is apparent that something more than tillage may be necessary, the father of drill husbandry to the contrary notwithstanding, it is proper to remark that but few farmers have brought their practice up to the full appreciation of the benefits of frequently stirring the earth, and mellowing it, to the depth of ten, fifteen, or twenty inches. The object of the agriculturist is to make the most of all the elements of crops which his soil contains. The raw materials of bread and meat at and near the earth's surface are the gift of Providence; and it is not less the duty than the interest of the husbandman to *husband* them with great care and wisdom. To break the undercrust, or subsoil, so that water, air, and warmth may freely descend and ascend about the roots of plants, and thus supply them at all times with their appropriate aliment, and enable them to grow in all directions, is the crowning glory of modern agriculture. In many places underdraining is also necessary. This is particularly the case where a field lies in a basin, having higher land near it, whose water-shed carries a part of that which falls in rains into the ground below and at a distance. In most of the States, if not in all, where a soil contains no more water than what falls upon it, underdraining is rarely necessary. But the unevenness of the surface, and the variable direction of many geological strata, operate to convey the water which falls on one acre or field into the earth of another acre or field. This of course gives an excess in certain localities, to be disposed of only by drains or open ditches. The growth of grasses and rushes peculiar to wet places will indicate where draining is required to sweeten the soil. Viewed as a mere mechanical operation, the farmer must see to it that his tilled ground is neither too open nor too compact; that its depth and friability are maintained by the due admixture of sand, clay, and vegetable mould, aided by draining where necessary. Sandy, porous soils are improved by the use of a heavy roller and the treading of sheep, hogs, and young cattle, which should be fed on fields of this kind. There are usually more fine particles of earthy matter from eight to twelve inches below the surface than at it, which, being brought up by the plough, mingled with the surface sand, and rolled after seeding, will much improve the texture of the soil. Old fields are more apt to become compact, heavy, and lifeless, than too open and pervious to air and water. How to renovate and rejuvenate an exhausted clay soil will be better understood after we have studied the next chapter.

CHAPTER VI.

CHEMICAL EFFECTS OF TILLAGE.

We have seen in the preceding chapters that the minute subdivision of the soil operates to condense atmospheric air and other gases within its pores. It enables water to descend and ascend with great freedom through the mass of tilled earth. We have now to consider the chemical effects which follow from the breaking and stirring of the ground. To render our explanations clear and satisfactory to plain, unscientific farmers, it is proper to give the meaning of several words unavoidably used in discussing this subject.

That important hidden changes do take place in the soil, in consequence of good tillage, not to be explained by any mere mechanical theory, few intelligent men will deny. What are these occult changes in the earthy matter operated on by the implements of husbandry? At what point shall we begin to study them?

1. All matter is supposed to be endowed by its Creator with certain *forces* tending to form compound bodies, which forces exist sometimes in an *active*, and at others in a *quiescent*, state.

To illustrate: if the two gases called *chlorine* and *hydrogen* be mixed in the dark, no combination takes place; but if brought into the light, under the direct rays of the sun, the slumbering forces in these two bodies are excited into action, and a chemical union occurs with an explosion. An intense acid is formed, called hydrochloric or muriatic acid, which differs widely from both of its elements.

2. Different substances are endowed with *peculiar* forces, the intensity and other peculiarities of which can only be learned by observation and careful experiment.

Thus, the metals called iron, nickel, and cobalt, alone possess the force denominated magnetism—other metals have no magnetic power. A knowledgo of the *forces* inherent in the elements of cultivated plants is invaluable to the husbandman; for he deals constantly with these elements, and labors to change them—now into manure and available food of plants, and now into grain, grass, milk, and meat, as food for man and his domestic animals. The chemist finds five pounds of pure sulphur in 100 pounds of wool. This well-known mineral can only come from the food of the animal and from the soil. We now bring the wool-grower directly to this point: Does your soil contain, in an available condition, sulphur enough to produce luxuriant crops of such plants as are best adapted by nature to keep sheep in good health? If not, then no amount of tillage, none of the chemical changes resulting from it, can give you good crops of clover, turnips, or cabbages. Why are 100 pounds of cabbage, exclusive of water, when perfectly sound, worth more as feed for sheep or cows, than a like weight of rye straw? That land too poor to yield a generous crop of cabbage will produce a fair one of rye or buckwheat, is known to most farmers. Although sulphur is not the only substance that exists far more abundantly in cabbage than in the other plants named, yet it is an element that seldom abounds in well-drained soils. Tillage can do much to promote fertility; but it cannot create something from nothing, nor change one elementary body into another. But tillage is usually more efficient to impoverish an arated field than to improve it; and it is this deteriorating effect of cultivation, irrespective of all crops, to which we desire to call particular attention. The chemical changes in the soil, produced by ploughing, are quite independent of the presence of plants. Tillage dissolves more silica, potash, soda, lime, magnesia, chlorine, iron, mould, sulphuric and phosphoric acids, than would be dissolved without this operation. If this were not so, the farmer would have as little occasion to plough, harrow, and hoe, as nature has when forming her most abundant products of the earth. After tillago has dissolved the elements of crops, they do not remain long in well-drained land, if no plants are present to imbibe the water that holds them in solution. Wherever the water runs, most of the organic and inorganic constituents of vegetables go with it, after they are fairly dissolved, like common salt in water. There are, however, several modifying chemical and physical properties in good soils, by which, when irrigated with water holding saline minerals in solution, a part of these fertilizers is retained. Thus, if the sulphate or muriate of ammonia in a weak solution be passed through a clay soil, the salt is decomposed, the ammonia is retained by the alumina, and the chlorine or muriatic acid, or sulphuric, as the case may be, will pass through as the chloride or sulphate of lime. Professor Way has published some interesting experiments on this subject, in a late number of the Journal of the Royal Agricultural Society of England. The effects of irrigation, both natural and artificial, and of tillage, on the chemical constitution of the soil, demand further research. A good deal more water will evaporate from an acre of land, than falls upon it in the course of a year. Hence a good supply of moisture in the subsoil, to rise by capillary attraction about the roots of needy crops in dry weather, to keep good the fluids circulating in plants when evaporation at their leaves is most active and profuse, is a matter of the highest importance. As a general rule, less water will ascend from the subsoil to the surface than descends into the earth—a part going to feed wells and springs or underground rivulets. What portion of the water that annually falls in rain and snow runs off into creeks, rivers, and swamps, on the surface; what portion sinks directly into the ground; and of this, what part rises again and is evaporated from the leaves of plants or from the naked earth, we are not informed; nor are there data sufficient, at present, to warrant an extended generalization on the subject. The common practice in England of placing numerous drains in the earth, at from 30 to 50 inches below the surface, and measuring the fall of water on a given area, and the quantity that percolates through soils of different texture into these covered conduits, has furnished nearly all the information we possess on the points under consideration. From one-tenth to a sixth of all the water that falls on a level or nearly level surface in the course of a year, will find its way into well-constructed drains in the climate of England; but a very humid atmosphere, with a low mean temperature, is ill adapted to the rapid evaporation of water from the foliage of plants and the surface of the ground. According to observations made by Charles Charnock, Esq., through a series of five years, and published in the Journal of the Royal Agricultural Society of England, for 1849, a soil which evaporated 33.61 inches of water in 12 months, had this quantity reduced to 22.48 inches when kept in the shade. This fact shows that shade and sunshine, as well as humidity and dryness, heat and cold, exert a powerful influence on the ascent and descent of water through the soil. In England, it is found, by experiment, that a quarter more water will evaporate from the surface of an acre than falls upon it, if artificially irrigated. Anxious that investigations of this kind should be prosecuted in this country, we will give a few of the results of researches and observations made by Mr. Charnock:—

In 1842, the fall of rain was 26.11 inches; the evaporation, in the sun, 30.02. In 1843, the fall of rain was 24.49; the evaporation, 31.19. In 1844, the evaporation was 37.85; while the fall of rain was only 19 inches. The evaporation was from a soil kept saturated by the frequent application of water in measured quantities. The quantity that fell was determined by a rain-gauge in the usual way. In 1845, the fall of rain was 28.18; the evaporation 31.09. In 1846, the fall was 24.24 inches; the evaporation, 23.28. The mean evaporation in the five years named was 32.686 inches; the fall, 24.402. The quantity of water that will percolate through a soil or common earth to the depth of three feet, depends so much on the physical properties and condition of the mass in each instance, that a large number of experiments on various soils can alone settle the question. The quantity of water that filtered through three feet of earth was, in 1842, 4.55 inches; in 1843, 4.28; in 1844, 3.60; in 1845, 4.92; in 1846, 6.76. These results were obtained by means of a leaden vessel three feet deep and one foot square, into which were put two feet of gravel and calcareous sand, so as to represent the substratum of the farm, and the remainder was filled up to an inch of the top with an average quantity of soil. At the bottom a pipe was inserted, which conveyed all the water that filtered through into a bottle, which was regularly emptied and registered. The leaden vessel was inserted into the ground to within an inch of the surface, keeping the level of the soil inside and outside alike, with an inch of the vessel above, to prevent any communication of water from without. The soil was kept free from weeds, and occasionally stirred, that it might not be more than ordinarily compact.

To determine the evaporation from saturated soil, a leaden vessel thirteen inches deep and a foot square was filled within an inch of the top with soil, and placed in the ground in the same manner as the previous vessel, with a pipe level with the surface of the soil to carry off the excess of top-water into a receiver. This soil was also stirred occasionally, to correspond with the tilled land which is wet and undrained. It will be seen that more water than falls upon a field must come into it, either by springs from below or by running over the surface, by filtering through the earth from the dip of its strata or the unevenness of the ground, to

supply as much as will evaporate. If heavy showers did not fall suddenly, it would be rare for the surface-soil to contain any considerable excess of moisture on common land. We have already stated that the earth on an acre weighs 2000 tons by going to the depth of twenty inches. This will hold from four to six inches of water without inconvenience, if equally distributed. An acre of water an inch deep is not far from 25,000 gallons, so that where forty inches fall in a year a million gallons are received on each acre. How to make the most of this water, whatever the precise quantity, and prevent all damage from washing and undue leaching, is a study that commends itself to the attention of every farmer.

We have known wheat sown the first of December to be harvested by the 20th of May, in Georgia; while in Maine, wheat sown the first of September is rarely ready for the cradle before the first of August. Why should five months and twenty days suffice to grow a crop of wheat—and they include all the cold of winter—in the State of Georgia, while eleven months are necessary in the State of Maine? We draw the following inferences from the facts named:

1. That as great *chemical changes* take place in the soil of the Southern State in six months as occur in the soil of the Northern State in eleven months. These changes consist essentially in decomposing both organic and inorganic substances which were before insoluble in rain-water, so far as is necessary to render them soluble and in a condition to enter the roots of plants.

2. That air, heat, rain-water, and probably electricity, are the prime agents in effecting the necessary chemical changes in the surface of the earth which supply, day by day, aliment to all vegetation.

3. As much water enters the roots and passes out of the leaves of wheat-plants in six months in Georgia as in eleven months in Maine. From the increased activity of all chemical, physical, and vegetable phenomena at the South, the intelligent reader will see why a defective system of tillage and husbandry there should impoverish the land faster than at the North. But the same agencies which rapidly exhaust the elements of crops when misdirected, will recuperate with equal facility and regain the lost fertility in the warmer climate. To ascertain the changes that transpire in cultivated and uncultivated soils in the course of three, six, nine, and twelve months in different latitudes, and under various circumstances, is not so formidable an undertaking as some may suppose. By leaching a cubic foot of rich earth six months with rain-water as it falls from the clouds, one may grow wheat, corn, or other plants in pounded glass with the fertilizers so extracted; and by applying a known quantity to the crop, and weighing it when matured and thoroughly dried, we can determine the relative weight of the plants organized, and of the food given to them. Thus, if a corn-plant weighs when dry eight drachms, and has received only one drachm of dissolved organic and inorganic matter extracted from a rich soil, it is plain that ground glass, heated to burn out all vegetable substances, and washed in hydrochloric acid, still further to purify it, could not yield the other seven drachms of weight in the corn. It must have drawn 87½ per cent. of its solids, which are carbon and the elements of water, from the atmosphere and water. There are other ways in which the writer has been able to demonstrate the important fact, that, in forming one hundred pounds of organized matter in cultivated plants, the soil

parts with less than fifteen pounds, and often less than ten, of its solids. Sand that has been burnt at a red heat for some time, and boiled in a strong mineral acid, will grow crops by feeding the plants on such of their constituents as good soils or the best manure furnish. In truth, the substance of the earth which does not dissolve when a crop is growing has no more to do in adding to its weight than ground glass has, or than cotton has, when plants are grown by extending their roots into its moist fibres. It is a knowledge of this fact which has led to the extensive culture of mere drifting or desert sands, with the aid of ashes and guano. The more we learn of the raw material of crops, as it exists in the soil, the less important is it that the surface of the earth abound in such raw material as is supplied by nature.* Science corrects these defects with constantly increasing facility. Bone-earth, or phosphate of lime, is a mineral less abundant in most soils than is desirable; but chemistry has demonstrated that all cities abound in phosphates of lime, potash, and magnesia, and in ammonia, which are derived from the breadstuffs and provisions consumed by their inhabitants, and the oats, hay, and other food of horses and cows kept within their limits. That fertilizers of this kind are generally allowed to run to waste, not only in cities, but in villages, and even on many farms, is a fact known to every agriculturist. There are, however, extensive natural beds of *apatite* (phosphate of lime) being discovered by the researches of geologists and chemists, which promise greater usefulness to agriculture than any deposites of gypsum known. Professor Emmons, of Albany, has recently presented specimens of this mineral from an extensive bed near Crown Point, New York, to the State Society, which is noticed in the December number, 1850, of the journal of said society. Dr. Buckland, Dean of Westminster, has an instructive paper on the "Causes of the presence of phosphates in the strata of the earth," in the tenth volume of the Journal of the Royal Agricultural Society, from which we will copy a few sentences:—

"Professor Liebig five or six years ago invited the attention of agriculturists to the possibility of applying to the same use as bone-dust and guano the fossil bones and coprolites† which occur together in certain beds of the lias formation. This invitation took place not many months after I had the honor of conducting him to the well-known *bone-bed* in the lower region of the lias at the Aust Passage Cliffs, on the left bank of the Severn, near Bristol, where two beds of lias (each from one to two feet thick) are densely loaded with dislocated bones and teeth and scales of extinct reptiles and fishes, interspersed abundantly with coprolites, derived from animals of many kinds, which seem to have converted that region into the *cloaca maxima* of ancient Gloucestershire at the time of the commencement of the formation of the lias. * * * In 1846, Professor Henslow laid a paper before the British Association, at Cambridge, on the abundant occurrence of the ear-bones of whales in the crag-beds of Felixstow, on the coast of Suffolk, together with large quantities of rolled pebbles of phosphate of lime, (which he then supposed to be coprolites,) among the miscellaneous gravel and shells that compose the bulk of the crag formation. About this time, also, Professor Solly's analysis of these supposed coprolites proved their chemical composition to be nearly identical with that of real coprolites from the lias; and the attention of agriculturists was invited to their use, as a manure of nearly equal value with guano or bone-dust. Mr. Solly's advice to agriculturists, to make use of this newly-discovered storehouse of fertility, has been duly responded to; and *many thousand tons* of these pebbles and bones have been collected from the shore near Felixstow, ground, and used as a manure."

* The idea advanced in the text is, that science and art are able to remedy natural defects in soils with ever-increasing economy as the positive wants of cultivated plants are more closely studied and better understood. In this way, knowledge is better than money or rich lands, for it is a perennial source of wealth, enjoyment and independence.

† "Coprolites" are fossil or petrified dung of sea-animals, amphibials, and birds, found in fossiliferous rocks.

When it is known that these fossil-bones of whales are many feet above the ocean, and that not an inhabitant of the tertiary sea in which they flourished is now found, we are constrained to acknowledge that science has taught farmers how to form bread and meat from the remains of animals that lived and died before the island of Great Britain had an existence. From the Hudson to the Rio Grande, the Atlantic and Gulf States contain many tertiary strata, having fertilizers of great value. French burr, greensand, chalk, and other valuable deposites, exist in Georgia.

Doctor Buckland thus graphically indicates the way in which fertile earths were formed, long before there was "a man to till the ground:"—

"I believe the essential condition was the admixture (in a fluid or semi-fluid state) of all the now consolidated ingredients of the marlstone and of the septaria, (which we use to make our Roman cement,) viz. of clay, *carbonate of lime*, and *protoxide of iron*, in a state of mud on the sea-bottom at the time of the disengagement of phosphoric compounds from the dung and putrefying bodies of fishes and of molluscous animals and marine worms at the bottom of the seas in which the deposition of the London clay was going on. These conditions that attended the deposition of the London clay were similar to those attending the deposites of sedimentary mud (subsequently converted to beds of clay and marl) in all geological formations since the waters were first peopled with swimming creatures of ten thousand kinds, with creeping things innumerable, both small and great beasts.

"From the first creation of fishes, to fill and multiply in the waters, there must have been a never-ceasing deposition of phosphoric compounds in every bed of mud that was in progress of accumulation at the bottom of all inhabited portions of seas, and lakes, and rivers; and thus the fecal dejections of all subaqueous animated nature must, by their decomposition, have supplied daily and hourly accessions of matter convertible to *phosphorite*. There must have been, also, a further never-ceasing supply of phosphates from the decay of the bodies of all these animals after their death—i. e. from the dead bodies of all fishes, and mollucss, and sea-worms that were not devoured by other animals."

The above reasoning will account as well for all the other elements of living beings necessary to fertility in sedimentary rocks having sand, clay, lime, and iron for their mass, as for phosphorus. This learned geologist and divine, who has done so much to popularize the great truths of science, remarks that, "where the bottom of the sea was covered only with silicious sand, no phosphoric combinations could take place; and hence the barrenness of the great silicious sandy deserts of the world; but where the bottom of the water contained, in an unconsolidated state, the ingredients of future marl, or marlstones, or septaria, conditions were present favorable to the formation of the new combinations of phosphorite."

Before tillage is applied to the soil, a large share of its phosphoric acid is combined with alumina and iron, and a large portion of its potash, soda, lime, and magnesia with silicic acid. In these forms, silicic acid, the alkalies, and phosphoric acid are insoluble, and unavailable as food for cultivated plants. Tillage brings oxygen gas, condensed in the pores or innumerable spaces in well-cultivated land, into a condition to act on the sulphur in iron pyrites and form sulphuric acid. This acid, as well as carbonic acid evolved by the rotting of vegetables turned under by the plough, attack the insoluble silicates of potash, soda, lime, and magnesia, and liberate their alkaline bases. So long as potash and soda exist to combine with nitric acid in a soil which abounds in decaying vegetation, or where stable-manure is applied to it, such acid is formed by the chemical union of oxygen and nitrogen, and it immediately combines with potash to form saltpetre, or with soda, to form nitrate of soda. Hence, so long as the mineral food of crops exists, *even in an insoluble form*, tillage and organic manures will operate to extract it, although latent in sand as hard as pulverized glass. Artificial nitre-beds consist essentially of a mixture of wood-ashes and manure.

The ashes furnish the necessary alkali, and the manure, in decomposing, starts the formation of nitric acid, which is continued at the expense of nitrogen in the air for an indefinite time, if potash be present to take up the acid as it is formed. This acid, as has already been stated, consists of fourteen parts of nitrogen chemically united with forty of oxygen. Phosphoric, sulphuric, nitric, hydrochloric, silicic, and carbonic acids, as well as the bases—alumina, iron, lime, potash, soda, magnesia, and ammonia—are all brought into active play through the agency of the plough, harrow, cultivator, and hoe. If we compare the aggregate weight of the earthy constituents of crops removed from the soil by tillage, pasturage, and mowing, with the weight of such ingredients restored to it, we shall find that the surface of our farms is constantly losing its alkalies, phosphorus, sulphur, chlorine, and soluble silica. If we obtain larger crops than formerly, by deeper and better cultivation, what is gained in crops is lost in their elements consumed in making them. The bone-earth, potash, and magnesia in the subsoil, are as certain to be extracted in time, as the loss of similar elements taken from the surface-soil in previous crops. The quantity can only be augmented by adding to the land such minerals as have been removed in water passing over or through the soil, in the stomachs of domestic animals, and in the several crops taken from the field. We dwell on this point, because, of the hundreds of communications sent to the Patent Office, estimating the cost of growing grain, cotton, roots, tobacco, hay, and other crops, no one has taken into the account the value of the raw material in the soil which is consumed to form the products of human industry.* It would be quite as sensible

* There are some soils so well stored with the earthy elements of crops, that we do not wonder that their value, in a commercial point of view, should be entirely overlooked. In a valuable communication, sent too late for insertion in this Report, Mr. Joseph Sibley, of West Rush, Monroe county, N. Y., (in the Genesee Valley,) says:—"I know lands that have been constantly worked for more than thirty years, which were thought at first to be too poor without receiving any manure, that now produce more than double the growth of any kind of crop that they would during the first five or ten years of their cultivation." He adds a fact or two, which deserve particular attention:—"Our soils are highly impregnated with lime,

to overlook the value of the coal, the ore, and the lime consumed in making iron, as to neglect the potash, ammonia, lime, magnesia, chlorine, phosphorus, sulphur, and mould, consumed in making a crop of wheat, corn, tobacco, cotton, potatoes, or hay. The best manure is only valuable because it consists of these substances. Strike out of a fertilizer every thing but water and carbonic acid, and it will be worthless to enrich a sterile soil. The salts in the ocean, of which Peruvian guano is the best representation, should be obtained and employed to add threefold to the productiveness of cultivated land. The same organized and disorganized elements in the sea that support its Flora and Fauna, are equally capable of nourishing all land plants and animals. Every river, and smaller stream, that falls into the ocean, carries with it an indefinite amount of both the mineral and organic constituents of all crops. All lakes and seas which have no outlet, except by solar evaporation, are salt; and, in many places, salts of lime, soda, and potash are precipitated. It is more than probable that the evaporation of sea-water in Florida and other Southern Atlantic and Gulf States, to obtain salts for manure, will pay a fair profit. The water should be let into shallow basins at high tide, and there retained till the sun and wind evaporate it. The more compound the salts, the better for all agricultural purposes.

A letter from the Chincha guano islands, on the coast of Peru, dated November 20, says that there were then a large fleet of vessels there, loading principally for England; but some few were up for the United States. "The guano is mostly taken from the north island, the southern one remaining untouched; and there are said to be on the three islands thirty millions of tons of guano. It is thirty feet in depth."

"At different points on the island are shoots or tunnels, made of heavy canvas, about three feet in diameter and 50 or 60 feet in length, reaching from the top of the island to the water, under which the boats are placed to receive the guano; and as it runs down with considerable velocity, they are soon despatched." As the consumption of this article is rapidly extending in the United States, we will give the results of a few experiments in England, where it was applied on much richer land than any manured with guano in this country and reported to this office. At a late meeting of the Sittingbourne Farmers' Club, Sir J. M. Tylden gave the following results of experiments with guano:—"Last autumn I set apart three pieces, of a quarter of an acre each, of Spalding wheat. On No. 1, I put no manure; on No. 2, applied guano at the rate of four cwt. (448 lbs.) per acre; and, on No. 3, guano at the rate of two cwt. (224 lbs.) per acre. The cost of guano on No. 2, £2; on No. 3, £1 per acre. The yield of No. 1, not manured, 28 bushels per acre; weight of straw, 1664 lbs. per acre; weight of wheat, 61½ lbs. per bushel. No. 2 had four cwt. of guano sown and harrowed in with the seed: yield, 38 bushels 6½ gallons per acre; weight of straw 3936 lbs. No. 3 had two cwt. of guano sown and harrowed in, as with No. 2: yield, 35 bushels, 6 gallons; weight of wheat, 61 lbs. per bushel; weight of straw, 3812 lbs."

and the most of them with the sulphate of lime, which accounts for their not becoming, like most other lands, so speedily exhausted without manure. With good husbandry, I have no doubt that most of our lands in this county will be as productive one hundred years hence as they now are. Much of the land which, when first improved, would not produce grass to any extent, now, after being worked for many years without manure, yields as fine hay and pasture as almost any in the country. Plaster is extensively used, as it abounds in the county, but its effects are less beneficial than formerly."

From the above data, it will be seen that on land so fertile as to produce 28 bushels of wheat per acre, 224 lbs. Peruvian guano gave an increase of seven bushels six gallons of grain, and of 1648 lbs. of straw. The additional two cwt. added only three bushels to the crop, when brought up to 35 bushels 6 gallons; which shows, that as the manure last applied cost a pound sterling, the gain did not pay. The straw and grain being more valuable in England than in this country, as well as clover and turnips, which follow wheat, of course higher manuring there than here is allowable. It is worthy of remark, also, that, taking every thing into the account, while 224 lbs. of guano paid a profit of 85 per cent. on its cost, 448 lbs. gave a profit of only 25 per cent.

The proper quantity of manure per acre which one ought to apply to obtain the best results, is a matter of great importance. In deciding this point, one must carefully estimate the value of the crop when grown, the condition of the soil, and the usual effects of any given amount of manure of a particular kind or quality. From the closest calculation of profit and loss that we can make, aided by the experience of hundreds of practical farmers, who have kindly answered all our questions, we reach the conclusion that lands should be made to yield about 30 bushels of wheat per acre in this country, to produce the grain at the least expense per bushel in a series of years. We have before us the London Agricultural Gazette, of January 4, 1851, in which it is stated that a field that gave 32½ bushels of wheat per acre without manure, yielded no more when guano, phosphate of ammonia, and potash were applied to parts of it; and we doubt if the largest crops of grain, whether wheat, corn, oats, or barley, pay for the last ten bushels per acre added to the same. The wheat-growers of Denmark, it is stated by the correspondent of the London Morning Chronicle, have brought up their lands to an average yield of 38 bushels per acre. If this be true, manure must cost next to nothing there, to go any further in the improvement of the soil. In the improvement of wheat itself, corn, and cotton, we think much may be done by the aid of science; but that is a subject which we shall not now discuss.

The burning of stubble has some advantages, and many advocates. A writer says:—"By burning the whole surface of one-half of a field, it bore last year an excellent crop of turnips, without the aid of farm-yard dung; and this year it has produced 10 bushels of barley and 13 trusses of straw more than any other part which received 18 loads of farm-yard manure."

Where vegetation is rank and the ground sour, burning tends to destroy all organic acids, sweeten and improve the soil. After lands are properly drained, caustic lime not only neutralizes all acids, but it attacks, and ultimately consumes, all organic substances. It operates most favorably when often applied, and in moderate doses. The farmer should proceed with caution, experimenting in a small way at first, watch results, and increase such practices as promise the highest pecuniary reward. Both the art and science of feeding cultivated plants are in their infancy; and we must devote years to the accumulation of new facts before we shall be warranted in saying how productive a soil should be made by artificial means, to yield the largest income to its owner and cultivator. To develop new truths in rural economy, every State in the Union should maintain a well-conducted experimental farm, the records of which would add largely to our knowledge of the capabilities of improved land to feed and clothe the human family. As tillage consumes both the organic and mineral constituents of crops, it should be applied to no larger area than is demanded for the highest gain of the husbandman. There are millions of acres annually devoted to the production of grain, cotton, and tobacco, more than are strictly necessary to obtain the quantities of these staples harvested. This involves the wasting and entire loss of an immense amount of vegetable mould, lime, magnesia, phosphorus, sulphur, potash, soda, chlorine, and ammonia. Although the departure of these things from arated land is not seen, and they do not appear in the crops, their loss is none the less certain. Some of them have passed into the atmosphere, and some have gone to the ocean. When a prairie is broken at the West, it often operates to make the neighborhood sickly for a season or two. Why is this? Because tillage greatly augments the decomposition of the vegetable and animal substances in the virgin soil. The air is loaded with fertilizing but poisonous gases that ploughing, harvesting, and hoeing discharge into it. Tillage is a most unnatural operation, and its effects on sand, clay, iron, lime, and other minerals, as they exist in the surface of the earth, can be understood only by one who is familiar with all the great truths revealed by the critical study of agricultural chemistry. So much preliminary knowledge of acids and bases, and the play of affinities, is needed, that one encounters almost insuperable difficulties in attempting to explain how carbonic acid derived from mould attacks the insoluble silicates of potash, soda, lime, and magnesia, and in the end yields to needy, growing plants soluble flint, soluble lime, magnesia, and all other elements present in the soil. One who has read with care Johnston's Lectures on Agricultural Chemistry and Geology, will have no difficulty in comprehending the chemical effects of tillage in consuming the food of plants, without such food ever entering their roots. Economy in saving the raw material of crops is only attainable by knowing all the results of tillage in decomposing mould and all compounds of silica, alumina, iron, lime, potash, and other bases. So soon as one crop is off the ground, another should succeed; not, indeed, further to exhaust the soil, but to collect in growing plants all the available elements of human food and clothing within their reach, to be carefully husbanded for future use. If the renovating crops be turned in by the plough, the soil gains carbon and nitrogen from the atmosphere; if consumed by domestic animals, the farmer has their manure, which costs him next to nothing. One that knows how to use growing plants to the best advantage can improve his land at the least expense. Indian corn possesses many elements of productiveness, and in skilful hands will add rapidly to the organic and inorganic food of other crops, where all such food is preserved from waste. Turnips are extensively used for a similar purpose in Great Britain, and may be equally so in this country.

FRUIT CULTURE.

BY J. J. THOMAS, MACEDON, N. Y.

After a lapse of two centuries since the settlement of the country, the cultivation of fruit is just beginning to assume a character its merits deserve. More trees have been set out into orchards within the past five or six years, even in those regions which were long since settled, than in all previous time. This rising estimate of the value of fruit is not founded on any false basis, and is not destined, like many other objects of general and eager interest, to endure only for a season, and then pass away. So long as substantial and cheaply furnished food, and the most desirable and wholesome luxuries shall be objects worthy of attainment, so long will fruit culture maintain its importance.

I. *As an article of food*, fruit, and more especially *apples*, have been proved of great value. Some farmers save annually, in various ways, from fifty to a hundred dollars by the use of green and dried fruit upon their tables—not merely by the amount of aliment afforded, but, adding to the variety and to the list of luxuries, enabling them to reduce the amount of other and more costly articles. By planting rich and high-flavored sorts for culinary purposes, instead of those of an inferior grade, a great saving may be made in sweetening and spices. The amount of sugar and other ingredients used for making bad apples good, is often more than enough to buy good apples, sugar and all. Fall pippins, for example, at fifty cents per bushel, have been found more economical than poor and insipid varieties at fifteen cents per bushel. By a free use of the best sweet apples through autumn and winter, for baking and for puddings, some families have avoided large expenditures. The aggregate saving in the million of American families who might enjoy the privilege of plenty of fruit, with a general cultivation of the best kinds for a succession the year through, might perhaps be set down, without extravagance, as more than the whole expenses of the General Government.

Not less important is the value of fruit as an article of food for domestic animals. Although direct and careful experiments by weighing and measuring are still wanting, enough has been ascertained to prove that apples, especially the richer sweet varieties, as food for cattle and swine, are fully equal to potatoes; and some of the most careful trials already made indicate their decided superiority, being about as seven to five. The chemical analyses of these two productions show the superiority of the apple in the aliment it contains, and also prove that some sorts excel others in richness and value. Hence the importance of ascertaining by careful trial those sorts best adapted to feeding and fattening.

For fattening swine, apples are particularly excellent. Some farmers have saved three-fourths of the expense of pork-making by allowing their hogs the run of a part of their orchards while the autumn fruit was falling from the trees. A neighbor sold forty dollars' worth of pork, fattened with the "droppings" of only half an acre of good grafted orchard. The process was completed by a week or two of feeding with grain. Even common seedling apples, if cooked, are valuable. In one experiment, 500 pounds of pork were made from 120 bushels. There is no doubt, however, that selected grafted varieties would have been found much superior. Even the hogs themselves are good judges, and show much discrimination in choosing the best trees whenever a plentiful supply is allowed them.

For milch-cows, sweet apples regularly and moderately fed, after being sliced to prevent choking, have been found to increase the milk one-third in quantity. They are also good for horses, as well as for nearly all other domestic animals.

While, therefore, the apple possesses a high value from its inherent qualities for feeding, the cheapness of its production far exceeds that of nearly every other article for this purpose. Taking, as an average, the value of land at fifty dollars an acre, we have the following estimate, giving the actual cost of one acre of orchard:—

Cost of land	$50.00
Cost of 50 apple-trees	10.00
Cost of setting out	5.00
	$65.00

The crops from the land will more than pay the yearly interest for the first few years, and the product of both land and trees will more than pay it as they become larger. An acre of full-sized bearing trees would, therefore, cost no more than sixty-five dollars. With the selection of the most productive sorts, in connection with the vigor imparted by good cultivation, the trees will yield, on an average, at least eight bushels each, or four hundred bushels from the acre. The annual interest on the orchard, at 6 per cent., would be about four dollars; the necessary cultivation and manuring, to maintain a most fruitful condition, would not exceed six more, making *ten dollars*, the whole yearly cost of the *four hundred bushels*, or *two and a half cents per bushel.* In the more fertile parts of the country, the only cultivation required would be one ploughing and two or three harrowings annually, reducing the cost of the ungathered crop to about one cent and a half per bushel—a sum much lower than the same value of nutriment yielded by grain or root crops. The only drawback is the time required for growth; and, as the immediate results are too often the controlling motive for exertion, the more remote and superior advantages of orchards, as a source of food, are but scantily enjoyed. No land-owner need fear to plant extensively for the purpose of a copious supply—needing not, like other crops, the yearly attention of procuring seed and planting. Such crops can never suffer by a glutted market, so long as the growth, maintenance, and fattening of domestic animals form an important portion of agricultural economy. Nor is the time required for an orchard to come into full bearing so great as common opinion regards it; for, through the vigor imparted by good culture, trees will attain a full-bearing age in a third of the time requisite where the soil is neglected and the trees are allowed to take their own course.

II. *As an article of comfort and luxury*, the value of fruit can scarcely be estimated. The few who have learned by actual experience the enjoyment of the best and most delicious sorts for the whole twelve months, would not willingly relinquish the privilege. Many, it is true, have furnished themselves with occasional supplies of their own raising—they possess only a few scattered fragments of the yearly circle of fruits; but the number is yet much too small, although rapidly increasing, who may place upon their tables delicious sorts on almost any day of the entire year.

Facilities for this annual round of delicacies vary in different portions of the Union. In the more northern States, where the culture of fruit has received the most attention, the earliest sorts of the cherry and strawberry ripen by the first days of summer; the later sorts, with the addition of currants and raspberries, extend the period for six weeks, or until midsummer. Apricots, in connection with the earlier pears, plums, and apples, immediately follow, and fill up the space till the rich profusion of autumn fruits, in all their kinds, keeps up an abundant supply till winter. Grapes and pears may be kept till spring; and by a proper attention to sorts and to good keeping, apples may be had every day of the year, or, at least, until the next strawberry season in early summer.

Is not an abundant provision for this yearly supply an object worthy of much exertion? What commodity is more calculated to increase the comforts of country life, and to add to the pleasures and to increase the attractions of home, to young people, than fine, ripe, and refreshing fruit, of one's own raising, during a whole season? The enjoyment yielded by a single bed of strawberries, supplying a few quarts daily for the table, we have never yet known to be despised; but this is but a single specimen in a rich and profuse cluster, when compared with the whole assemblage—embracing delicious and ruddy cherries, golden, perfumed apricots, juicy and refreshing apples, luscious bloom-dusted plums, buttery and melting pears, fragrant and crimson nectarines, clustering and transparent grapes—all diversified with their many and varying sorts.

III. *The value of fruit for market*, as a source of income, has been proved by many striking instances. Farmers, whose orchards do not occupy a tenth of their land, often make more by the sale of fruit than from all other crops besides. We have already seen in what manner 400 bushels of apples may be relied on as an annual crop from one acre of land. Admitting only half this amount of good fruit for market, and that the ungathered crop is worth only twelve and a half cents per bushel, (the lowest we have ever known for good winter apples,) then we have twenty-five dollars as the yearly interest on an investment of sixty-five dollars; or, deducting three dollars for cultivation, twenty-two as a net dividend. There has scarcely been a season, however, for a long series of years, when good apples have not been worth at least twenty-five cents, which, for the small crop just set down, would make the yearly net product forty-seven dollars per acre, or more than two-thirds the capital invested. With other fruits, the price is often much higher. Good late pears, after transportation to great distances, sell in our cities at three to five dollars per bushel. Single trees, producing eight to twelve bushels each, have, in a number of instances, afforded a profit of twenty or thirty dollars. Farms of a hundred acres are scarcely ever made to yield so much as a well-managed single acre of such pear-trees would produce.

A few well-attested instances of success will show that these estimates are not extravagant. Richard J. Hand, of Monroe county, New York, sold, in 1845, $440 worth of Northern Spy and Roxbury Russet apples from one acre. The land was well cultivated. Numerous cases have occurred under the notice of the writer, where one hundred dollars or more have been made from the sale of an acre of good winter apples; and a number of trees of the Rhode Island Greening have borne forty bushels each at a crop, yielding ten dollars from each tree. A fruit-raiser in Orange county, New York, sold in one year more than three hundred dollars' worth of plums from the fourth of an acre. These are only a few out of many instances which might be given.

Now, it is admitted that these are unusual cases; but they are so for no other reason than that good cultivation is unusual. No part, in the management of trees, receives more general neglect, and no neglect results in greater loss to the orchardist. It seems particularly unaccountable that while fruit-trees furnish larger returns than any thing else on the farm, they should be the very thing that the farmer most neglects. Nothing is more common than to suffer trees, both young and old, to weather the whole season through with scarcely a moment of labor or attention. Each has cost ten times more originally, and is worth now fifty times more, than a hill of corn or potatoes; yet, who thinks, for a moment, of planting a hill of corn in a grassy field, and of leaving it untouched by cultivation from spring to autumn? Yet this is the treatment of a large portion of newly transplanted trees. All the remarkable, and in some cases almost incredible, instances of young trees coming soon into bearing, and of older trees yielding enormous and lucrative crops, have mainly resulted from the same good manuring and mellowing of soil which every good cultivator gives for his potatoes, carrots, and cabbages.

Orchards which now yield $40 or $50 per acre without care, might be doubled in the value of their annual products by the appropriation of a sum not exceeding $5 to $10 per acre. The advantages of good treatment are threefold: young trees are thrown forward into bearing in less than half the time otherwise requisite; the products of large trees are doubled in amount; and the appearance and flavor are sometimes improved to a degree almost beyond belief. Some varieties of the pear, almost worthless under neglected culture, have been rich, melting, and delicious, when subjected to the genial influence of a deep, mellow, and fertile soil. Sometimes the same pear has been thus tripled in market value; and so has been the change in appearance, as well as in flavor, that we have known even experienced pomologists to be deceived into the belief that new sorts were before them, when they were really but old acquaintances grown under the most favorable influences.

Transplanting.—It has been estimated, that, of the hundreds of thousands of trees yearly set out in orchards in the United States, not more than one-third ever reach a good bearing condition. The delicacy in the organization of all the parts of a young tree appears to be overlooked or forgotten. The roots are mutilated when torn from the ground, or four-fifths of their length cut off by the spade. They are crowded into small holes, dug in hard soil, and often not large enough to receive all the roots, such as they are, without binding, and the earth is stamped hard upon them. A large number necessarily perish from such treatment, and those which survive often remain in a sickly or feeble condition, from neglect in successive years.

Very opposite is the management of the skilful and successful cultivator. The trees are carefully lifted from the earth, securing a wide circle of spreading roots and finely branching fibres; they are next immersed in a bed of mud, to coat the surface, and prevent injurious drying; ample holes are dug for the full extension of all the roots; fine and fertile soil is sprinkled in, while the small fibres are evenly spread out with the fingers; the earth is closely settled through all the interstices of the roots, not by stamping with the foot, but by pouring in a few quarts of water before the hole is quite filled.

As the subsequent treatment of the newly set trees is of the greatest importance, it may be well to enter more particularly into this branch of the subject.

Preparation of soil.—The first requisite of success and vigorous growth is a deep fertile soil. They may be secured for the tree, while young, by digging large holes and filling them (except in immediate contact with the roots) with very rich soil, or with short manure, well-mixed by raking with common earth. Young apple-trees, not larger than a carriage-whip, with holes seven feet in diameter, thus filled, have borne a bushel of fruit each the fifth summer. By the time the roots have run beyond the holes, the rest of the ground may have been enriched with manure, and deepened by ploughing. An admirable mode of deepening is first to loosen the soil as far down as practicable with a subsoil plough, and then to trench-plough this deeply loosened bed for the intermixture of manure. Trench-ploughing is effected by running a large common plough in the bottom of the previous furrow. The subsoiling admits this to a much greater depth than could possibly be attained without it. This preparation of the ground may be accomplished before or after planting the trees.

When the surface cannot well be prepared in this manner, a strip of ground eight feet wide, where the row of trees is to stand, may be prepared at less expenditure of labor. This method would indeed be always found of great use in clayey soils, which, otherwise holding water like a tub in the holes, would admit of drainage by means of the deep furrow through the centre. A small quantity of brush laid in the bottom of the furrow, before being filled, would allow the water to soak away for years afterwards.

Cultivation and mulching.—After a young tree is transplanted in the best manner, the first step only has been taken. Much will depend on the treatment it receives the first summer. Neither a tree nor a domestic animal can thrive and grow, if not well fed in its early years. The ground must be kept mellow and free from weeds for a distance of at least several feet around, because the new roots begin rapidly to extend themselves, and the roots of weeds and grass, if permitted, will also approach towards the tree, to rob it of its support. As soon as the dry summer season arrives, or sooner, the trees must be well *mulched*—that is, covered for several feet around with old straw, coarse litter, or leaves, not less than five or six inches thick. This keeps the top soil, throughout the hottest day, as moist as in the dew of morning, and consequently the under soil can never become dry. The moisture of the soil is thus preserved in the most even manner—incomparably better than by the irregular supplies of artificial watering, which not unfrequently do more harm than good, by causing the surface to bake, the water not penetrating to the roots below. For *cherry-trees*, more especially, which often perish at midsummer, after having made a good beginning, mulching is of the greatest importance.

The writer has restored a row of young apple-trees, which were so much injured by the drought as to cease growing and assume a sickly appearance, to freshness and vigor, by the simple operation of mulching, although no watering was given, and no rain fell, neither at the time nor for some weeks after the improvement in their foliage became visible. A correspondent of the *Horticulturist* mulched fifty trees out of a hundred and fifty, all of which had commenced growth alike. Those which were mulched all lived. Of the hundred others, fifteen perished.

On the approach of winter, to guard against *the attacks of the mice*, which work under the snow, a little mound of earth, about ten or twelve inches high, should be thrown around each tree, to remain till spring. This has proved a complete protection in hundreds of instances, even where trees have stood in thick grass, the most tempting of all spots to these little depredators. Nothing is easier, and nothing more efficacious, than this simple remedy, which has also the additional advantage of stiffening the newly set tree against the action of the wind.

Keeping the ground well cultivated has already been urged. A few examples of its influence may be interesting. Some years since, fifty fine peach-trees were set out, under the notice of the writer. The work was carefully done, and all lived. The ground was alike in quality, and a part was occupied with a crop of winter wheat, and a part with potatoes. The latter received, of course, good cultivation, with repeated hoeings; the former was not cultivated at all. On examining the trees after harvest, it was found that none of those standing in the wheat ground had grown more than *three inches*, and few more than one or two inches. On the other hand, of those in the potatoes, none had grown less than *a foot and a half*, and some had thrown out new shoots *two and a half feet long*. In another instance, the superiority of growth given by means of a hoed crop to the trees of a large bearing orchard of peaches, compared with those standing side by side in an unhoed crop of peas, was so striking as to be visible by the color of the foliage at a distance of more than half a mile. The worst piece of ground which it is possible for a young orchard to occupy is a meadow. We have observed whole hundreds smothered to death the first summer by the heavy grass which nearly enveloped them. Sown grain crops are not much better; but low cultivated crops, as potatoes, rutabagas, and carrots are the best which can occupy the land. But all plants in all cases draw upon the strength of the soil; and hence clean, mellow, unoccupied ground is the best. A skilful cultivator found that his trees made about double the growth on clean unplanted ground, compared with those which stood among his field-trees. Dr. Thompson, of Delaware, states that two rows of potatoes only, between the rows of bearing peach-trees, have been found not only to affect the fruit, but to injure the trees. Hence the best market-orchards in the country—those most famed for their splendid fruit, high prices, and heavy net profits—are kept clean by ploughing and harrowing, in connection with the application of manure.

Some are, perhaps, now ready to exclaim, "We cannot *afford* to give so much attention to our trees—we cannot devote all this labor to them!" What! not afford to be economical? Not afford to save trees, after having paid for them? Then, by all means, buy only half the number, and apply the other half of the purchase-money in giving them the best possible care. An eminent and experienced cultivator has given it as his opinion, in which, it must be admitted, there is a great deal of truth, that if nine-tenths of the orchards of the older States were cut down, and the labor of taking care of them expended on the remaining tenth, more and better fruit would be raised. No good farmer hesitates for a moment in bestowing all the required attention on his annually planted crops: why, then, should he not exercise the same wisdom in relation to that which is more valuable than any of them?

The difficulty of cultivation is usually much increased by the very inconvenient machinery used for ploughing near the rows. A two-horse team, with double whipple-trees, cannot safely approach nearer than three feet; and every ploughman dreads a task attended with lacerated bark on the one hand, and wide grassy "balks" on the other. A great improvement is made by placing one horse ahead of the other, like a canal-boat team, with a very short whipple-tree for the hindmost, whose draught-traces may also be considerably lengthened, to admit of steering the plough to the right or left. With this arrangement, the task is easily and handsomely accomplished.

A wide error is committed in cultivating and manuring orchards by those who forget that roots extend far beyond the circle measured by the branches. When the trees become large, the whole of the ground is filled with a network of fibres. The larger and more obvious roots are near the base of the trunk; but the finer ones, which contribute the nourishment, are spread at great distances. Hence the whole surface should be kept mellow and receive the manure, and not narrow strips or pinched-up circles just at the base of the trunks.

SELECTION AND PARTICULAR TREATMENT OF DIFFERENT FRUITS.

In planting every orchard or fruit-garden, the intended object must be kept strictly in view. For supplying a family, the selection will, of course, be quite different from that of a market-orchard. The former may be nearly the same in whatever locality; the latter will vary exceedingly, with the nature and distance of the market and the resources of the planter.

It will be most convenient to speak in the first place of the former.

To supply a family of moderate size, 100 well-managed and full-grown trees will afford an abundance with the best cultivation. At least, this number may be taken as a fair and full average, to be diminished or increased according to varying circumstances. They may be distributed among the different kinds in about the following proportion: 30 apple-trees, 20 pear-trees, 12 peach-trees, 10 cherry-trees, 10 plum-trees, 6 apricot-trees, 4 nectarine-trees, 8 grape-trees. As the apple and pear-trees are to furnish a large portion of the year, when other fruits are out of season, they compose one-half of the whole number. The cost of this hundred, at present nursery prices, would not exceed 30 dollars. To make the supply still more complete, a few additional rods of ground should be planted with strawberries, gooseberries, raspberries, and currants, the cost of which would increase the above sum to 40 dollars, the annual interest of which would not amount to the usual cost of replenishing a tobacco-box for a year. This number of each kind, if well chosen, would furnish strawberries for a month, cherries for two months, raspberries for nearly a month, apricots for one month, plums for three months, peaches for two months, grapes for four months, pears for eight months, and apples for the whole yearly circle.

These might all be planted on an acre and a half of land; but if two

acres could be appropriated it would be better, as new trees must be occasionally set out to keep up a succession of good thrifty bearers. Plums, apricots, and nectarines are to be so arranged that they may be easily fenced off by themselves for the confinement of pigs and poultry to destroy and repel the curculio, as will be noticed on a future page.

To protect such an orchard from that peculiar and most serious evil, which prevails to a disgraceful extent in this country, namely, fruit-stealing, a good secure thorn hedge should encircle the whole. In the extreme Northern portion of the Union the English hawthorn has succeeded well, and some of the American species have done well further South. But neither of them is to be relied on when there is danger of the ravages of the borer, which has wholly destroyed some beautiful thorn hedges in the Northern and Middle States. There are, however, two hedge-plants, not liable to any known disease or destroyer, eminently fitted to protect fruit-trees from the spoiler. These are the buckthorn and Osage orange. The former is extremely hardy and poisonously bitter to any animal that attempts to feed upon it; the latter, although somewhat sensitive of severe winter frosts, will succeed well as *a hedge* as far north as the peach and Isabella grape will mature their fruits, and it is so profusely set with sharp thorns as to form a most terrific barrier. The only objection to a hedge is the time required for its growth. Its advantages are thus summed up by one of our distinguished writers:—"It is like an impregnable fortress, neither to be scaled, broken through, nor climbed over. Fowls will not fly over it, because they fear to alight upon its top; and men and beasts are not likely to make more than one attempt to force its green walls. It shows a fair and leafy shield to its antagonist, but it has thousands of concealed arrows ready at the moment of assault; and there are few creatures, however bold, who care to 'come to the *scratch*' twice with such a foe."

The mode of preparing the soil for such an orchard has been already pointed out. The selection of the varieties is a matter of the greatest importance. The best and most delicious sorts are generally as easily grown as the worst; and some good varieties are more than twice as productive as others—an important quality to those who have but limited grounds.

THE APPLE.

This fruit, first in value for its easy culture, hardiness, general adaptedness to all places, and the long supply it affords, will grow on any land that will raise good crops of corn, wheat, and potatoes. No tree is more benefited by a deep and well-manured soil. If well managed, the young trees ought to bear half a bushel to a bushel each by the fifth year after setting, and several bushels annually by the eighth or tenth year.

The varieties should be so proportioned as to afford a constant supply of fresh fruit for the twelve months. Early sorts last only two or three weeks, and should, therefore, be fewer in quantity than such as keep through the several months of winter and spring. If the earliest sorts commence ripening at midsummer, scarcely four months will elapse before the time arrives for securing the remainder within doors; therefore, the remaining two-thirds of the year are to be furnished with winter and spring varieties. It, however, happens that during the whole of autumn there is a great profusion of other fruits, as peaches, grapes, plums,

&c., which reduces the number of apples for this season, and renders a still larger proportion of long keepers desirable. The following numbers, in a list of 30 sorts, may therefore be thus distributed through the different periods: 4 of summer varieties, 2 of early and mid-autumn, 4 of late autumn and early winter, 10 of winter apples, and 10 of long keepers. Among the best and most productive sorts which have been extensively tried are the following:—

Summer Apples.

Early Harvest, generally esteemed through the Northern and Middle States as the best very early apple; in Illinois and adjacent portions of the West it has not proved a good bearer, and in some of the eastern parts of New England it adds to this defect slowness of growth and liability to crack and blast. When the soil is not naturally of the most fertile character, it needs the best cultivation.

Sine Qua Non, a week or two later than *Early Harvest*—better, and more productive; not so extensively known, and being of a rather slow and crooked growth, not so popular among nurserymen.

Red Astrachan.—Remarkable for its great beauty, to which a part of its popularity is owing; rather coarse for the table, but unequalled as a summer stewing fruit. Introduced only a few years since, but appears to have done well whenever tried.

Williams's Favorite.—A very handsome summer variety, but hardly of the highest quality; very popular in New England, but has not been extensively cultivated elsewhere.

Summer Rose.—Small, remarkable for its delicate texture and agreeable flavor. In these qualities it is fully equalled and surpassed in productiveness by the *Early Joe*, a new variety, only proved as yet in Western New York.

Sops of Wine.—This has proved a valuable, fine-growing, and productive sort in the Northern and Eastern portions of the Union.

The *Sweet Bough* is generally esteemed in many of the States as the best summer sweet apple. At the West it has proved unproductive. This defect of Eastern sorts on very fertile soils may diminish as the trees grow older.

The *Carolina Red June*, unknown at the East, is regarded by many as the best summer apple for the West.

The *Bohanon*, a fine early fruit of Virginia and Kentucky, ripens during the latter half of summer.

In addition to the above, the *American Summer Pearmain* may be added as a fruit of much value, although very liable to blast in some localities; the *Early Strawberry* as a small, beautiful, and productive sort, not of the highest quality; and the *Golden Sweet*, as a fine growing, productive, and good summer sweet baking apple.

Autumn Apples.

Autumn Strawberry.—So far as yet cultivated in New York and Northern Ohio, this has proved a fine, beautiful, very agreeable, and productive variety. It ripens early in autumn, and will keep till winter.

Gravenstein.—Although not many years since its introduction, the

gravenstein has been widely disseminated, and has proved, both at the North and South, a variety of the highest excellence.

Porter.—Pre-eminently the autumn apple of New England; it succeeds well, but does not maintain fully its Eastern reputation in New York and Northern Ohio; though slow in growth, fruit very fair, with heavy crops.

Dyer, or *Pomme Royale.*—Perhaps unequalled in richness of flavor and fine texture combined, among all autumn varieties, but only moderately productive.

Hawley.—A new sort, proved as yet only in New York; large, with a mild and excellent flavor.

The preceding all ripen by the middle of autumn; the following late in autumn; and in the more Northern States, they keep till midwinter.

Rambo.—In the East and North, a fine, spicy, rich fruit, of moderate size; in the Western States, of larger size, and a great and general favorite, although sometimes inclining to be water-cored.

Fameuse.—Very beautiful; of a refreshing, but not high flavor; fine and productive at the West; much valued at the extreme North.

Fall Pippin.—Very large, very celebrated, and very excellent; moderately productive, especially at the West; much valued for stewing.

Belmont, or Gate.—This has proved very fine in New York, Michigan, Northern and Central Ohio, and Illinois, and worthless at Cincinnati. Varies exceedingly in its external appearance, with season and locality. An eminent pomologist at Cleveland says, that, were he confined to one sort, he would choose the Belmont.

The following are among the best *autumn sweet apples:—Jersey Sweeting, Autumnal Swaar, Haskell Sweet, Summer Sweet, Paradise*, and *Peach-pond Sweet.*

The *Gloucester Cheese, Fall Cheese*, and *Fall Queen* or *Horse Apple*, are among the best varieties peculiar to the Southern States.

Winter Apples.

Yellow Bellflower.—With the exception of some parts of New Jersey, and a few other localities where it fails, this apple is uniformly fine, and much esteemed from New England to the Mississippi valley. Too delicate for a market fruit, it excels in its fine texture and agreeable acid flavor.

Westfield Seek-no-further.—Appears to be uniformly fine in all localities, especially in the Western States. At the East and North it is a good-keeping winter fruit; at the West and South-west, it ripens late in autumn and during the first of winter.

Hubbardston Nonesuch.—This excellent and rich variety has not been much cultivated out of New England and New York, where it is a late autumn and early winter fruit.

Bullock's Pippin, or *American Golden Russet.*—Very popular through Ohio, Indiana, &c., on account of the extreme delicacy of its texture and its great productiveness. In some other localities it does not always ripen so as to become tender, and is too small for market.

Peck's Pleasant.—A new variety; a very fine, smooth, and fair, and productive sort, so far as tried in New York and New England, ripening during the first half of winter.

Baldwin.—The most highly esteemed, and most celebrated New England winter apple. It appears to succeed equally well in New York. Its productiveness is remarkable: single, full-grown trees not unfrequently bearing 40 to 50 bushels. In the Western States, it becomes coarser, inferior in flavor, and subject to the bitter-rot. It is an exceedingly variable sort, when grown under different influences, even on the same spot of ground; specimens are sometimes so different, as at first glance to scarcely resemble each other.

Rhode Island Greening.—As celebrated, in Western New York, as the Baldwin in New England, for its free growth and great productiveness. Forty bushels are not a rare crop for a full-grown, well-cultivated tree. In the West, it does not bear so well; but the trees may become more productive when they become older. As far South as St. Louis, it ceases to be a winter apple, ripening before the close of autumn; and in the Southern States, it is changed to an early autumn variety.

Red Canada, known also as the *Nonesuch*, or "true Nonesuch," in New England, has proved of great excellence, so far as it has fruited—from Maine to Northern Ohio—and will doubtless succeed well farther West. It is regarded, by many good judges, as unexcelled in its rich and agreeable qualities by any winter apple.

Jonathan.—A beautiful, very fair, and productive sort in New York; but not, as yet, much proved elsewhere. In quality it is fine, but not quite equal to the Red Canada, to which it appears to be allied.

Esopus Spitzenburgh.—Far-famed for the extraordinary richness and spiciness of its flavor, in which it is nearly, if not quite, unequalled. The flesh is too firm, and to some the acid is too high, to be wholly agreeable. It is excellent for stewing. It maintains its high character, through New York and the West, so far as tried; but is usually only moderate in the amount of its crops.

Swaar.—For a mild, agreeable, and very rich flavor, this is regarded by many as unexcelled, and by others as unequalled. It bears well, but on old and overloaded trees the fruit is apt to be scabby or blotched. In some parts of New England it loses its high character, becoming light and corky at the core.

Northern Spy.—Much celebrated in Western New York as a handsome, fresh-flavored spring apple, but not proved elsewhere. The young trees do not come soon into bearing, and the trees need higher and better cultivation than many other sorts, to prevent the fruit from becoming small and defective.

Roxbury Russet.—Succeeds well throughout the Northern States, and, although good at the West, does not always bear well there. It is the most celebrated of all long-keeping sorts. It succeeds well, and maintains its fair appearance in all soils and with all kinds of treatment; but with rich culture, it becomes larger and bears heavier crops. Small specimens are flat; larger ones become more conical, with short, thick stems. It is known in many parts of Ohio, under the name of Putnam Russet.

English Russet.—Fruit rather small, from overbearing; keeps a year without difficulty; bears profusely in all localities. In Illinois, six bushels have been produced from one tree the sixth year from setting out.

Newtown Pippin.—But little cultivated in New England; but well known from the Hudson to the Mississippi, for its high and long-keeping qualities, and for a part of the crop being undersized, unless grown under favorable influences. In New York it requires high culture to prevent most of the crop becoming small and scabby.

Pryor's Red.—This fine fruit is one of very wide adaptation, being very highly esteemed and widely cultivated in the South and West, and succeeding well as far north as 43° latitude, in Western New York.

Rawle's Jannet.—Like the last-named variety, greatly esteemed in the Western and South-western States. The fruit is very valuable for its long-keeping quality. The trees, by overbearing, produce many small or imperfect specimens. Not of the highest flavor.

Milan.—Known only at the West. It possesses a mild, pleasant, and agreeable, but not very high flavor, but is much esteemed, more especially in Illinois, for its fine growth and productiveness.

Winter Cheese.—Cultivated much in Southern Virginia, and is one of the best early winter apples of that region.

Among the best *winter sweet apples* are the following:—*Broadwell*, *Tallman Sweeting*, *Danvers Sweet*, *Baily Sweet*, *Ladies' Sweeting*, and *Sweet Baldwin*.

More space has been devoted to the preceding list, from the universal importance and the great value of the apple in all collections. In small gardens, the number, of course, must be greatly reduced; but with the remarks appended to each variety, no person need fail of getting good sorts. The following circumstance may be stated as a proof of the extreme difficulty of prescribing exactly those which shall suit every one. At the first meeting of the American congress of fruit-growers in New York city, a committee of nine was appointed to prepare select lists of fruits adapted to general cultivation. A vote in committee of over two-thirds was decided to be sufficient to place any fruit on the select list; yet, with all this liberal allowance, only *ten sorts* of apples could be agreed on "as worthy of general cultivation." The difficulty was not less with other kinds. When the pear, for example, was under consideration, (although nearly a *thousand varieties* have borne fruit in this country,) there were only *two sorts*—the Seckel and Bartlett—which received a *unanimous* vote in committee. The lists furnished in this article will therefore be understood as not intended to be perfect, nor as embracing all the best *local* sorts which may be known, but those generally which have received a *large vote* of the intelligent fruit-raising portion of the community. Most of them succeed well in the Southern States, where they mature one or two months sooner than at the North.

THE PEAR.

This fruit, greatly exceeding the apple in the delicacy and melting quality of its texture, and in its delicious flavor, and also possessing the very desirable merit of a continuance for many months, would stand inferior to no fruit for value and importance, but for its most destructive malady—*the blight*. There appears to be no certain protection against this disaster; but its ravages may be greatly lessened or mitigated. Whenever the leaves on any branches suddenly turn black as if *scorched*, not a moment is to be lost. The branches must be immediately cut off, a foot or two below the affected part, and committed to the fire. If this practice is promptly and perseveringly adhered to, it will in most cases soon check the spread of the disease. The best preventive appears to be a good soil, producing well-grown, healthy, well-ripened wood; too great a fertility inducing succulency and not hardiness, and a poor soil causing a feeble and not sufficiently vigorous growth.

Dwarf pears, made by pruning into a pyramidal form trees grafted or budded on the quince, possess several advantages. They come sooner into bearing, in most cases, than those on pear roots; they occupy but little ground, each tree not needing more space than six to eight feet, thus admitting many trees even in limited gardens; and they but slightly shade and injure adjacent crops. Hence, no person should set them out who is not determined to give them the very best culture. Many sorts do not succeed on the quince.

Varieties.—A vast number of varieties of the pear have been collected at home and introduced from abroad, only a small portion of which are worthy of extensive cultivation. An eminent New England pomologist, who has fruited about one thousand varieties, gave it as his opinion that all that is valuable may be secured by a careful selection of about *twenty*. The following are generally esteemed as the best:—

Summer Pears.

Madeleine.—The earliest good pear; needs house-ripening.

Summer Doyenné.—New; scarcely later; equal in quality; rather smaller.

English Jargonelle.—Large; good; but worthless unless ripened in the house.

Tyson.—A new sort, of great richness, delicacy, and excellence.

Rostiezer.—Perhaps the highest flavored summer pear; rather small.

Bloodgood.—Usually fine; but in some places insipid.

Dearborn's Seedling.—Always fine; but rather small.

Bartlett.—Ripening at the end of summer, and passing into autumn; a great and almost universal favorite; large, melting, and good; the tree grows vigorously, and bears well while yet very young. An instance occurred under the notice of the writer, where a young tree, about six feet high, the second year from transplanting, bore about a peck of superb fruit.

Autumn Pears.

Washington.—Very sweet and high-flavored; uniformly fine; refuses a quince stock.

Golden Bilboa.—Fair and handsome; flavor a notch below the best.

Urbaniste.—Fine, and very melting; tree does not bear young.

Seckel.—Renowned through the pomological world as the highest flavored of all pears, but quite small in size. Tree very hardy, rarely attacked with blight; growth, slow.

Heathcot.—A New England pear of high quality.

Louise Bonne of Jersey.—Famed for its productiveness, (on quince stock,) combined with a good flavor.

Onondaga, or *Swan's Orange.*—A very large, freely-growing, fine-flavored pear; somewhat variable in quality.

Beurre d'Anjou.—Newly introduced; quality excellent.

Autumn Paradise.—A new pear of exceedingly high flavor, and promising to become very valuable.

Beurre Bosc.—Of good size and of very high quality; rather slow in growth; will not grow on the quince.

Flemish Beauty.—Remarkable for its fair and attractive appearance, combined with fine flavor. If there is any defect in this pear it is in its slight lack of high flavor when not grown under the most favorable circumstances. Fails on the quince.

Belle Lucrative.—As an eminent pomologist remarked, "*when* this pear is fine, it is *very* fine;" but it not unfrequently falls to an inferior quality. The best specimens probably approach as near *perfection* for a truly delicious pear as any to be found.

The *White Doyenné*, (or *Virgulieu* of New York, *Butter Pear* of Pennsylvania, and *St. Michael* of New England,) although it fails in some parts of the Eastern States, is considered as the most valuable of all pears, all its qualities considered, in Central and Western New York, and succeeds finely at the West. The *Gray Doyenné* is similar to it in quality. The *Doyenné Boussock* is a newly-imported variety, resembling it in quality and appearance, but of larger size.

Beurre Diel.—Large, rich, but rather coarse; ripening quite late in autumn.

Winter Pears.

The *Beurre d'Aremberg*, (or *Aremberg*,) and the *Winkfield*, (or *Vicar of Winkfield*,) stand first for productiveness; the *Winter Neles* for high flavor.

The *Easter Beurre* is the best long-keeping sort, ripening in spring: the tree needs high cultivation. The *Glout Morceau*, *Lewis*, and *Prince's*, *St. Germain*, are also fine winter pears. The *Chaumontel* is an excellent old pear, but needs, at the North, the warmest and richest soil for the development of its good qualities.

The following succeed best on the quince: Louise Bonne, of Jersey, Beurre Diel, Steven's Genesee, Angouleme, Winkfield, Long Green of Autumn, Glout Morceau, Chaumontel, Easter Beurre, Tyson, and Beurre d'Amalis.

No fruit suffers more in quality from bad cultivation than the *pear;* and *winter* pears are rendered nearly worthless if neglected. Unless they grow in a good, deep soil, they cannot perfect their flavor. If the season is cold, the fruit will not attain maturity before the cold weather of autumn, unless subjected to the best treatment; or, if the soil be dry, its growth will be checked until too late to ripen well. Hence good management, even under an unpropitious sun, will generally give us much better winter pears than the most favorable skies without it. Manure, with a small proportion of ashes, well worked into the soil, will impart vigor of growth; and mulching, in connection with frequent digging, will preserve the soil moist during any season of drought. A single trial is sufficient to convince any one of the economy of all the labor thus applied, by the large crops of finely-swollen, rich, and delicious pears which are the result.

The Chaumontel, Easter Beurre, and some others, are not easily injured by autumnal frosts, and should be left on the trees till the approach of cold weather. The Vicar of Winkfield, on the other hand, should be carefully preserved from frost.

A very essential requisite to the successful keeping of winter pears is a good cellar or fruit-room. It should be just sufficiently moist to prevent shrivelling on one hand, and rotting on the other; and the temperature should be low. The want of such a room, added to neglected cultivation, is one great reason why so many have failed with this fruit. In this room the fruit is to be kept till the time of ripening approaches, or until near the time the fruit is wanted; it is then to be placed in a warm room, with a temperature of about 70°, where, in a few days, it will change to a fine yellow, and become ripe and melting. In this way, pears may be successively ripened off so as to furnish a supply through winter.*

THE PEACH.

The peach, usually regarded as the most delicious of all fruits, may be made to yield a supply, by a good selection of varieties, for more than two months. The earliest good sort is the *Early Ann*, but too tender for the extreme Northern peach region. It is closely followed by the *Early Tillotson*—an excellent, productive, and more hardy variety, and well adapted to all localities, from Lake Ontario to the Gulf of Mexico. In Mississippi and Alabama it matures within two or three weeks of the first of summer. The Tillotson is immediately succeeded and often ripens with the *Serrate Early York*, a peach not inferior to it in value; after which, *Cole's Early Red, Cooledge's Favorite, Large Early York, Grosse Mignonne, Early Crawford, Morris White, Nivette, Bergen's Yellow, Old Mixon Free*, and *Druid Hill*, form an admirable succession of the best sorts. The *Heath Cling*, which does not always escape the frost at the North, becomes, when the fruit is thinned and well cultivated, the best very late peach, keeping on shelves in a cool, dry room, for two or three weeks after being gathered.

Stunted peach-trees always produce much smaller fruit than those of vigorous growth; but the crop suffers even more in flavor than in size. No tree more imperiously requires regular pruning. If neglected, the branches gradually extend in length, the side-shoots perishing, until they become long, naked arms, bearing leaves and fruit only at their extremities.

To prevent this difficulty, and to preserve the trees for a long series of years in a healthy, vigorous condition, and in a neat, compact form, the *shortening-in* mode of pruning has been successfully adopted. It consists in cutting off, in winter or spring, about one-half or two-thirds of every shoot of the preceding year's growth all over the tree. If this is commenced about the time the trees begin bearing, and is annually kept up, they will always maintain a handsome, compact shape; the fruit will be larger in size, not less in quantity, and immeasurably superior in flavor. The work may be expeditiously done with a common pruning-knife, with a short standing ladder.

The *peach-worm* attacks the bark of the tree at the root, but, unlike the apple-borer, never enters the wood. It feeds exclusively on the soft or pulpy inner portion, leaving the outside or hard shell which conceals it. Its presence is therefore indicated by the sawdust-like matter, mixed with gum, which is thrown out at the surface of the ground. In depositing its eggs, the parent or winged insect prefers to insert them where the outer surface is soft, as in young trees, or where the base of the trunk is shaded by grass. The grub kills the tree only when it girdles the bark.

* The ripening, however, must not be attempted before the usual season of maturity. Unless the season has been long and warm, the Easter Beurre, for example, will not mature much before spring. If the store-room is quite cool, the ripening of early winter sorts may be retarded several weeks. Some require to be kept in tight boxes, when brought into the ripening-room, to prevent shrivelling.

It is easily destroyed by following it in its hole with a knife, and will always be found at the farther extremity. Hundreds of trees may be thus cleared by a single person in a day. Ashes or slaked lime, placed round the tree, although not an infallible remedy, and never driving out the grub when once lodged there, tends to repel its attacks.

The great and peculiar malady of the peach is the *yellows*. It is both contagious and incurable. Its first infallible indication in bearing trees, is the premature ripening of the fruit, often two or three weeks in advance of the usual time, accompanied with purple discolorations of the flesh. The tree afterwards assumes a sickly appearance, frequently with many small, wiry shoots near the centre of the head, and it soon perishes. The disease may be communicated by planting stones from affected trees, by the pollen from the flowers, by budding, by using a knife on a healthy tree previously used on a diseased one, and by contact of the roots. A tree, when attacked, should be grubbed up immediately and burned, and no peach-tree planted on the site for many years.

THE PLUM.

The great enemy to the plum is the *curculio*. It is a little beaked beetle, about as large as a pea-bug, which lays its eggs in the young fruit. The egg soon forms a grub or larva, which, eating into the pulp of the growing fruit, causes it to fall to the ground. If laid after the fruit becomes large, it induces premature ripening, and spoils it. This insect usually begins its work as soon as the blossom is off the young fruit. Its mark is a peculiar, little, crescent-like incision, termed by a certain Irish gardener, "the baby's nail," a most expressive phrase.

Out of a multitude of remedies, there are two which are more particularly useful and reliable. One is to confine pigs, chickens, and geese, in the part of the orchard occupied by plums. They should be sufficiently numerous to eat all the fallen fruit, thus destroying the grub, and lessening the danger of the next year's crop. Their presence also frightens away the beetle from depositing its eggs. Operating thus in two ways, they are usually sufficient, if in good numbers, to save the crop, unless the curculio is unusually abundant. When this is the case, the other remedy, which is jarring the beetles from the tree, must be combined with it.

The jarring is to be done with a wooden mallet; and to prevent bruising the bark, the blow should be made upon the short stump of a small branch cut off for this purpose. The insects drop at once upon white sheets spread beneath, when they are immediately detected and killed by a pinch of the thumb and finger. When crushed, this insect, unlike nearly every other, feels dry and crumbling, like Indian meal. The work is best done in the cool of the morning, when the beetles are more torpid and easily caught. In the heat of the day, they do not drop so readily, and often spread their wings and are gone before the thumb-and-finger manipulation can reach them. This method is sufficient of itself to save any crop, if unremittingly applied; but it is distrusted by many who have lost their crops by an occasional intermission of a day or two.

Single trees, planted in much-frequented places, where this timid insect is frightened away, are often loaded with fruit without any care devoted to them.

There is a remarkable shrewdness in the instinct of this insect. It will not deposit its eggs, (unless hardly driven for a lodgment, from great numbers,) where there is not a fair chance for the welfare of the young larva. Hence it avoids puncturing fruit over a pavement, or on trees which lean over the water. But as trees cannot often or conveniently be protected in this way, the swine and poultry remedy will be found best for general use. The jarring can be resorted to as an auxiliary, or as the main remedy, where these animals cannot be allowed to run.

A malady which has destroyed the plum in large numbers, is the *black knot* on the shoots and branches. The cause is not satisfactorily understood, but the remedy is sure. It is to cut off instantly, on their first appearance, all affected parts, and to commit them to the fire. It may be requisite, indeed, in some instances, to remove large portions of some trees, before the evil is checked; but it is better to cut away a part than to allow the disease to spread without control and destroy all.

The following *varieties of the plum* have mostly proved general favorites among cultivators, and they will furnish a successive supply from midsummer till autumnal frosts:—

Primordian, Early Royal, Imperial Ottoman, Early Orleans, Green Gage, Lawrence Favorite, Lombard, Columbia, Bleecker's Gage, Purple Favorite, Purple Gage, Huling's Superb, Imperial Gage, Jefferson, Red Diaper, Coe's Golden Drop, Coe's Late Red, Blue Imporatrice, Jackworth Imporatrice.

THE APRICOT.

This golden, perfumed, midsummer fruit has been singularly neglected in many places where it would flourish in perfection. Its eminent merit consists in early maturity, ripening a month before the first peaches, while it is but little inferior to the peach in flavor. Its unwearied enemy, the curculio, whose habits have just been described, has doubtless discouraged many from its cultivation. By care in applying the remedies, full crops may be obtained, as it is scarcely less productive than the plum. It becomes, like the peach, feeble and stunted by age, if neglected, and needs the shortening-in method of pruning. When grown on a good dry soil, *with a subsoil which never becomes soaked with water*, it proves hardy, and succeeds well in Western New York, as far north as 43 degrees of latitude.

Varieties.—The *Golden* or *Fishkill*, the *Breda*, and the *Black* are the hardiest, most productive, and reliable for the North. The *Large Early* and the *Moorpark* are larger and of finer flavor, but less certain as to productiveness. The *Black* apricot is a distinct species from the others, and apparently as hardy as an apple-tree; and, although of second-rate quality, is quite valuable in the Northern States.

THE CHERRY.

The cherry, in the Northern States, is but little liable to any disease or enemy except the *cherry-bird*, which usually destroys the crop as soon as it ripens. The only effectual remedy is powder and shot; they soon become fearful, and, after a few hours spent upon them for a day or two, have not unfrequently quitted the premises wholly for a week or two at a time. In the West, the cherry-tree often suffers from the burning of the bark, one of the best remedies for which appears to be in forming the head very low, or within a foot or two of the ground. The *heart cherries*, that is, the straight or regular growing sorts, do not succeed well at the South; the *Mayduke* and other *sour* varieties are much better adapted to that region. Dwarf cherries, budded on the *Prunus Mahalet* as a stock, often succeed where other trees will not, and they may prove valuable for this reason, in some localities. The following varieties of the cherry furnish a good succession for about six weeks, beginning with the first of summer.

Early Purple Guingue, Doctor, Boyer's Early Heart, American Heart, Knight's Early Black, Black Tartarian, Holland Biganean, Rockport Biganean, Black Eagle, Elton, Yellow Spanish or *Biganean, Downton, Mayduke, Downer's Late, Belle Magnifique, Plumstone Morello.*

GRAPES.

The American varieties are the only sorts, with one or two exceptions, which may be successfully cultivated in the open air, in many parts of the Union. The foreign varieties mature in great perfection, if sheltered by a glazed house, either with or without fire heat. The best American grapes for the North, *Diana* and *Isabella;* for the Middle and Western States, *Isabella* and *Catawba.*

The limits of this article preclude a particular account of the management and treatment of hardy grapes. It may be sufficient to observe, that, like fruit-trees, they need a deep, loose, and fertile soil; and that, unless annually pruned down, so as to give shoots not older than the second summer for bearing the crop, neither high quality nor productiveness can be maintained.

Grapes may be preserved for months, if simply packed in kiln-dried sawdust, in close boxes or casks, and kept in a cool place.

SMALL GARDEN FRUIT.

A very copious supply of table delicacies may be obtained for the first half of the summer, by a few rods of ground planted with strawberries, raspberries, and currants.

STRAWBERRIES,

Under good management, will yield twenty quarts or more to the square rod. They should be kept cultivated in drills or strips, treating the runners as weeds; and after having stood in this way for two years, the runners should be allowed to fill up the previously cultivated strips or spaces, and then the old rows are to be spaded in. By this treatment, we get new plantations without the labor of setting out the plants.

Strawberries are of two kinds, *staminate* and *pistillate;* the latter cannot be relied on for good crops without the fertilizing presence of the former, but, with their presence, they are usually the best. Hence, wherever a pistillate sort occupies a bed, there should be another bed, or at least one row, of some staminate variety, side by side, and separate by an alley of a few feet wide, to prevent the sorts mixing by runners.

The best staminate sorts are the *Large Early Scarlet* and *Boston Pine*; the best pistillates are *Burr's New Pine*, *Hovey's Seedling*, *Old* or *Cincinnati Hudson*, and, in some localities, the *Black Prince*.

CURRANTS

May be greatly improved and more than doubled in size, by enriching cultivation, and by a sufficient pruning annually to keep the shoots from becoming crowded or stunted. The best varieties are the *Red* and the *White Dutch*, and there are some newer sorts of considerable celebrity; but even the old red and white currants, under the best management, will far excel any of them treated with neglect.

RASPBERRIES.

The best are the *Red Antwerp*, (if genuine,) the *Fastolff*, and the *Franconia*. These all need a deep, rich, and sufficiently moist soil. Where the ground is gravelly, and liable to suffer from drought, it should be deeply enriched, and the plants mulched during the season of ripening. Raspberries are greatly improved on gravelly land by *irrigation* in connection with mulching. We have known the stems to make triple the growth in a summer when thus treated, compared with others managed in the ordinary way.

RAISING FRUIT FOR MARKET.

The reader's attention has hitherto been directed to the supply which each family may afford itself, by a well-planted and well-managed fruit garden and orchard. This is the most perfect mode of enjoying fruit; there is a freshness and a delicious flavor in such as becomes matured on the tree, and used when plucked with the fresh bloom upon its surface, covering the melting juice of richness within, not to be found in any gathered before fully ripe and conveyed to great distances. There is also a peculiar satisfaction in deriving this supply from the trees which one's own hand has planted and reared, and which have become an interesting appendage to a rural home.

But it is to be remembered that there are many families in towns and cities, and in some other localities, who cannot, from the nature of the case, raise their own fruit. These must depend, for these useful delicacies, upon the crops of those who furnish them for market. Hence, it becomes the interest of both cultivator and consumer that every facility should be offered for an abundant supply. There is, perhaps, but one kind of fruit that has reached a desired extent in culture for this purpose—the peach. The first extensive orchard of this fruit, which was planted by Reeves and Ridgway, in Delaware, occupying 120 acres, proved highly profitable when prices were high. In one year, when the fruit sold from one and a half to five dollars per bushel, their gross sales were about sixteen thousand dollars. Since prices have fallen, a less sum has been obtained from the thousand acres occupied by the Reybolds, of that State, whose crops give constant employment during the selling season to a schooner and two steamboats. There are other fruits which have afforded heavy profits in market. A single orchardist on the Hudson is said to have sold *twelve thousand* dollars, worth of Newtown pippins in a year, a large part of which were sent to London and Liverpool. C. A. Cable, of Cleveland, obtained, in 1845, from an orchard of one hundred cherry-trees, twenty years old, more than one thousand dollars. An extensive cultivator of the grape, above New York city, has obtained several thousand dollars per annum by the sale of the crop, after kept till winter.

The strawberry has been raised only at Cincinnati in sufficient quantities to supply the demands of all. Two hundred bushels per day as an average for the whole strawberry season, or four thousand bushels in the aggregate, have been sold in that city in one year. One cultivator alone sent in one hundred and twenty-five bushels in a day, requiring sixty hands to gather them.

The great number of trees which have been set out in all parts of the country, have led many to the inquiry, "Will prices be maintained? Will not the market be surfeited?" To answer these questions, let us glance at a few facts.

Perhaps the only instances which have already occurred of a fall in prices, are the peaches of the Eastern cities, and the strawberries at Cincinnati. But these are both perishable fruits—they must be consumed as soon as purchased, or else be lost. Fifty times the amount of *keeping* fruit would find consumers, for it may remain on hand for a month together. But a single city no longer becomes the limited market for long keepers; the whole country is open; and no night-and-day labors are needed to bring them into market before decay seizes them. Railroads and canals will carry them to any part of the Union—steamships will transport them to the millions of Europe. The only requisite is so to cheapen the supply that all may enjoy them. The Newtown pippin has already found its way to the London markets; but the present amount, compared with the quantities destined to flow there, when orchards are profusely multiplied and facilities for conveyance increase, are but as the dripping rill to the mighty river. The price of good winter-apples through the great apple region, Western New York, has rather advanced than fallen during the past thirty years; but it has been shown, in a former part of this article, that even at half the present prices, orchards would be eminently remunerative. How long it may be before such a result takes place, while hungry millions for the whole hungry year are ready to consume them, is very uncertain.

We may, therefore, safely conclude that the time has not yet arrived for land-owners to withdraw their attention to an increase of their orchards; and while the population of the country and facilities for conveyance are multiplying so rapidly, no investment is likely to prove more permanently profitable or beneficial to the public at large.

It is easy to give a list of varieties for the private garden, but much more difficult to name those which may be best for market in all localities. There are so many circumstances to be considered in adapting the supply to the public demand, that no person can well undertake it, with the greatest prospect of success, without a previous thorough acquaintance with the best varities, to be obtained only by their actual cultivation on his ground, and from observation.

MANAGEMENT OF WHEAT HARVEST.

BY EDMUND RUFFIN, ESQ., OF VIRGINIA.

In preparing the following statement, it was my purpose to present merely my own practice and the opinions founded thereon; and not the practices or opinions of other farmers, whether better or worse, unless by special reference. Neither do I presume to offer my practice as the best example for other farmers; but simply as the procedure which my circumstances have induced or compelled me to adopt, and which the general results have seemed to sanction or approve.

The proper time for reaping wheat is when the grains have just reached the "*doughy*" condition; or when they are so soft as to be easily mashed between the finger and thumb. The interior of the grain is then a soft, glutinous, adhesive pulp; but having no remains of the white fluid, or "milk," the presence of which indicates the preceding and too immature condition. But as no considerable space (if even the smallest spot) of wheat can have all the grain at once precisely in the same "dough state," I do not wait for it to be complete. It is safe to begin to reap when not more than one-tenth part of the heads (of latter growth) in any one place of sufficient size have still a little milk to exude from the mashed grains. And in the progress of reaping the more ripened wheat, the same indication and rule govern as to any greener spots or margins. The greener grain, still showing a very little milky fluid, and the pulp softer and less glutinous than of the "dough state," will doubtless lose something in shrinking. But such loss I have never found appreciable in the general result. When reaped in the proper "dough state," I do not believe there will be any loss of size or weight of the grains by shrinkage, more than if left standing until dry—while there is great gain from the earlier reaping, in forwarding and securing the harvest, and thereby avoiding the hazards of bad weather.

The thus reaping wheat as much as possible in so green a state, has been condemned by the opinions and even experiments of many farmers, some of whom I respect highly as authority. Most of such experiments were comparisons made of different heads of wheat, apparently equal in size or number of grains—or of certain larger numbers of grains separated, of two samples—the one cut off green, and the other suffered to stand until fully ripe and dry. All such results are liable to objections. 1st. It is very difficult, if not impossible, to make fair and accurate comparisons as to size and quantity of any two heads of wheat, the one cut off green, and the other left to stand until dry. 2d. Even if such comparison could be perfectly accurate, still it would be made of wheat saved from every damage or danger from bad weather—and not exposed, as a large part of every crop must necessarily be, even in the most favorable season for harvest.

Now, even if it were true (which however I do not admit or believe) that a head of wheat cut off in in the dough state lost something of the size and weight it *might* attain if left to stand until quite dry, and then secured without any damage from rain—still it might well be that such (possible) loss would be more than compensated in the avoiding, by early reaping, the heavier losses of wheat which *always* attend the latter part of a protracted harvest. This is the true question. Even with beginning to reap

wheat in the "dough state," it is rare that a full crop of wheat can be all secured before much waste has been suffered by over-ripeness, aggravated by bad weather. Under such impressions, I have not resorted to the tests of any comparative weighings or measurements, or particular experiments. But in my general experience of reaping thus early, extending from 1822 to 1851, I have never had reason to suppose that any loss, either general or particular (unless in the small proportion of "milky grains") has occurred. The general gain has been believed to be very considerable, and for every harvest; and one particular crop was by this early reaping nearly all saved, just in advance of a long rainy spell, which destroyed fully half of the neighboring crops, then mostly standing. This occurred nearly thirty years ago, when the general practice was to begin reaping later than is now usual on nearly all wheat-farms.*

Aiming then to reap wheat as early as is safe, the operation is usually begun as soon as the most forward spots, of a few acres in size, have reached the "dough state." Sometimes the straw and chaff are yellow, and riper in appearance than the grain; in other years, the green color of the plant and its sappy condition more or less remain. Different measures of time,

* From memoranda written at the time of the occurrences, I am enabled to state the days of beginning to reap wheat for a number of years. For the intervening years, omitted, no such note was made, or preserved. Coggins Farm, the first subject of my labors, is high, hilly, and mostly sandy land, on the south bank of James River, and about 24 miles S. E. from Richmond. Marlbourne Farm, 13 miles N. E. from Richmond, and on the south of the Pamunkey River, is low and flat land, the soil of various textures, but a large proportion very stiff. Vegetation generally, as well as the first ripening of wheat, is always some days more advanced on the former than the latter farm—though they are not more than 25 miles apart.

Reaping wheat begun at		Coggins.	Marlbourne.
1818,	Golden chaff wheat, and ripe	June 25th	
1819,	Golden chaff wheat, and ripe	23d	
1822,	Mountain Purple straw and green,	8th	
1823,	"	13th	
1824,	"	11th	
1825,	"	10th	
1826,	"	12th (*a*)	
1827,	"	16th	
1828,	"	12th	
1829,	"	19th (*a*)	
1831,	"	16th	
1836,	" (crop almost destroyed by rust)	27th (*b*)	
1837,	"	16th	
1839,	"	18th	
1840,	"	8th	
1841,	"	21st	
1842,	"	13th	
1843,	"	19th	
1844,	"	3d	
1845,	"	6th	11th
1846,	"	8th	11th
1847,	"	14th	14th
1848,	"	7th	7th
1849,	" (All good or forward growth cut down by freezing, 15th to 17th of April,)	21st	20th (*b*)
1850,	"		19th

From 1822 to the present time, the same kind of wheat has been cultivated, first known as the "Mountain Purple straw," and more lately distinguished as the "Early Purple straw." During all this time, my usage and aim have been to begin to reap as soon as enough wheat had reached the "dough state." But a few of these beginnings (marked *a*, *a*) were not made quite so soon, because of the pressure of other work; and in some others, (*b*, *b*,) the ripening of wheat was much retarded by peculiarity of season or disease of the crop.

according to such different circumstances, will be required, previous to the subsequent operations of binding and putting the sheaves into "shocks."

I use for reaping only the scythe and cradle. Since coming to my present farm, I have had great difficulty in getting the wood-work of cradles made heavy enough. Cradles made as light as usual hereabout are more laborious to work in good wheat, and less efficient, than heavier cradles. My scythemen complained loudly of the lightness of the ordinary cradles, which I was compelled to use for several years.

When wheat through the country was generally a very light growth, the reapers were taught to catch the wheat cut by each sweep of the scythe, from the cradle with the left hand, and then let drop the handfuls on the ground. This was best for such very thin wheat. But for a heavy growth, it would be better if our men could empty the wheat from the cradle, or "strew" it regularly along the row, as is done in some other parts of the country. My practice, then, of "handing" the wheat from the cradle is not deemed the best, but is the result of the old and inveterate habits of the laborers. It would doubtless be an improvement if we could introduce here, for all heavy wheat, the "strewing" instead of "handing"—and also the cradles best suited for the former practice. Perhaps a still greater benefit may be found in the substitution of reaping-machines—which even now are used by most of the good farmers of my neighborhood. But because of their great liability to get out of order, the difficulties of working them, and especially my own ignorance of machinery, I have feared to attempt the use of a reaping-machine.

After getting into full operation, each reaper is followed immediately by a "binder," who ties up into sheaves all the wheat cut by the reaper. In light or ordinary wheat, this is light work for the binder. But it is heavy service, if well performed, in heavy wheat, or if following a scattering and wasteful reaper.

The wheat is thrown by the reaper, as "handed" from the cradle, in piles of one, two, or three handfuls together—evenly as may be, and the stalks lying at right angles to the direction of the reaper's row. Each binder carries in the right hand a very light wooden rake, with six teeth, and the handle 18 to 22 inches long, which is conveniently used to straighten and gather up the wheat for the sheaf, and also to rake up most of the scattered stalks. The sheaf is made no larger than a band, made of a single length of the stalks of wheat, can securely tie up; and, if the straw is very green, or moist with dew or rain, still smaller size of sheaves is required.

In the beginning of reaping, usually there is not much wheat ripe enough, and there is no need for the most rapid work; and the perfect safety of the first reaped wheat is more important than greater speed in the progress of the work. Then, contrary to the later and general practice, the reaping sometimes proceeds some hours in advance of the binding. When so separated from the reapers, the binders always work much more slowly. But this loss can then be submitted to, for the attendant benefits of giving some time for the straw (and any intermixture of weeds) to wither, and partially dry by exposure before binding. The bands then tie better; and, as the green straw has then withered and shrunk somewhat, the band will not become so much looser afterwards, by the further drying of the sheaf.

The sheaves are left lying on the ground, in the rows where bound, but none in the water-furrows. There they remain, in the beginning of harvest, and, if rain is not threatened, from 3 to 8 hours (besides the whole night, if intervening) after the binding—or about a day later than the reaping—when the sheaves are brought together and put into "shocks" or "hand-stacks." The delay of this operation (and which is only permitted for wheat still green, and also in settled fair weather) permits the wheat to dry something more, and thereby is safer from becoming mouldy in the centre of the shock. The sheaves also are of less weight to the bearers, (who are mostly small hands,) and they stand more firmly in the shock. If an unexpected rain should occur, there will rarely be any damage done to sheaves caught lying on the ground—and still more rarely if the wheat is green and fresh. And this observation applies to sheaves so caught by rain, in any state of dryness and any later time of harvest. If the earth is dry, and absorbs the rain as it falls, so that none shall continue to soak any heads of wheat—and if the rain, even if heavy, does not last more than a few hours—the sheaves will mostly dry as they lie, and without any damage. This result has been found after (undesigned) exposure for 8 days, during which a heavy rain had fallen, and had cleared off. But much delay and risk of exposure to rain need not be permitted. Should a drenching or long-continued rain catch sheaves lying on the ground, they should be soon afterwards set up in small "stooks" of 4 to 9 sheaves each. They will dry in that state, if drying weather follows: if the weather continues damp, the stooks must be shifted, so that the wet sides of the sheaves shall be turned to the outside of the stook. But such damage, or any danger of such, has never occurred to me, except in the remarkably wet harvest of 1846. Then, and in any such long-continued wet weather, no method and no precautions can prevent great loss. Then, indeed, the sheaves sprouted when left only 24 hours on the thoroughly wet ground. But also in stooks previously set up, and even in the still standing stalks, much of the grain sprouted.

The things most important for the perfection of harvest-labors are: 1st. That the wheat shall be cut well, and laid evenly and regularly by the reapers; 2d. That the binders shall gather up the wheat without too much scattering and waste, and tie the sheaves securely; and, 3d. That the shocks are built and roofed over well, so as to stand erect, and to exclude rain. Of course, there must be more or less of short-comings in the efforts to reach all these desired ends.

The operations of reaping and binding need not be described, and, indeed, would scarcely admit of description. As to the building of shocks, perhaps directions may be advantageously given to those who need such instruction. My own heavy early losses, which were suffered from my want of knowing how to build shocks, would be enough to impress on me the importance of better knowledge. And even at this much later time of generally improved practice in harvest operations, there are more than half the farms in Lower Virginia where a wheat-shock has never yet been properly built.

It formerly was my usage, as it still is of some other and better farmers, to put all the sheaves, (of green wheat,) as fast as bound up, into "stooks" of 8 or 10 sheaves each. These stooks are made by setting 3 sheaves on their stubble ends, about 12 or 15 inches apart, on the ground, and forming, by their position, a triangle—the heads of the sheaves being brought together to a central point. Then 8 other sheaves are set around and in close contact, each one on the ground, at the opening between two of the inner 3 sheaves. A few more may be added, to the outside, to give proper size and shape, as desired, to suit the weather. Each stook, when finished, presents, roughly, the shape of a small cone. In such stooks, the wheat will usually cure well; and, after a day or two of good weather, may be put into shocks of the largest convenient size.

But I object to, and have abandoned this plan of general stooking, (for green wheat,) because of the labor of twice handling and moving, and the greater waste, by shedding stalks from the sheaves, in these handlings. If the weather should be good, the sheaves would be as safe if left lying separately on the ground. A light or transient, though much heavier rain, would not hurt the sheaves, either in stooks, or lying on the ground. If a storm of rain and wind occurred, the stooks would be nearly all overthrown, and the wheat would be but little safer than if the sheaves had been lying on the ground. And, in case of such a storm, or of any considerable rain, stooks may and ought afterwards to be set up, to permit the sheaves to dry. It does not often happen, from such an occurrence of heavy rain, that I lose any thing from the omission of building stooks before the rain occurs.

In beginning to build a "shock," the first 3 sheaves are set up as in putting up a stook. Others are set around the first, in a circular form, the "butts" or stubble ends of the sheaves, set firmly on the ground and close to the inner sheaves, and the heads pressed inward towards the central point. This foundation is thus continued to be enlarged until of sufficient size, (according to the length and dryness of the wheat.) This first part of the shock approaches in form a truncated obtuse cone. The inward inclined heads of the opposite outside sheaves are about 2½ to (for largest sizes) not more than 4 feet apart. The sheaves of the latter rounds should have been firmly pressed inward, and all set closely together, so as to be as compact as possible. The roofing is begun by setting the stubble end of a sheaf upon and partly into the bands of two of the outside sheaves; and so continuing a course around—putting each sheaf over the joining of two others below it, when spaces permit. These sheaves, forming the first course of the roof, have also their heads pressed inwards to the centre; and they are prevented from slipping down by some of the stubble ends of every sheaf sticking into the bands of the lower sheaves. This first course serves to reduce the amount of *cutting off* before exhibited, but still preserves the general form of a truncated cone, rising higher than before. Another course of sheaves is then laid on in the same way, rising still higher and approaching nearer to a point. The sheaves are laid on in the manner of shingles or slates to cover the roof of a house. Each sheaf covers the "break" between the two of the course below; and the heads of every sheaf are covered by the straw end of the next course above—so that no heads (except of the "cap") are exposed to rain, so long as the shock does not tumble, or lean so much as to disorder its roofing, and admit rain.

The last course carries the sheaves to a point, as high as the builder, standing on the ground, can well place them. The shock is then (or ought to be) nearly a perfect cone, of height greater than the diameter of the base. The last 6 or 8 sheaves used to bring the top to a point, should be of smaller size. And as the greenest wheat (occurring in spots) is bound into particularly small sheaves, these serve well for this topping. Moreover, by being so exposed to air, if put up as soon as reaped, these sheaves of green wheat will cure safely.

The "capping" and finishing of the shock is next to be done. For this, a very large sheaf is made, by tying a band of double length securely around and near to the stubble end of the wheat, put evenly together. The sheaf is then placed on the ground, resting on its stubble end, and so held while the laborer bends down at the band, and outward, all the stems, by handfuls, beginning at and around the outside, and so proceeding around until reaching the central stems. Being bent outward, the heads then are the outside of a circle, lying on the ground. In this flat outspread shape, the sheaf is lifted by a fork stuck into the tied part, as high as over the point of the shock, then placed thereon, reversed, so that the tied stubble end shall make the pointed top of the cap, and the loose stems of the cap-sheaf shall fall upon and cover all the upper part of the cone. The sheaf is properly adjusted; and some of the heads of wheat, hanging downward, are fastened into the bands of the underlying sheaves, on four opposite points, so as to prevent the cap being easily blown off by high winds. A light ladder, 3 to 4 feet long, set against the shock, will aid the capping of large shocks.

If properly so built, no heads of wheat will be exposed to rain, except those (hanging downward) of the cap-sheaf. And though these few are wetted by every rain, they are also so exposed to the air and sun, that they soon dry—and will keep sound in any but wet weather of unusually long continuance.

According to the size of such shocks, and to the quality of the crop, they will hold from 2 to 5 bushels of wheat; or more usually 2½ to 4. If the weather is threatening, and if sheaves are very green, or are actually somewhat moistened by rain or dew, it will be safe and proper to put up the wheat in small shocks. When this has been done for fear of worse weather, I have found both green wheat and damp sheaves to cure well. And in other cases, where no danger was feared, and less caution used, I have had both green wheat and wheat damp (from previous rain or dew) to become mouldy, in straw and chaff, in the middle of the shock; but without any other apparent damage to the grain than some discoloration. Some of the most mouldy heads, and still moist, as found when beginning to thrash wheat, were tried as to their power of germination; and of 100 such grains, 95 sprouted.

But, though wheat may thus bear to be shocked in a green and even in a wet state—and though it is expedient to do so in particular cases, when a worse condition is feared, from the continuance or threatened approach of wet weather—still I prefer to avoid such procedure in ordinary practice. It is not only necessary that wheat shall cure and dry finally and thoroughly in the shock, and free from damage in passing through its "sweating," (which every shock goes through,) but it is also very important that the wheat shall be dry as early as the time to begin threshing. If this operation has to be delayed, because the wheat is not then thoroughly dry, the completion will be late, and the shocks exposed to much more damage from a rainy spell.

The intervals of time, as above stated, between the reaping and the binding, and between the binding and the putting into shocks, are deemed proper, and allowed only in the early part of harvest, when the wheat is green—or afterwards, in case of wheat being reaped when moist with rain or dew. Of all these causes of danger, or damage, the moisture remaining from heavy dew seems to be the worst. The thinnest growing wheat, and still more if it is "dead-ripe," and therefore cuts badly when dry, should be reserved for reaping in the mornings, while dew remains. A light dew need not stop binding. But if there is heavy dew, and it is necessary to reap during its continuance, the wheat ought to lie long enough to nearly dry before being bound, and still longer before being put into shocks. The heaviest dew need not delay the building of shocks, of sheaves bound dry the preceding day—as their moisture will be only on the upper outside.

Having considered these subjects of exceptions to general operations, the latter, though far the more important in amount, can be despatched in fewer words.

Usually, before half the harvest labors are over, the remaining wheat is so ripe, by the time it can be reaped, that it may be shocked immediately. Much earlier, (if, indeed, not from the beginning,) the binding should have followed immediately after the reaping. After being thus brought together, there is thereafter permitted as little interval between these different operations as possible. Still, in settled fair weather, there will be no objection to there being enough sheaves left on the ground over-night to occupy all hands, except the reapers, in putting them into shocks, the next morning, during the continuance of dew too heavy to permit binding. At such times, the younger men not yet accustomed to reap may learn to use the cradle, in the lightest wheat.

When the labors of harvest are in regular progress, there is but little to be feared from rainy weather, except so far as it will delay the completion of the work, and injure the standing wheat. All the reaped wheat may be (if desired) safe in the shock within two hours after being cut down. If sudden rain threatens, by aid of the reapers and binders, all can be secured in half an hour. But the danger from delay of reaping, and of rain, to the yet standing and already fully-ripe wheat, is very great; and this danger is tenfold increased by a late beginning of harvest. By beginning to reap the wheat when green, there is an advance of 4 to 6 days gained; and, if afterwards interrupted, even for as long a time during the latter part of harvest, by a spell of rain, the farmer is then precisely where he would have been without that delay, if waiting at first for his wheat to be fully ripe and dry. On the other hand, if after so waiting, such a rainy spell were then to occur, the crop would be nearly destroyed. If not actually sprouted, the quality of the grain would be injured by every wetting and drying—and, even if not lodged in mass, the wheat would have its heads so turned down, that the loss in reaping would be enormous.

My harvest labors are too heavy for my limited force, and therefore they cannot be executed very perfectly. Especially, there is always great scatterings and waste of wheat by badly-operating cradles, or some awkward reapers, and which cannot be, or is not, raked up and saved by the binders. No laborers, either reapers or binders, worth having, can be hired here; and all who seek for such employment in harvest, studiously avoid all farms where there is any heavy growth to reap and no whisky is permitted to be used by the laborers. I have ceased to seek for or to obtain any aid of harvest hirelings.

To the foregoing general statements of practice and opinions, I will append the particular facts, as to weather and operations, of two different harvests. The statements are extracted (in substance) from my farm-journal. The entries concerning or indirectly relating to harvest operations or difficulties only will be presented. The two statements are selected from the number contained in my farm-journals, for the following reasons: Both the crops referred to were harvested within the few past years, so that most farmers may recollect the weather and other general circumstances of each time: In one of the cases, the harvest was remarkable for the worst weather I ever had to encounter; and through the other there was generally fine

weather, but the crop was unusually heavy, and the labors were protracted, and thereby the difficulties and risks much increased. A tabular statement of my latest harvest will also be added. The manner of proceeding, in all cases, agreed with the foregoing opinions and directions:

Harvest operations on Marlbourne Farm. Extracted from my Farm-journal. 1846.

[The spring season of 1846, to the end of May, had been generally and remarkably rainy.]

"*June* 1. Thick mist all forenoon. At night, heavy rain.

"3*d*. Driest and lightest part of corn-field just fit to be ploughed. [Continued generally cloudy, or misty, and cool, with some light rains in all the next five days.]

"9*th*. Slowly raining from 7 A. M. until late at night. Very cool.—The wheat seems ripe enough to begin to-morrow; but, in the very bad condition of the corn-field, I must give it another day's work before leaving it.

"10*th*. Still cloudy—and all day nothing but variations of thick mist, thin drizzle, or, in the cessations of both, damp and cold air. [Of course, better weather to begin harvest was waited for.]

"11*th*. Steady rain from last night to noon, making the corn-field everywhere too wet for working. Afternoon, began to reap wheat, as soon as the rain had dried from the straw. Continuing cloudy—and several scuds of misty drizzle, which did not cause any cessation of the work. Binding the wheat into sheaves, as fast as reaped, and setting up in stooks immediately after.

"12*th*. Raining heavily last night—and continued at intervals and slowly for nearly all day, though worse in forenoon. Notwithstanding, despairing of doing better by waiting, reaped and bound wheat about 6 hours of forenoon. Then, fearing to proceed, discharged the hands, because there was no other work for them. Never had I a corn-field so much needing both ploughing and weeding, and yet it is too wet to be touched, when weather ought to forbid reaping wheat. The condition of both crops, but especially the wheat, is awfully alarming. It is now nearly throughout just in the state to begin reaping; and, even if good weather were now to come, the wheat must lose much before the harvest can be entirely finished. But there is every prospect of bad weather continuing; and if so, of ruin to the crop, whether cut down wet, or left to stand, waiting for drier weather. Besides all the previous rains, and cloudy weather, there has not been any sunshine during the last five days, and there has been more or less rain on all of them.—Quite cold.

"13*th*. Steady rain, and sometimes falling heavily, from morning until noon—and showers at intervals afterwards, into the night. Thick damp air, or otherwise mist, at all other times. At 2 P. M. began to stook the sheaves cut and bound yesterday forenoon, which in part had been left on the ground when the hands were driven off by increase of rain. I supposed it did not matter whether the wheat lay on the ground, in sheaves, or was in stooks, for 24 hours only after being reaped, remaining wet in both cases, and the weather being so cool. But it was found that some of the wheat on the ground had already sprouted—and the same surprising and disastrous result may now well be expected for all, without a speedy change to drying weather. Even of the standing wheat the grains are much swollen by moisture, as if going on fast to sprout. Yet it was but in the dough state, and yesterday, if weather had permitted continuing to reap, J—— doubted whether there was enough wheat then ripe enough. As soon as the little stooking required was done, again discharged the hands, having no work for them. At late bed-time, still slowly raining.

"*Sunday*, 14*th*. Misty, cloudy, and always damp air until noon. Afterwards, some sunshine. Light scud of rain in evening, with threatening clouds and thunder. Turning warmer, found the sprouting progressing in all the stooks—and more in those of the wheat cut and sheaved wet on the 12th, and stooked on that and the following day. Would have thrown open the stooks to-day, if clear and settled weather. As it was, the risk was too great.

"There are numerous sprouted grains of the ripest *standing-wheat!* And all the sprouting is not so alarming as the apparent condition of all the other grain of the crop; which is so swollen and softened by the continued moisture, that it seems like wheat which has soaked in water for the purpose of making starch. And even if it should now dry soon enough to prevent further sprouting, I fear much that the gluten may be mostly converted to starch, to the great injury of the wheat for sale, and also to its power of germination. The damage is greatest in the ripest wheat. As my kind [a forward purple-straw, red-grain wheat] is 5 to 7 days earlier in ripening than any ordinary kind, (except the May and Mediterranean,) it is now just so much advanced towards injury or destruction, more than the later kinds.—Warm.

"15*th*. Threatening all day, but no rain. But even the expectation of rain is a serious impediment to the operations desired, under such difficulties. Began early to reap—and (for fear of more rain) binding immediately, and putting into shocks soon after. After dew was off, opened all the shocks, turned the inner and wetted sheaves outside, in new and smaller stooks—reducing the number of sheaves in each from 8 or 9 to 4 only. The sprouting very bad—and no drying yet of the interior of the wet sheaves. The grain of the standing wheat was still very soft this morning. But the sunshine dried it fast; and before night, some grains were shattering under the stroke of the scythe. If this day had also been rainy, the crop must have been nearly or quite ruined, by the general sprouting or later rotting of the wet grains. As it is, the loss is already great. Shocked nearly all the wheat reaped to-day. All that reaped before, remaining still exposed, and wet, in the small stooks.

"16*th*. Warm, and generally clear—but sometimes cloudy, and one very sudden and transient shower, which fortunately did no injury. Kept today's reaping shocked nearly up to the scythes, except the wheat cut early in the dew, which remained in stooks.

"17*th*. Finding that the wheat reaped wet would not dry in stooks of more than 4 or 5 sheaves, set up the sheaves singly. Shocked all the reaped wheat by night. The wheat cut on the 11th, when dry, has kept, and dried in the stooks, with but little sprouting or other damage; and with no other care than shifting the position of the sheaves on the 15th, and reducing the size of stooks from 8 or 9 to 4 or 5 sheaves. The wheat cut wet fared much worse, and was not entirely dry even after being to-day exposed in sheaves standing singly—though generally it is now fit for keeping in the small shocks into which it was put. Very hot sunshine, interrupted by passing clouds. At night, light rain.

"18*th*. Clear until afternoon, and hot. Then, heavy cloud, with severe thunder and lightning, and violent wind. Slow rain began at 5 P. M., which stopped reaping for two hours. Afterwards, reaped about an acre, in the rain, without binding. The building of shocks kept so near the scythes, that all was done by the time the rain began to fall steadily. But the furious wind, just before, had blown off some caps and top sheaves of other shocks, and I fear has done much damage.

"19*th*. The violent wind of yesterday has been more injurious than was anticipated. Many stalks of corn are broken off. The standing wheat before had more or less leaning from N. E., the direction of the previous storm. The wind of yesterday was from the opposite quarter; and it has reversed and increased the leaning of all the wheat, and has broken numerous stalks everywhere, so that the heads are too low to be saved in reaping. The caps, and even some of the roofing sheaves, of many shocks blown off, or displaced, which will require much trouble to repair.—Clear through greater part of the day. In afternoon, another heavy and alarming cloud, which, however, mostly passed by, causing only slow and light rain, from before 6 P. M. to dark. The day's previous reaping all shocked, and no wheat exposed, except the shocks damaged by the wind, and not yet repaired.

"20*th*. In afternoon, again heavy and alarming thunder-clouds, and rain in sight, falling along an extensive line, for two hours. Fortunately, none reached here until nearly dark, and then but a light shower. Nearly all the wheat shocked up to the reaping. The waste very great, owing to the dead-ripe and dry state of the wheat, and the numerous broken and bent stalks. There is, however, but little shattering of the grain, owing to its being so generally shrivelled and badly filled. This defect being caused by the quantity of rain during the growth, is greater where the land is lowest and richest, and the straw most luxuriant. The very thin 'stand' of the wheat also served greatly to increase this evil. [Nearly all the seed-wheat had been more or less injured by being washed in brine; and about one-fourth, or nearly, did not come up.]

"*Sunday*, 21*st*. Very cool since last evening's rain. This the first day without some rain since the beginning of harvest, and for some time before.

"22*d*. Still very cool. The waste in reaping increases with its causes, the dryness and broken down state of the wheat.

"23*d*. Strong north wind, and still very cool. Afternoon, rain falling in sight, but merely a light scud here, just before night.

"24*th*. The first moderately warm day, of late.

"25*th*. Finished reaping by night, and the building of shocks very nearly."

This crop yielded enough straw for more than 3000 bushels of grain. The actual product of wheat was 2432 bushels. The quantity of land is 201 acres. The laboring force of the farm was 24 hands of all kinds. Such of the house-servants as could be spared, (about 3,) aided in the labors of harvest. The whole field force was not throughout engaged in the harvest. The shocks were 850 in number, of which about 100, put up wet, were very small.

When threshing the crop, it did not appear that damage had occurred to any of the wheat, after its being put into shocks. This result was better than expected, from the unfavorable weather and condition of the wheat preceding the putting of some of it into shocks.

Harvest of 1848.

[The weather of the spring of 1848 had been good. No important disease or disaster had occurred to my wheat crop, which appeared very good for the land. It proved, indeed, to be a much better product of grain than I supposed during harvest. The crops of wheat generally were better that year than in any other known.]

"*June 7th.* Afternoon—began to reap wheat, with 8 cradles only. The wheat is barely ripe enough [i. e. in the 'dough state'] anywhere; and yet it is so generally near to that state, that I fear most of the crop will be dead-ripe, and wasting, before my small force can half get through the harvest. Strong north wind—and still continues very cool. Reaping equal to work of 1½ days of one man.

"*8th.* From 3 to 6 reapers, at different times, [4½ days work ?] Before night, brought the binding up to the reaping. Sheaves shocked up to wheat cut down 8 hours preceding the last reaping. 41 shocks. Wind northerly. This morning, the air seemed cold enough for frost—but none visible. Earth now very dry. Clouds threatening rain—but again clear before night.

"*9th.* Work of 7½ reapers. Day hot, but again cool at night. 40 shocks built. This work now a little more than a day behind the reaping.

"*10th.* Hazy and cloudy. At 10.30 A. M. slow drizzle began. Suspended reaping—and continued putting up shocks until 12 M., and also bound the wheat reaped and left unbound while wet with dew. Both operations hazardous. After a cessation of 3 hours, (during which the weather continued cloudy and damp, but not rainy,) returned to wheat, and shocked all remaining, and which was still quite damp. 174 shocks, mostly small. Those put up before the beginning of the rain were of good size, and some of them larger than usual.*—[8 reapers. 5 days' work of reaping ?]

"*Sunday*, 11*th.* Threatening clouds, but no rain.

"*12th.* 8 reapers. The building of shocks within 2½ hours of the reaping—and desired to be as near as possible. 98 shocks, of large size. Windy, cool, and clear.

"*13th.* Very cool morning, and strong north wind all day. The wheat has ripened rapidly. Though still green in low spots, much the greater proportion is quite ripe, and the straw dry. The heads are beginning to turn downwards. Yet but little more than one-fourth of the wheat land has been reaped. The work gets on slowly. The harvest will be long on hand, even with good weather; and a storm or a spell of rainy weather will cause great loss. 8½ reapers. 110 shocks put up—and within an hour's work of the reaping.

"*14th.* Strong N. W. wind impeded the reaping, and required the moving to more sheltered ground. 7½ reapers. 95 shocks.

"*15th.* Wind S. W. Very warm. 8 reapers—but two of them young beginners, in place of two good scythemen who are sick to-day. Wheat now dead-ripe—and where longest ripe, the heads bent downward. Began to reap the rankest growth, of which very little is lodged, owing to the very favorable weather. 83 shocks.

"*16th.* 8 reapers. Clear, still, and very warm. Straw now so dry and brittle as to be an impediment to tying the bands. Shattering of grain to-day for first time. 53 shocks. The first hot night (or indeed otherwise than cool) this summer.

"*17th.* Strong S. W. wind. Clouds threatening rain. Have now finished reaping nearly all the wheat or clover-fallow, which includes nearly all of the heavy growth. About half of the land in wheat now reaped. So far, all well secured, but all still to reap is in great peril. 96 shocks. [8 reapers ?]

"*Sunday*, 18*th.* Heavy shower. Loose tilled land wet about 2 inches deep. This refreshing to the growing crops, and I hope of not much damage to the wheat. But in its present state, every wetting must do some harm.

"*19th.* Strong southerly wind, impeding the reaping. Four several scuds of rain—which did not stop any of the work, though perhaps the shocking of the damp sheaves may be hazardous. 70 shocks—nearly up to the reaping. 9 reapers. Cool at night.

"*20th.* Nine reapers. 96 shocks. Last night, another hasty shower, which did not prevent binding and shocking this morning. Reaping lightest wheat every morning as long as there remains any effect of dew or dampness on the straw. Afterwards, the reaping moved to thick wheat. Very hot.

"*21st.* 9½ reapers. 79 shocks.

"*22d.* The first calm day for some time—and oppressively hot, even when clouds obscured the sun, as was the case for most of the day. 9 reapers. 77 shocks.

"*23d.* High S. wind. Reaping had to be moved to more sheltered ground. 10 reapers. 63 shocks. Rain threatening. So many heads of wheat now are turned downward, and the straw is so rigid and brittle, that the binding is difficult, and badly done. The topping of the shocks also made bad, by the outspread heads of the wheat in every sheaf, and the rigidness of the straw.

"*24th.* 8½ reapers. 73 shocks. North wind—and at night quite cool.

"*Monday, 26th.* Finished reaping at 1.30 P. M. 6 reapers to that time. [4 day's work.] 37 shocks.

"This has been the longest harvest I have ever gone through, but with the best weather ever known throughout harvest. If a heavy rain had occurred, the loss of wheat, from the delay of reaping, would have been very great."

When threshing, all the small shocks put up moist with rain, on the 10th, were found dry, and the wheat in good order. Some other and larger shocks, put up greener, and in dry weather, were mouldy in the middle—though there was no loss of grain.

The crop grew on 256 acres, (as estimated,) and made 5127 bushels. The shocks, 1289, averaged very nearly 4 bushels. The days' work of reaping are estimated at 125½—and the average of quantity of land for each was 2.04 acres; and of grain, 40.8 bushels. The farm hands, of all kinds, were 26, to which were added 5 house-servants—very nearly that whole force being engaged all the time in harvest labors.—*American Farmer.*

* None of this wheat, shocked after drizzle, and when damp, or but partially drying afterwards, was found damaged, at threshing-time.

REARING NEAT CATTLE.

Mr. D. S. Caldwell, of Essex county, Massachusetts, offers the following judicious remarks on the subject of feeding and weaning calves:

"The most defective branch of farm economy in New England that has come under my observation, is the treatment of calves under the age of four months old. Many stock-growers allow their calves to have all the milk of the dam until six or seven weeks old, (which is frequently all the food they need,) and the young animals eat little or no grass or hay. They are then suddenly weaned, before they have acquired the habit of eating solid food of any kind, and are reduced almost to the point of starving, from which they seldom, if ever, recover."

Mr. Caldwell estimates the cost of rearing a calf till it is three years old, in Essex county, at $26.50; and the animal must be large and in good condition to bring the money. "Ordinary cattle," he remarks, "do not pay for raising, where pasturage is so high as in this vicinity, and most farmers have nearly abandoned the business. To learn calves to eat grass, hay, roots, or meal, at an early age, it is recommended to give them about half feed in milk, say at the age of three or four weeks, put finely cut roots into their mouths, and hold their mouths till they chew and swallow, or swallow without chewing, the food. In this way, a calf will soon acquire a taste for roots or meal, and eat of its own accord. One eating calf in a pen will soon learn others to do likewise. A calf should have milk till it is ten weeks old, and be gradually weaned. To allow a young animal to suffer from the lack of nutritious food is the worst possible economy, for it will be worth less when three years old, if poorly kept, than at two." By keeping his calves in a thriving condition during the first two years of their lives, Mr. Caldwell sells his two-year old heifers at from $22 to $25. In the spring of 1849, he sold three at the following prices: $30, $32.50, and $35. A three-year old heifer purchased by Mr. C., kept in the ordinary way the first year of her existence, brought only $26. A pair of three-year old steers, which had been used to the yoke two years, and not pampered, were worth $80. Their weight was 3040 pounds. Their extra keep, above ordinary young stock, did not exceed $10, while their labor had been worth $20 the past year. In the opinion of Mr. C., a given amount of food will yield more meat in a Durham than in any other breed of cattle. He says that "they make the best of oxen, but I cannot recommend them for milkers."

Mr. Geo. W. Drisko, of Washington county, Maine, says that upwards of 12,000 cattle were received at Cambridge market, Mass., from the western and central counties of Maine, during the year ending November 1st, 1850. This business has sprung up since the construction of the railroad from Boston into Maine, and it is likely to increase. There are many districts in which it will pay well to rear superior milkers, beef-cattle, and working-oxen; where the growing of ordinary stock is a losing business. Every close observer, who has paid attention to this subject, must know that the necessary cost of breeding fine animals and bringing them to maturity, does not exceed that of producing indifferent ones of equal weight; and yet, a good cow sells readily at three times the price of a poor one, and then yields a better profit to the purchaser than the latter. Beef-cattle, which furnish the butcher little besides heads and horns, legs and viscera, although a vast

quantity of food was consumed to form this mass of offal, are dear at any price. Farmers have too long and too generally neglected the art of breeding and keeping domestic animals. This branch of rural industry affords little profit to a majority of agriculturists, simply because it is not properly attended to. In Belgium, it is the general practice to market beef-cattle at two years of age—experience having taught the important truth that young growing animals give a larger return in meat for any given amount of food than adults can possibly yield. A steer, which is 1000 days old, should have a live weight of 1500 pounds. In rearing calves from dairy-cows, they should be fed on buttermilk and skim-milk sweetened with molasses. This saccharine substance is the best substitute for the butter taken from their mother's milk. A small quantity of molasses will answer the purposes of the animal economy. A gruel, made by boiling a little corn, oat, or barley-meal, is excellent feed for calves, and will pay a round profit, if the animals are worth raising. Pea and bean porridge are admirably adapted to promote the growth of calves. In England, it is a common practice to rear two calves on a single cow; a plan that is adopted by many in this country. At the South and West, calves and cows herd together, and, with care and good keep, fine stock may grow in this way. But the misfortune is, where cattle can be reared at so little expense, they receive scarcely any attention; and by propagating from inferior animals of both sexes, the herd soon degenerates. Cattle that have to pick up a precarious living the year round where they can find it, always deteriorate. By regular feeding 365 days in a year, or securing good keep and care, as to salt, water, shelter, and propagation, one's stock may be constantly improving. Too little pains are taken to provide fresh pastures for neat stock, horses, and mules, and in making good winter forage. Considered as a whole, three-fourths of the meadows in the United States are suffering a gradual exhaustion of the elements which form timothy, herds-grass, blue-grass, and clover. Not one farmer in ten thousand keeps an exact account of debit and credit in reference to the bone-earth and potash taken from any field in hay and grass, and restored to it in manure of any kind. If such an account were kept, the book would show that the soil parts with vastly more alkalies and other elements of crops, than it receives. Neat cattle should be so managed as to make this account balance.

Mr. Moses Coburn, of Whitewater, Walworth county, Wisconsin, says that the cost of rearing steers until they are three years old, in that region, is about $8 each; at which age a pair of well-matched steers command $40. The usual price of good dairy-cows in the fall is about $15; in the spring, they sell at $20.

Mr. James D. Bell, of Walden, Vermont, who is in latitude 44½° north, on the Green Mountains, says that the cost of rearing neat cattle till three years old, is $15; at which age the usual price is $20. Cows are worth from $25 to $35 in the spring, and in the fall from $15 to $20. "Our farmers grow but few sheep or hogs. Some first-rate horses are reared. A dairy cow yields, on an average, 150 pounds of butter a year, which is worth 17 cents a pound. The culture of turnips, carrots, and beets is increasing. Potatoes were rotted somewhat in 1850; common yield, 150 bushels per acre; 500 have been grown in this town. Agricultural interest slowly but surely advancing."

Mr. Joseph W. Dudley, of Madison, Connecticut, says that it costs about $20 to rear a calf till it becomes three years old, and a steer at that age is worth $25. Value of good cows in the spring is from $35 to $40; in the fall, $25 to $30. Cows yield, on an average, 150 pounds butter per annum; cost of production 16 cents; average price, "one Yankee shilling."

Mr. C. A. Spalding, of Windham county, Connecticut, estimates the expense of rearing cattle till three years old, at $30; which are worth $30 to $35. Good cows sell in the spring at from $30 to $35; in the fall, $12 less. Feed is often poor, and cows average only 100 pounds of cheese, and 40 of butter; the former being made in warm, and the latter in cool weather. Mr. Daniel W. Alford, of Hartford, Connecticut, writes that cows yield 200 pounds of butter in a year; of cheese, the same quantity. Cost of producing butter, 12 cents; that of cheese not stated. Cost of rearing neat cattle till three years old, $18 a head; price from $20 to $30. Mr. R. P. Stevens, of Cerestown, Pennsylvania, estimates the expense of rearing neat stock until three years of age, at $20; and says that the average price at that age is $30. This indicates a good business in McKean county, which is well adapted to grazing. He remarks "that it is generally conceded that a given quantity of food will yield more meat in a Durham, or Devon, than in common stock, or our native breed." Mr. Prescott Cutting, of Worcester county, Massachusetts, writes that "considerable attention is paid in this section to the rearing of stock: our heifers for the dairy; steers for the yoke; and both, ultimately, for the shambles. Breeds, natives pretty well crossed with Durhams, and lately with Devons. I have no doubt that a given amount of feed will produce more beef in a Durham than in a native." "Cost of rearing till three years old, I should say, at least $25, and they usually bring about that price, (heifers,) and steers a little more. System of rearing, is to let the calf suck till 10 or 12 weeks old, then put them in good feed. It is bad economy to stint a calf during the early part of its life, for he seldom, if ever, recovers from the injury. Pains are taken to raise good milkers from our best cows." Our correspondent urges the importance of selecting a male from a family of superior milkers, instead of looking so particularly to his size and form, regardless of maternity. By careful selections of both sexes for a few generations, a distinct family may be formed, which, with care and good management as dairy-cows, will be much improved from the original stock.

Mr. Joseph Sibley, of West Rush, Monroe county, New York, says, "On no subject connected with agriculture is there so great a difference of opinion as on that of stock. With some, every thing that is *new* is the best. To be far-fetched and dear-bought establishes a reputation, regardless of all defects. I am of the opinion that farmers often deceive themselves; when they get an animal of a new breed, they give it altogether better keeping than their old breeds receive, and such usage renders the new better-looking and more productive: the new breed is credited with advantages which are really due to increased care and feeding. My own opinion is, that if as much pains had been taken with our native cattle as has been bestowed on the imported races for the last 20 years, the former would by this time be quite equal to the latter. The cattle generally imported into this country are from stock bred in England for the shambles, and for show, rather than profit. These races have been kept so high and so extravagantly fed, that high-keeping has become constitutional, and their offspring must be pampered, or they fall below our more hardy native

stock; and this result is witnessed where both are kept together, summer and winter, on something less than full feed."

Mr. Sibley says that apples are grown to feed hogs and cattle to a considerable extent, and that good eating-apples are a profitable market-crop. His communication bears date February 21st, 1851, and after this report is mainly completed. At that time, he had apples which weighed 24 ounces.

Mr. Lewis T. Hoyt, of Danbury, Connecticut, says that the average yearly produce of butter, per cow, is not less than 200 pounds; which is worth from 18 to 20 cents a pound. Good dairy-cows sell at from $30 to $40 in spring, and from $20 to $30 in fall.

In some remarks on the cost of rearing neat cattle, Mr. George Boyer, of Schuylkill county, Pennsylvania, advises agriculturists to raise colts instead of neat stock. He says that he has had 30 years experience in the business, and finds no difference in the expense of rearing a colt or steer, till three years old. At the age named, a colt will sell for $75 or $80; and a steer at less than a third of the money. Good blooded colts bring readily $100 apiece, when three years old; and sometimes $200 or $300. He adds, "I have paid more than the sums named for colts, and think the production of horses far more profitable to the farmer than to raise cattle."

Colonel B. F. Bridgeman, of Bledsoe county, Tennessee, writes that the cost of rearing heifers and steers until three years old is $7.50; and ten dollars is the price at which they are sold. Good dairy-cows are worth from $10 to $12. He says that 100 pounds of corn will produce from 10 to 12 pounds of beef; and that Durham cattle will yield more good beef from a given amount of feed than natives. In seeding for meadows or pastures, Colonel B. uses 2 gallons red-top, 3 gallons timothy, and 1½ to 2 gallons clover-seed per acre. This is a good mixture. He estimates the cost of growing hay at $6 per ton, which most farmers at the North will regard as high.

Mr. Turner Vaughan, of Wilson county, in the same State, writes that "the cost of rearing neat cattle until 3 years, is as follows: 1st year, $1; 2d year, $2; 3d year, $3. On my little farm, this can be and is done, and pays tolerably fair wages. A short time since, I sold 35 head, at the above-named age, for $181, and did very well." One hundred and eighty-one dollars, divided by 35, gives only a small fraction over $5.17 a head for three-year old steers; which shows how cheaply neat stock is grown in Wilson county. Mr. V. remarks: "I am pretty well fixed for this kind of work; my yearlings fodder themselves after this wise: I put ricks or stacks of hay on platforms 18 inches high, made of logs or fence-rails, in each of which are two tons of hay—if hay it may be called, being composed of millet, wheat, and oat-straw. My weaned calves stand around these stacks all winter, and eat as they like. When the weather is very hard, I give them coarse cornmeal, in little troughs, manufactured (ground) at a chunck of a horse-mill hard by, which serves as a shelter during winter. My mode of raising cattle is my own; and in it I find remarkable safety from disease—not losing 2 per cent. The great secrets are, good shelter in winter and high salting in summer. I buy my calves at $1.50 a head; so you see my grass and hay fed beef costs me less than 2 cents a pound, and my stall-fed less than 3½ cents. Good dairy-cows are worth $15. A given amount of food will produce more beef in a Durham, Devon, or Hereford, than in any indigenous or native animal. I deem it wrong to cut the ears of stock: keeping them inside of fences is better. My plan of castration (if it is mine) is most successful for all kinds of stock: I draw the testicle a few inches from the groin, clamp the spermatic chord with two sticks tied at one end, and cut it off close to the clamp; pour on a spoonful of tar, grease, and salt, kept warm; then sear the chord well, and take all off. The emasculated animals should be kept out of the rain till well; and in this way I lose *none*. I change bulls every two years. Beef is worth from 2 to 4 cents; green hides, 5 cents; dry, 10; tallow, 6 to 8. I keep my yearlings, milch-cows, and other neat stock, in separate fields in summer, and apartments in winter; and warm and comfortable in cold weather, as far as practicable. This division of *caste* and *size* prevents the strong from robbing the weak, and, by carefully sawing off the tip of the horn, no mischief is done."

THE PREPARATION AND USE OF MANURES.

BY DANIEL LEE, M. D.

All manures, from whatever source derived, should be regarded as part and parcel of the soil, and studied in that connection. It is usual to consider them under the heads of animal, vegetable, and mineral manures. Animal manures are either animal substances, like the flesh of a dead horse or sheep, or the excrements of animals, voided by the bowels and kidneys. Vegetable manures differ from the dung and urine of herbivorous animals in being less concentrated, and containing in a given weight more carbon (coal) and more of the elements of water, (oxygen and hydrogen.) Decaying vegetables, not consumed by animals, yield vegetable manures. Mineral manures differ from both animal and vegetable in being in a wholly disorganized state, like gypsum, burnt bones, wood-ashes, ammonia, and carbonic acid. Of all animal manures, the excrements of dunghill-fowls and sea-birds, called guano, approximate nearest to those which are minerals, or in a disorganized condition. Comparatively speaking, guano contains very little carbon and oxygen, and a large percentage of nitrogen and phosphorus.

In no department of rural economy is American labor more unskilfully expended than in the collection and use of manures. This arises partly from the low price of crops, which discourages the critical study of fertilizers, and partly from the lack of good schools and experimental farms for teaching such labor-saving processes as may be best adapted to the peculiar circumstances of the cultivators of the soil in the several States. Different crops, prices, soils, climates, and variations in value and kind of farm labor, all modify practice, and render the effort to lay down general rules in manure-making exceedingly difficult and hazardous. We shall venture, however, to indicate two or three plans for collecting and applying manures, which experience has shown to be highly advantageous.

In all cases where it can conveniently be done, domestic animals should be fed under a shelter of some kind, to protect them from the sun and rains of summer, and the cold and storms of winter. In this way, their droppings may easily be gathered into heaps, keeping the dung and urine together, and both from loss by volatilization, and protecting the mass from the washings of rain or snow water, and natural drainage. Where manure has to be hauled any considerable distance, it is bad policy to add weight to it by applying water with the view to promote fermentation or the rotting of the heap. Suppose one has ten tons of dry straw or cornstalks, it will not pay to add, as is often done, forty tons of rain-water, so that the farmer actually hauls four tons of simple water into his distant fields to convey thither one ton of vegetable matter. If one's soil is so dry that straw and cornstalks will not readily decay when ploughed in, sound economy dictates the making of all compost-heaps in the fields where the manure is to be used. This will save the hauling of an immense quantity of water; for every ingredient used in making the compost may go into the field in a dry state. Leached or dripped ashes should be well dried to diminish their weight before hauling; the same remark will apply to swamp-muck or mud, to forest-leaves, straw, and trash of every kind. Rains are expected to supply the necessary amount of water; although it will often pay to dig wells in fields to have water for this purpose and for stock in all coming time. A large reservoir, dug in the ground, and made tight by water-lime cement or good clay, to hold surface-water in case living water is not readily attainable, will pay a good interest on its cost. The excrements of domestic animals, particularly their urine, will hasten the decomposition of coarse straw, stalks, and muck; but it is better to haul the dung and urine of domestic animals to distant compost-heaps than so many tons of valueless water. Without the admixture of the excreta of animals, all vegetable substances placed in the compost-heap will rot, and stable-manure may be more economically applied directly to the land that needs it. As a general rule, the sooner a plant designed to fertilize the soil is buried in it, the better. It can never yield a larger quantity of carbon, hydrogen, nitrogen, oxygen, or earthy salts, by passing through the digestive organs of any animal, or by lying a day or a year in a manure or compost-heap. In case one has poor land, and desires to produce a large crop in a few weeks or months, as in market-gardening, then the previous rotting of manure or vegetable substances is indispensable to feed many growing plants up to the highest point of vegetable nutrition. But on fair soils, in common field culture, this great labor of preparing food for crops is unwise husbandry. Let the entire decomposition take place in the soil, as is witnessed when clover, peas, or other plants are turned under with the plough. If it was convenient, all the droppings of animals should be immediately covered in the soils which most lack fertility; for they will lose more than they can gain by keeping above-ground. But so speedy and constant an application of manures would interfere with other necessary labors on the farm, and hence the safe-keeping of fertilizers until needed is a matter of importance. It is excellent economy to provide a bed of dry straw, forest-leaves, or peat, to absorb all the urine of domestic animals. In what is called "box-feeding," both the dung and urine of fatting oxen, sheep, and hogs are intimately mixed with straw, or some other good absorbent, and trodden under the feet of the animals. As the latter consume meal and roots, their excreta are obviously rich in the elements of fertility. The animal is turned loose in a small pen or box, being fed regularly and well supplied with litter for bedding. The mass of manure thus formed is rarely disturbed until it is applied to the ground, either as a top-dressing or to be mingled with tilled earth. As a general rule, it is desirable to cover manure with from three to nine inches of soil. If it is light, porous, and sandy, manure should be buried deep; if compact and impervions, a covering of two or three inches will suffice to retain all gaseous elements. Manure moves both downward and upward, as well as laterally, in tilled ground, and therefore on a medium soil it should be placed midway in the earth stirred with the plough. If the ground is broken ten inches deep, five inches of the soil should lie above the manure, and five below it.

All organic and mineral fertilizers dissolved in water will enter so far into a chemical combination with the soil when applied to it in irrigation, that nothing will be lost by atmospheric and solar influences, unless the quantity applied per square rod is needlessly large. This speedy and thorough incorporation of fertilizing substances with the soil when dissolved, has led many to attempt the complete solution of manure before it is applied to the land, knowing that it cannot enter the roots of plants to nourish them before it is dissolved in water, or reduced to a gaseous state. By bringing all fertilizers made in stables and yards into a liquid form, the manure is easily conveyed in wooden pump-logs or pipes made of burnt clay into the several fields on the farm. If the fields are lower than the barn or stable, the water will run to them in pipes by its own gravity; and if higher, horse-power or a small steam-engine will force the liquid up to their level. Operations of this kind are successfully practised in England. Hose is used to distribute the water over the surface in the fields; and thus they are both manured and irrigated at such times as the applications will do the most good.

REMARKS ON DAIRY COWS, &c.

BY H. S. JOHNSON, CANTON, N. Y.

Every dairyman should raise his own cows. In purchasing, it is not always easy to obtain cows of the best quality, and, where such can be bought, the outlay is so considerable, that, as a general rule, it is not advisable for the farmer to incur the expense. It will be more economical to wait two or three years, in which time he can raise them. The farmer will not feel the expense of raising ten, fifteen, or twenty cows from calves as he will the outlay of buying that number. Add to this, he is more sure to raise good cows than he is to get them by purchase. Heifers well kept will generally come in the spring when they are two years old, and three such heifers will make as much butter or cheese the first season, and give milk, as two full-grown cows of the same quality.

Cows of a good constitution and well kept will improve till they are eight years old, and many will grow better for butter and cheese till they are ten or even twelve years old. Good healthy cows do not ordinarily diminish their dairy qualities till they pass their fourteenth year. I have kept some cows till they were sixteen and even eighteen years old, without perceiving any falling off of their good dairy properties. From my experience, it is safe to keep good healthy cows in the dairy one milking season after they are fourteen years old.

I have a small dairy of twenty-two cows, all of which I raised from calves. Most of these gave milk at two years old. I do not allow my cows to go dry more than from six to eight weeks. December 20th:—We are now, in my family, making butter of the first quality for the table. Winter has been severe during the last four weeks: the cows are fed nothing but good hay. We milk every day at noon: at this time of the day we think we get more milk than we should at either night or morning, or at both night and morning. The milk is put into a common tin milk-strainer, then the strainer set into a vessel of boiling water over the fire, and allowed to heat till the milk is nearly scalded, when it is strained into pans and set in a warm stove-room for the cream to rise. About the second day, the cream is taken off, warmed to sixty-two degrees, and churned. It then churns in from ten to fifteen minutes, and the butter is good, rich, and yellow. By this means we make about half the amount of butter after winter has fairly set in that we do from the same cows in the months of September and October. My experience is, that, by this management, cows are quite as good for the dairy the following summer as though they had gone dry three or even four months.

As far as my information extends, it is a common practice with dairymen to kill their calves at about seven days old. The practice deserves and should receive reprehension: it tends to prevent all improvement in cattle, and it yields no profit to its abettors. My practice is to select for raising all my early well-formed calves. These are allowed to suck from three days to a week, when they are taken away from the cow and fed with skim-milk. When they are about one month old, we put into each mess for a calf about one gill of shorts or oatmeal, increasing the quantity, as the calf grows older, to half a pint for each mess. When such a number of cows come in that we think it desirable to make cheese, we commence cheese making, and feed the calves with whey and shorts or oatmeal, instead of skim-milk; taking care to have the calves in plenty of good fresh grass for feed. The late calves we let suck all the milk of the cow till they are from four to five weeks old, when they are sold for veal. When I do not wish to keep my calves after they are weaned, which takes place when they are three months old, there is always a cash market for them of more than the cost to raise them to that period. By pursuing this course, the amount of our butter and cheese is not perceptibly diminished, and we are raising the best to take the place of such cows as require to be turned off for beef, and the means also are used to secure the most desirable improvement in cattle.

In selecting individuals for breeders to improve dairy-cows, horned cattle, and, indeed, other domestic animals, the farmer should not be governed by any one breed. The excellence of the animal should decide its claim to consideration. That animal should be selected which is the nearest to perfection.

The efforts to bring into notice particular breeds of imported animals is doing much good to the agricultural interest, and great praise is due to those worthy men who have embarked in the enterprise. They should be encouraged to continue their philanthropic exertions. But then for every farmer there is something practical about this business. His interest is to select for breeding the most excellent animals, irrespective of every other claim. Perhaps it is not temerity to suppose that, as a people, there is a kind of propensity among us to follow some fashionable course in the selection of our breeds of domestic animals. Hence the introduction of a popular breed is often attended by a prevailing mania of greater or less intensity, according to the prices paid for these new animals. In the hurry which takes place to obtain the favorite breed first, trifling and accidental tests of excellence are established, and it would be difficult to decide whether the produced progeny owe their celebrity to the enthusiasm or empiricism of buyers and sellers. Trifling distinctive marks may, to a certain extent, present indicia of a breed or variety; but the shadow should not, as is too often the case, be mistaken for the substance. An animal may possess the slight peculiarities of a breed, without any of its excellences. In forming an estimate of the qualities of an individual, the marks of resemblance should not be regarded to the exclusion of excellences. Even pedigrees, without excellence, are of little value; and when they are puffed about, appended with lofty-sounding names, to give celebrity to inferiority, they are ridiculous.

Such are some of the leading considerations which should influence the discreet farmer to make his experiments with known and established traits of real worth. I take the liberty to offer a suggestion for the consideration of those desirous to improve dairy-cows. There is a breed of cattle, which have long been known in England and Scotland for the richness of their milk and the valuable flavour which it imparts to cheese. These properties are so well known, that many of the most eminent dairymen keep a few of them for this specific object. They are a small, hardy breed, with few properties to recommend them for beef or market, except that they are easy to keep, even thriving where other cattle would starve. Some of them have been imported into this country; but, so far as I am informed, they have not met with great favor, on account of being small. The prevailing taste is for large cattle. It will be understood that I allude to the breed called Alderney cattle. Now, would not a cross of these Alderneys with such stock as we have, be likely to be an improvement for dairy-cows? Did I know where to obtain a pure-blooded sire, I would try the experiment.

MANURE.

The subject of manure is one of unlimited importance to every farmer. There was a time when the fancied elixir of life drew the arrested attention of the nations. Its supposed value was all-engrossing. Happily for the world, the dark shades of that night of ignorance have retired. But still subjects that are perceived to be of high importance engross the minds and become the chosen hobbies of men. Not unfrequently the élite and the savans enter the arena and contend for the prize. The efforts to discover hidden truths or bring to light occult science not unfrequently exert an influence which conducts unthinking and bewildered men so far astray, that they either neglect their own interest, or else pursue it with such inappropriate means as are sure to defeat their most assiduous efforts.

But what bearing have these remarks on the humble subject of manure for the farm? Reflect, and you will perceive that they are not altogether inappropriate. By at least common consent, the subject of manure is admitted to be the foundation of agricultural prosperity. This is the true state of the case in both Europe and America. The admitted importance of manure to successful farming is so great, that the most laborious investigations of science are directed to it. Men deservedly in the highest ranks of talent and literature are bestowing upon it their untiring labors. On this subject, several of the most learned men that ever enlightened and adorned any age or country are gathering their most unfading laurels. In our own land, many of the first scholars of the age are awakened and electrified by

the commanding importance of this rustic subject. So far, all is well. Noble minds, men of undying fame, are in this particular giving their labors to a subject every way worthy of their regard. To increase the comforts and multiply the food for a world is no trifling concern.

This class of scientific men are exerting a wide influence—an influence that affects every agricultural society and every agricultural paper. Though their labors have developed many important truths and disclosed much valuable information, yet they have but just entered the wide field which opens before them, and much that they have communicated is theory, and not fact. Experiments, testing the true value of different kinds of manure, have as yet been very imperfect and unsatisfactory. After all that has been obtained, our knowledge on this subject is still in its infancy. There is some reason to apprehend that agriculturists may be so infatuated by the many theories as idly to seek after some substance for manure, as men formerly sought the philosopher's stone, or else, amid perplexity, to conclude that all is fancy, and leave their fields to barrenness and decay.

The farmer should be very cautious in regard to what some have been pleased to denominate special manure, and others, concentrated manure. This consists in burning the materials and using the ashes to enrich the land. No doubt such ashes, or any ashes judiciously employed, are a good fertilizer. But is there not a loss in the process of burning? Every man, who has been at all conversant with clearing new land, knows that, in a very dry time, there is danger of burning such land too much. When all the vegetable matter is consumed by the fire in clearing, there may be one fair crop after it, but the land will be rendered barren and subject to moss for a long term of years. The prairies of the West are rendered productive by partially burning the vegetable surface. But burn deep, consume all the accumulation of vegetables, and barrenness will succeed. Men of experience in clearing land are cautious about burning deep even green-timbered lands. If the farmer wishes to increase the efficiency of his manure, let him haul marl, clay, and leached ashes on his sandy land, but let him by no means burn his manure-heap, nor suffer it to become dry by fermenting.

To the farmer it is important that the investigations of agricultural chemistry should proceed. The farmer should wait patiently for the result of those labors, and, as fast as facts are established, he should profit by them. In the mean time, he should be diligent in using the means which all experience, since the earth began to be cultivated, proves will enrich his fields and increase the reward of his toil. Notwithstanding all that has been written on agricultural chemistry by the venerated names of Sir Humphrey Davy, Lampadius, Goeppert, Sprengel, Liebig, Fresenius, Boussingault, and numerous other worthies in both Europe and America, still it is clear that one of the best substances to enrich the land and increase the crop,—one upon which every farmer may rely with unwavering safety, is barn-yard manure. As a farmer, here lies his pearl of great price—here his mine of gold. Nor does he need another Solomon to instruct him how to use it. All that is needed is care and effort to accumulate it, discretion in preserving it, a liberal hand and common sense to spread it on his fields.

Twenty-five head of cattle will, in this climate, with proper care, make one hundred cords of manure during the foddering season. This, spread on eight acres, will cause each acre to yield fifty bushels of corn—that is, on land, which, without manure, would not produce more than twenty or twenty-five bushels to the acre. Thus there would be a clear gain of two hundred bushels of corn the first year, with no additional expense, only that of putting the manure on the land. The second year, the same manure would equally benefit a wheat-crop or some other grain. Nor would the manure then be exhausted. The land would still be in a good condition for grass or clover. Where corn is worth fifty cents the bushel, the farmer may with safety estimate each cord of his barn-yard manure worth to him at least two dollars in cash, besides keeping his farm in a productive state. The farmer who saves his manure with care and applies it with common sense will steer his course with safety, and not be lost on a barren waste. But neglect manure, and no part of the world can continue fertile under the exhausting process of agriculture. If, without manure, the father obtains good crops, he will surely leave desolation and poverty to his sons. Here is a case where the iniquity of the fathers is visited upon the children.

It then becomes a matter of no small interest to inquire what are some of the means well adapted to accumulate and preserve manure. The farmer should stable all his cattle during the foddering season. His stables should all be prepared with tanks or vats under them, to receive all the liquid secretions from his cattle. Into these vats should be thrown, in the fall, a quantity of some suitable substance to absorb and retain the liquids. This putting into the vats some absorbent should be repeated two or more times during the winter. He should also have a good yard connected with his stables, in which his cattle may run in the daytime, when out of the stables. His yard should be covered to the depth of six inches or more, in the fall, with swamp-muck, with leaves from the forest, with any turf from the highway or from his headlands. By lying in his yard during the winter, and being mixed with the droppings of his cattle, any of these substances will be as good in the spring as common barn-yard manure. All the coarse remains of the fodder, which the stock refuse to eat, should be thrown into the tanks under the stables; the manure from the stables should be thrown into heaps, and sheltered from the rains and snows, to preserve it from leaching; all the weeds on the farm, of every kind, should be collected while green, and piled in the yard for manure. The farmer's hogs should be kept at work making manure. Their pen should be so constructed that there will be a hog-laboratory in one part of it. In this apartment should often be placed swamp-muck, turf, or straw, all of which the hogs will manufacture into first rate manure during the season. They will work diligently if occasionally encouraged with a little corn and other grain sprinkled over their task, and provided they have a clean, dry place to which they can retire for rest after hard fatigue. Each hog will produce at least one cord of manure in the course of the summer. The privy, also, should be constructed with a bin or portable box under the seat, with handles, so that two men can remove it, as occasion may require, and empty it on the manure heap. This box should be supplied with some absorbent material, and often be the recipient of a liberal supply of gypsum. Every animal that pertains to the farmer should assist in accumulating manure—the family, cattle, hogs and all. A well-regulated method of doing this will essentially contribute to the comfort and health of all, as well as secure the thrift of the farmer.

In the spring, every place that contains manure should be cleared of its contents for the benefit of the field. Farmers, who cautiously secure all the manure they can, use it discreetly, and exercise becoming economy, with the ordinary blessings of Him who rewards the diligent hand, will soon be able to live in palaces, become money-lenders, and enjoy the appellation of the nobility of America—not made noblemen by the ever-wavering breath of monarchy, but constituted *the nobility* by their skill with the plough and their success in producing bread for the hungry.

ROTATION OF CROPS.

A proper rotation of crops is very difficult to obtain, and of high importance to the farmer. A rotation adapted to one section may be entirely injudicious for another. It should be particularly adapted to the place where it is employed, so as to suit the soil, the climate, and the market. As these will vary in different localities, the farmer should exercise his judgment in arranging the rotation so as to secure the best means of enriching the farm, and take that course which will yield the most profitable returns for his labor. To obtain these results, the first principles upon which rotations are based should be brought into the account.

One principle never to be overlooked is, that every plant exhausts certain constituents of the soil on which it grows. Every plant obtains a part of its support from the soil and a part from the atmosphere; and hence every crop diminishes the fertility of the soil where the plant is removed from the field. But if allowed to remain on the soil they enrich it, for all that they abstract from the soil, with all they draw from the atmosphere, is given back again; and hence the noted fertility of lands on which the accumulated succession of vegetables have decayed during many years. But on the farm, the crop is generally removed, and hence the necessity of making a return by manuring, to prevent sterility. By constantly cropping, the most fertile fields will become unproductive and barren. In this way, most lands become unprofitable in a few years. Several of the most fertile sections of the State of New York have, in this way, been so far exhausted as not to yield a remunerating crop. Again: Different plants do not take from the soil the same elements; and hence a succession of the same crop must soon deprive the soil of certain parts which are essential to its growth, and it must languish, while some other crop, requiring different food, would flourish luxuriantly.

Nor should the farmer overlook the fact that some plants favor the growth of certain kinds of weeds more than others; chess and cockle flourish with wheat. Weeds peculiar to a particular crop multiply greatly when that crop is raised on the same land for many successive years. The same is also true in regard to certain kinds of destructive insects. The Hessian-fly and the weevil pursue the wheat-crop. The wireworm and the grub make their choice among the crops of the farmer, and multiply rapidly with a succession of what they have chosen.

Every farmer knows that some crops admit of a heavier application of manure than others. Broad-leaved succulent plants admit of abundance of manure. Corn, beets, and turnips are of this class; likewise grass for meadows and pasture, with most plants whose value depends mainly on the quantity of green growth. But the crops of smaller grain, such as barley, wheat and rye, may be so heavily manured as to cause a too luxuriant growth of straw at the expense of the grain. For this reason, in a rotation, the manure should be applied to such as are immediately benefited by a larger application. Corn and oats will derive more benefit from manure less decayed than wheat requires. A field heavily manured in the spring with manure made in the barn-yard during the winter, will produce a larger crop of corn or oats, and the next season yield as large a crop of spring wheat as it would had the manure been piled in the yard through one summer and then been spread on the field for wheat. The manure should always be put on the field as soon as may be after breaking up the sward, that it may be thoroughly spread and mixed with the soil. This item is of no little importance, for, by leaving fresh manure in bunches, unmixed with the soil, it yields little benefit to the plants, and, by increasing the drought, it has diminished instead of increasing the crop.

Farming, wisely conducted, is a continued succession of exhaustion and replenishing. The best method of replenishing the land should, in all rotations, be regarded as the leading object. The crop which brings the most money is not always the best. Not a few look only to immediate profit, and their management of the soil perfectly harmonizes with this one idea. Future fertility is disregarded; every thing possible is taken from the field and nothing returned to it—nothing done to restore its wasted energies—nothing to check the progress of exhaustion. If the farm, when new, was rich and fertile, it soon becomes barren and sterile, and the misguided occupant is ready to abandon the desolation which his improvidence has spread around him, and seek more fertile lands in a new country.

That these evils may all be avoided is certain, if a rotation of cropping can be secured, which shall afford a sufficient change in the draft made by the plants on the different elements of fertility in the soil, and which shall return to the soil as great a proportion of organic matter in manure as is taken from it. Of late years, it has been proved by many skilful farmers, that by the application of manures produced on the farm only, there has been a constant increase of fertility.

In forming a rotation, a number of particulars should be carefully considered:—1. To exhaust the soil the least that can be done. 2. Restore back to the soil as much manure as practicable. 3. Take that course which will best prepare the field for a future crop. 4. Prevent, as far as possible, the growth of weeds and the increase of insects. 5. Adapt the application of manure to the respective requirements of the different crops which are to follow. 6. Select the several crops so as to adapt them to soil, climate, and market.

For a three years course, the following is found to do well:—First year—Corn, well manured. Second year—Wheat. Third year—Clover.

This rotation brings round a return of the same crop so frequently that there will be danger of exhausting instead of increasing the fertility of the soil. A more extended rotation, like the following, would be preferable:—First year—Corn, oats, and roots, with plenty of manure. Second year—Barley, or peas, or both. Third year—Wheat. Fourth year—Clover, from two to three years.

It is needless to furnish specific examples of rotation. The principles above laid down will enable the cultivator to vary the crops for rotation as circumstances require. The more the subject is examined, the more deeply interesting will its investigation and application appear. A rotation, the same as given above, has tripled the products of many farms, and some, which were exhausted and abandoned, it has restored to fertility rivalling the rich districts of virgin soil. Let the farmer carefully examine the subject of rotation, exercise his judgment in its practical application, and he will guide his operations with precision and with increased profit.

That the farms will not now produce such abundant crops of wheat as they were accustomed to yield, has of late become the common complaint of agriculturists in the Northern and Eastern States. This complaint is well-founded—it is the language of fact. While the great mass consider this fact mysterious and inexplicable, it is one of the most obvious things in the world. It is the natural result of the negligent method of farming that has done it. The fields have been cropped without being replenished, till they are exhausted. There is no more propriety in this complaint than there would be in the case of the man who should complain that his team would not work while he neglected to feed them. Feed the team properly and fully, and it will work. Feed the field and subject it to a judicious rotation, and it will produce more than its former abundance. The same field may be constantly cropped, and yet constantly enriched with the refuse of its own productions. Let farmers perform their part faithfully, and there would be no worn-out lands as long as the world stands.

A PLEA FOR AGRICULTURE.

The most splendid superstructure has its foundation either on the earth or beneath its surface. Though what is high, magnificent, and imposing may engross the whole attention and monopolize the entire thoughts, yet it is the humble foundation which sustains the mighty edifice. So all the splendor and glory of these United States, which extort the admiration of the old world and constitute this the most desirable of all lands, are sustained by humble agriculture. There was once a city delivered from the invading forces of a powerful king by a poor wise man, and yet no one, we are told in the sequel, thought of that poor wise man, but forgot him. Is it not something so with our government in regard to agriculture? Very little, even next to nothing, is done for this prime essential interest. The accumulated millions of our national revenue are mostly expended for the benefit and protection of commerce, and by that means almost directly to advance the manufacturing interest, while only a few hundred dollars, through the instrumentality of the Patent Office, are doled out as a pittance, or perhaps a peace-offering, to agriculture.

Now it may be asked in soberness, is this course wise? Is it the dictate of impartial justice? Is it *republican* thus to neglect that interest which sustains all others?

Will not candor give a negative response to each and to all these interrogatories? The vast extent and exigencies of our country will constitute agriculture the greatest interest of the United States, until all our vacant lands are brought into cultivation and made to enrich and feed the teeming millions who must eventually have their homes here, until every frontier section is occupied by a dense population, who will make these waste lands yield wealth to the nation, and be able to defend the borders in case of an invasion. Nor can a town, city, or village be built up and sustained otherwise than as rustic farmers become pioneers to provide them food. Neither does it require the eyes of an Argus to perceive that by the neglect of agriculture our country has already sustained some serious detriment. Under governmental neglect, agriculture has either sunk or remained in disrepute. While commerce has been the chief pet of the government, it has, with all its appendages, been regarded as replete with honor. As a consequence, a vast number of our young men, possessing talent and enterprise, have turned from the disrepute of agriculture and resorted to mercantile employment. That department has been overcrowded, and thousands, after a few years spent in that pursuit, have failed, and become the most pitiable and most helpless of paupers. How much better would it have been for the country, for these men and their descendants, had they been contented to till the ground! While agriculture has been treated as a detected impostor and loaded with obloquy, the exclusive patronage of the government upon commerce has operated as a lure to draw numerous thousands of young men of fine promise upon the fatal rock. Nor does this make up all the dimensions of the evil. One of the most useful and honorable of the learned professions stands intimately connected with commerce and the mercantile pursuit. As a consequence, that profession has been crowded to overflowing, and not a little out of repute. Thus, the evil of which we complain has, indirectly at least, blotted out and destroyed no small amount of the rising talent and promise of our country.

Nor is this neglect of agriculture in accordance with impartial justice. Our naval force has, with great propriety, been called the right arm of the nation. Agriculture nerves that arm and makes it strong: take away this aid, and that arm would become palsied and powerless. Not only so, but the agricultural class, more than any other, must defend our country, in case of an insurrection or invasion. Still further, in the State of New York, which is, probably, about a fair specimen of the other States, the agricultural interest pays near four-fifths of the taxes, and, of course, about that proportion indirectly towards the United States revenue. Is it republican thus to tax this interest, and then cast it off by neglect? Why should not the farming interest be allowed a bureau at the seat of government—an organ by which they might communicate with the councils of the nation, as their exigencies might demand? Might not a pittance of the nation's treasure be appropriated to establish and carry on an experimental farm in different States, where experiments, which exceed the means of nearly all the farmers, might be made with agriculture and with animals? The farmer, the manufacturer, and the merchant are allies, and should be treated as such by the government, without partiality. These unitedly have rendered our country independent by its own resources, and safe against foreign foes. All America is united in the bonds of internal commerce. Our exchanges at home exceed our foreign traffic. Were our ships driven from the ocean-highways of the world, our country has become competent to sustain itself. We have less to fear from war than any other nation. The farmers have done their part towards securing this happy state of things. Now we may pursue our career, vindicate our rights, and put forth all our energies, in conscious security. While we rejoice in our strength, that joy should be tempered with gentleness, and evince a spirit of love for all; a love that shall perpetuate tranquillity, and cause a continued development of the boundless resources of the country.

SHEEP HUSBANDRY AND WOOL-GROWING IN THE UNITED STATES.

BY HENRY S. RANDALL, OF CORTLANDVILLE, N. Y.

AMOUNT OF WOOL REQUIRED BY OUR POPULATION.

An ordinary laboring Northern farmer, in comfortable circumstances, annually consumes, in dress, bedding, &c., not far from 18 or 20 pounds of wool, in the condition in which our home-wools are sold to the manufacturer. Boys of sixteen, in the same class, who labor on farms, consume about as much as adults. Boys of eight, consume 4 or 5 pounds. Females will not probably average to exceed much beyond one-quarter of the consumption of males.

There is a large class of poorer laboring population which diminish their consumption of wool by the substitution of cotton; and, on the other hand, in the cities, villages, and even throughout the rural districts, there is a large class who entirely exceed the first estimate.

A laborer in the Southern States requires from 8 to 10 pounds of wool annually for his health and comfort; and this is about the ordinary amount received by slaves of an age to labor in the field.

The average annual consumption of the entire population of the United States has been generally estimated by agricultural writers at 6 pounds per head; I think that 5 pounds would come nearer the actual amount. But to place the estimates which follow, clearly and certainly within the bounds of truth, I shall assume 4 pounds as the average of individual consumption.

INCREASE OF POPULATION AND PROSPECTIVE DEMAND.

In 1790, the population of the United States was	3,929,827
" 1800,	5,305,941
" 1810,	7,239,814
" 1820,	9,638,191
" 1830,	12,866,020
" 1840,	17,069,453

The census of 1850 will probably exhibit a larger ratio of increase; but as the late emigration to our country has been greatly promoted by causes which may not continue to operate permanently, this will be left out of the account. By the first six censuses, it will be seen that our population increases at a compound ratio, exceeding 3 per centum per annum; and 3 per centum, annually compounded, would double it in 23 years and 164 days.

The circumstances which have led to the rapid multiplication of our population—cheap and healthy lands, and consequently abundant provisions at a moderate expenditure of toil—will not be materially diminished until our population considerably exceeds that of Europe, which is to say, between 220,000,000 and 230,000,000. But estimating the rate of increase from 1840 to 1890 at 3 per centum, which would double the population as above stated, and after 1890 at 2 per centum, which would double it in about

86 years, the following would be our population at the periods indicated, and the amount of wool which, according to the previous estimate, would be necessary for their annual consumption:

Year.	Population.	Pounds of wool.
1863–4	34,138,906	136,555,624
1886–7	68,277,812	273,111,248
1925	136,555,624	546,222,496
1963	273,111,248	1,092,444,992

Thus, in 112 years, our population is likely to outnumber the present one of Europe, and our annual consumption of wool to exceed *one billion and ninety-two millions of pounds!* Assuming that sheep average 3 pounds of wool per head—which exceeds the present average product throughout the United States—and it will require over *three hundred and sixty-four millions of sheep* to supply the demand! The States south of the Potomac and Ohio and east of the Mississippi (containing 450,000 square miles) would support all these, at a trifle over 1½ sheep to the acre!

FACILITIES FOR PRODUCTION.

The wool zones, the wool-growing countries—those where the product is sufficiently remunerating to economically constitute it an important article of production—are mainly comprised within latitudinal zones or belts on each side of the equator, about 15° in breadth, and encircling the earth. Their distance from the equator varies in different longitudes, owing to the various circumstances affecting the temperature: in other words, the wool-zones are bounded by isothermal instead of latitudinal lines. Beginning on the eastern side of each continent, the zone north of the equator includes the country lying between the 30th and 45th degree of latitude, and bearing thence westwardly and northwardly, it terminates between 40° and 55° on the western shores of each continent. I am not definitely informed what isothermal lines in the southern hemisphere would bound the regions of analogous temperature. From the narrowness of both continents, south of the equator in the corresponding latitudes, and their greater consequent modification by the temperature of the ocean, it is probable that the southern wool-zone may extend nearer the pole, and thus be bounded; but, even then, the area of land included in it would be inconsiderable compared with that in the northern zone.

It must be borne in mind, that although the general course of isothermal lines has been followed in giving the boundaries of the northern zone, these lines, and consequently the zone itself, exhibit many minor deviations, owing to the local conditions which affect the temperature, such as elevation, contiguity of large bodies of water, prevalent winds, mountain barriers excluding cold or warm winds, etc. To prevent misunderstanding in the minds of less-informed readers, an instance of each of these exceptions will be noted. A few hundred feet of elevation, usually from 350, diminish the heat equivalent to a degree in distance farther from the equator.* A lofty

* Three hundred feet is the rule given by Professor Leslie, but the experiments of Humboldt, Gay-Lussac, and others, show that this cannot be relied on. It usually requires a greater elevation to produce the effect. In New York, Prof. Emmons has shown that the mean is about 350 feet. See Nat. Hist. of the State.

mountain will therefore exhibit every variety of climate, colder than that of the plane of its base; and, if it stands within the torrid zone, it will consequently exhibit all the climates and their flora, from the torrid to the frigid. For these reasons, the Andes, in South America, must carry, on portions of their declivities, a mild climate, adapted to wool-growing, far north of 30°—even to the equator; and, from a parity of conditions, the Cordilleras of Mexico must extend the northern wool-zone far south of 30°. From the vicinity of large bodies of water, the peninsula of Michigan and the eastern portions of New England have been shown to be exposed to less extremes of heat and cold than the western portions of Wisconsin;* and England, in the latitude of Labrador, has a milder and more uniform temperature than the interior of New York. But in the case of England, the third exception, the effect of prevailing winds, operates in connexion with the one already named: the movement of the westerly wind is such as to prevent the accumulation of ice on the whole north-western coast of Europe, and to carry the ocean temperature *considerably* to the landward. Norway, in the latitude of Iceland and Greenland—and of the basic of the Dionid, where spirits freeze and quicksilver becomes malleable—exhibits the flora of northern Germany. The effects of mountain barriers are to be seen in the differences of the temperature in eastern and western Europe, and in different countries of Western Asia. The Carpathians, Alps, and Apennines are so many successive barriers against the cold north-east winds, which sweep, without obstruction, across the plains of Russia from the Arctic Sea. Southern Russia is therefore colder than France. The north of Persia and south of Independent Tartary are in the same latitude with Italy; but the former, uncovered to the north winds, are cold and inclement, while Italy, sheltered by the Carpathians, Alps, and the innumerable ranges in Turkey, (and the contiguous seas moderating the hot winds of Africa) possesses one of the most delightful climates in the world. The lofty Altays, by cutting off the south winds from Siberia, add materially to the rigors of its own climate.

The valley of the Mississippi, divided latitudinally by no mountain barriers for thousands of miles, is exposed to the free sweep of both the southern and northern winds, and consequently its excesses and fluctuations of temperature in the middle region, where neither wind has yet been materially modified by the prevailing local temperature, reach those enormous extremes which have been noted in the observations kept by the officers of the army. While the annual range of temperature at New London, Connecticut, averaged for 9 years but 78°, it averaged at Rock Island, Illinois, 106°, and at Council Bluffs, 120°.†

There are other considerations besides climatic ones, which practically influence the adaptation of countries to wool-growing. The most important of these are the density of population, and the consequent price of soil; and to these must be added various natural and artificial local peculiarities.

Sheep can never be economically kept to a great extent, for *wool-growing purposes*, amidst a dense population. They would thus be made to occupy lands which should be devoted to the growth of products for human food. Nor can wool be economically grown under such circumstances, and exchanged for the food products of other countries, because this husbandry

* See Forry on Climate of the United States. † Ibid p. 43.

requires so little human labor, that it would not give occupation to a dense population, nor would its proceeds be sufficient for the subsistence of such a population. An acre of land, worth one or two hundred dollars, in an old and thickly populated country, for the production of human food, would produce no more wool than an acre worth but one or two dollars, in America or Australia. The former cannot, therefore, sustain the competition. We see some partial contradictions to this in practice in some of the German states, but this is but temporary. Skill and habit will do something to countervail nature, but wool produced under the circumstances it is in portions of Germany, France, &c., when brought into *full* competition with *similar qualities* grown on cheap and sparsely inhabited lands, will not, for a moment, stand the competition in external markets, nor in domestic ones, unless ruinously forced upon the people of the countries where they are grown, by oppressive tariffs on the foreign article.

The German and French wools alluded to can yet be produced, because neither labor nor moneyed capital demand so good a return where they are grown as in newer countries, and because the supply of the world is short compared with the demand; generally and peculiarly so in regard to a corresponding style of staples.

The above considerations, with certain local ones pertaining to climate, national habits, institutions, &c., will effectually prevent Spain, Portugal, France, the British Islands, Holland, Prussia, Bavaria, the smaller German States, the Western portion of Austria, Switzerland, Italy, Turkey, Persia, Tartary and China, Northern and Southern Africa, in the southern wool-growing zone, from competing successfully with more favored regions, *as soon as those more favored regions are prepared to supply the demand of the world.* This subtracts so great a portion from the area of the *natural* wool-growing zone, that it leaves the United States in possession of, probably, a moiety of that part of it throughout the world, which is adapted also by artificial circumstances to wool-growing.

COMPETITION OF DIFFERENT COUNTRIES IN THE WOOL-ZONE.

South America.—South America, and more particularly Buenos Ayres, possesses great advantages for the cheap production of wool. Lands were here until recently, and are now, for aught I have learned to the contrary, granted by the government, in estates a league square (5760 acres), at ten cents per acre. Its vast *pampas* are plains like our prairies, covered with wild grasses and destitute of timber. Until recently, these were depastured almost exclusively by horses and cattle, which were often killed for their hides. Labor is cheap, and the population sparse.

The Gauchos inhabit the north, and tribes of mounted Indians the southern pampas, who are wild, predatory, and often engaged in war. The culture of sheep has extended of late, and some Europeans have purchased large estates for that purpose. I am not aware that sheep have to labor under any particular local natural disadvantages.* The restless and predatory character of the population and the unsettled nature of the government seem to constitute the main drawbacks on this as on every other branch of industry.

* Still there *may* be serious natural disadvantages. Very little is known of the interior of that country by citizens of the United States.

Australia.—The wool product of Australia and Van Diemen's Land has increased with vast rapidity within a few years. The following statements are from a table compiled from official sources, in Bischoff's Comprehensive History of Woollen and Worsted Manufactures, &c.

In 1810, the export to England was	1,670
1815,	78,171
1820,	99,415
1825,	323,995
1830,	1,967,309
1835,	4,210,301
1840,	9,721,243

Later than this, I am in possession of no official accounts, but suppose that the clip of 1850 more than quadrupled that of 1840. One of our most intelligent and best informed manufacturers (Mr. Samuel Lawrence) recently wrote me that the Australian flocks now number 20,000,000 of sheep, and he added, "from thence England receives a large proportion of her supply of fine wool." According to this, the present product should more than quintuple that of 1840.

Professor McCulloch states, that the bad land in this country "bears a much greater proportion to the good than in almost any other." Also, that it is subject to the recurrence of periodical droughts, which sometimes continue for two, three, and even four years together; that the last great drought began in 1826, and did not terminate until 1829; that during the whole of this period, there was often not a single shower in six months,—and that the whole surface of the ground "was so parched and withered, that all minor vegetation ceased, and even culinary vegetables were not raised without much difficulty."*

There was another drought in 1835, and another in 1841. The effects of the latter on the sheep are thus described by Mr. Hood:†

"It will scarcely be believed in England that the estimated number of sheep which have died within the last twelve months in the colony, from catarrh and drought, is 70,000!! that colonists are compelled, in order to save the dam from starvation, to cut the throat of her lamb; that no means are adopted for securing a stock of lambs for next year; or that a stockholder would offer 8,000 sheep to any one that would remove them from his runs, and, finding that no one could be prevailed upon to taint his own flocks by accepting so dangerous a present, had recourse to consuming them by fire, and had actually killed and burnt 2,000."

"The wild and poachy nature of a considerable portion of the pasture," says Mr. Youatt, "gives the foot-rot a peculiar character, and, if neglected, it becomes inveterate, and destroys the animal."‡

The scab is a prevalent disease, and the convict shepherd, who has a pique against his master, can easily, by bringing his flock in contact with a diseased one, subject them to this dangerous and troublesome malady.§

Epidemics, supposed to be owing to the astringency of the water, and some other causes, have, some years, cut off half the sheep.‖

* McCulloch's "Commercial Dictionary," art. Sydney.
† Quoted by Sprance in "History, Diseases, &c. of the Sheep," London, 1844, p. 67.
‡ Youatt on Sheep, p. 189.
§ Lanny's "Historical and Statistical Account," vol. i. p. 351.
‖ See Spooner, pp. 417–421.

The above extracts are all from *English* writers of reputation, and have not, so far as I am informed, been contradicted.

The minimum government price of lands in Australia is *5s.* ($1.15) per acre, and but a very little, if any, good land is sold at that price. Mr. Hood states, that the portion of Captain McArthur's immense estate, which was obtained by purchase, cost, on the average, *7s. 6d.* ($1.72½) per acre. Shepherds receive from £15 to £20, ($69 to $92,) *with a house and rations,* per annum; overseers of a superior description, £50 to £60, ($230 to 276,) also *with a house and rations.**

It is about four times as far (13,000 miles) from Sydney or Hobartstown to London as it is from New York to London; and the expense of conveying a passenger from England to Sydney is three times that of conveying him to Quebec.† Under all these circumstances, McCulloch (though he made at the time an error in the price of American lands) justly remarks:

"If slaves could be imported into a colony of this sort, there might be some chance of its succeeding. But, while land of the very best quality may be had in the valley of the Mississippi for about a dollar an acre, or less, we think better of the common sense of our countrymen than to suppose that any one able to carry himself across the Atlantic will resort to Australia."

Hungary.‡—In considerable portions of Hungary, the climate is fine, the soil rich, and, the feudal tenures remaining unabolished, the land is yet held in those large estates so favorable to sheep-husbandry. Prince Esterhazy, the former Austrian ambassador to England, says Mr. Paget,§ owns an estate of something more than 7,000 square miles, including 130 villages, 40 towns, and 34 castles. His sheep are said to amount to 3,000,000.‖ Other nobles own flocks of from 10,000 to 30,000. The demi-savage Magyar serf, whose labor costs nothing, whose principal garment is a sheep-skin, and whose miserable and scanty food is more than half stolen,¶ makes a most *economical* shepherd! Hungary lacks facilities for internal communication, and her convenience to the Mediterranean market, excepting Turkey, so as to first throw her agricultural products into ports where the demand is good, is decidedly inferior to that of France, Italy, and Spain. The Danube is the only natural outlet to her commerce, which, thanks to a liberality of policy on the part of Turkey, contrasting most favorably with that of several *enlightened*** nations under similar circumstances, she enjoys without limitation. To reach Trieste, a long land carriage is indispensable. Her exports, too, are embarrassed by the imposts and narrow restrictions of the imperial government. She cannot therefore export cheap heavy articles, such as provisions, to so great advantage as the Levantine nations; but every circumstance points to her as a country which should be one of the first on the eastern continent for the production of wine, silk, wool, &c.

Southern Russia.††—Separated from Hungary and Transylvania only by the Carpathian Mountains and Turkish Moldavia, lie the fertile provinces of South-eastern Russia, the basins of the Dniester, the Dnieper, and the

* Report of a "Committee," &c., quoted by McCulloch, Com. Dic. art. Sydney.

† McCulloch.

‡ This article from my "Letters on Sheep Husbandry in the South."

§ Paget's Hungary, Transylvania, vol. i. p. 46.

‖ Youatt on Sheep.

¶ Paget, pp. 18 to 19.

** *E. g.* with that of England in relation to the St. Lawrence.

†† This article is also taken from my letters on "Sheep Husbandry in the South."

Don. From the Carpathians to the Caspian, across the entire extent of the plains of ancient Scythia, not an elevation which could be properly dignified with the appellation of a mountain breaks the immense expanse! The lower valley of the Dniester, or Borysthenes, formerly known as the Ukraine, has been celebrated for centuries for its pasturage, for its horses and cattle; and recently flocks of Merino sheep have been introduced there and successfully crossed with the native variety. In 1839, Mr. Slade states that many of the colonists on the Steppes and in Bessarabia had 20,000 sheep. Merinos were introduced into Crimea or Taurida by M. Rouvier, a French adventurer, in about 1802.* In this favored peninsula, which the learned Pallas describes as little less than an earthly paradise, they have multiplied exceedingly, and extended to Cherson, Ekatherinoslav, Bessarabia, and other provincial governments.† The export of wool from Odessa in 1829, was 3,402 lbs.; in 1830, 21,361 lbs.; in 1831, 35,058 lbs.; in 1832, 41,558 lbs.; in 1833, 65,457 lbs.; in 1834, 66,901 lbs.‡

In one respect, Southern Russia has the advantage over Hungary—it is more sparsely populated, and land is perhaps in still lower estimation. As in the latter, the land, much of it, is fertile and well adapted to pasturage, and the price of labor is next to nothing. But, for causes already adverted to, there is a wide disparity in the climates of the two countries, if we leave Crimea out of view. That of Russia, affected by the north and north-east winds—which the Carpathian Mountains exclude from Hungary—has a winter which for length and intensity is entirely unequalled in the latter, excepting in its northern mountainous regions. Sheep must be housed and fed for some months on dry food in Southern Russia. Taking into view the broad level Steppes,§ and their luxuriant natural verdure; taking into view the climate, warm in summer, cold and exposed to winds of great severity in winter, it strikes me that there must be no inconsiderable resemblance between this portion of Russia and our own north-western prairies in corresponding latitudes, (45° to 46°.) But when the cost of land and labor is taken into consideration, wool can be produced cheaper, in my judgment, in South-western Russia than in Spain, France, Germany, Italy, or any other portion of Europe, excepting Hungary.

The United States.—As already remarked, the United States probably possesses half the cheap fertile lands included in the wool zone throughout the world. Nearly her entire territory lies within it. Experience has amply proved that sheep are healthy in every portion of the United States. The terrible droughts and predispositions to certain diseases encountered by the Australian flock-master—the comparative insecurity of property in Buenos Ayres—the climatic vicissitudes of Southern Russia (with the exception of the comparatively small peninsula of Taurida)—are none of them known in our *most favored* wool-growing regions. Land is cheaper here, and more fertile, and much nearer the great wool-markets of the world than in Australia. Our lands are probably as cheap as those of Hungary and Southern Russia, and, for a long series of years to come, will be practically as cheap as those of Buenos Ayres, because the purchase of only a quarter section (80 acres) of government lands will give its possessor the use of all contiguous ones

* For the interesting account of this fortunate French Jason, see Slade's Travels in Germany and Russia. London, 1840.

† Slade. Also McCulloch's Com. Dic., art. Odessa.

‡ McCulloch, art. Odessa.

§ Plains, like the prairies, pampas, llanos, &c.

until they are occupied. Lands can actually be bought of the owners, in portions of our territories, at a price not exceeding the government minimum in Buenos Ayres; and in others (in Oregon) they are given to the settler.

Under all the above circumstances, we *ought* to compete successfully with South America, Hungary, and Southern Russia in external markets, to *undersell* Australia in these markets, and, with the discrimination of our tariff of duties against them, to drive *all* foreign wools from our own markets.

The enormously increasing quantities of wool necessary to keep up with the demands of the home market have been given, and we see how futile is the idea that there is any danger of over-supplying it. In fact, we have never grown enough wool to meet the home demand. The following tables will show the imports of the raw and manufactured article for the last few years:

Value of Woollens imported from 1821 *to* 1851.

In 1821	$7,437,737	In 1836	$21,080,008
1822	12,185,904	1837	8,500,292
1823	8,268,038	1838	11,512,920
1824	8,386,597	1839	18,575,945
1825	11,392,264	1840	9,071,184
1826	8,431,974	1841	11,001,939
1827	8,742,701	1842	8,375,725
1828	8,679,505	1843	2,475,154
1829	6,881,489	1844	9,475,762
1830	5,776,396	1845	10,666,176
1831	12,627,229	1846	
1832	9,992,424	1847	
1833	13,262,509	1848	
1834	11,879,328	1849	
1835	17,834,424	1850	

Value of Wool imported from 1837 *to* 1851.

	Wool not costing to exceed 7 cts per pound.	Exceeding 7 cts. per pound.	Total.
Average imports of 1837, 1838, and 1839	$558,458		
Average imports of 1840, 1841, and 1842	759,646	$801,087	$1,359,545
Import of 1843*	190,352	1,004.312	1,763,958
Import of 1844	754,441	54,695	245,047
Import of 1845	1,553,789	97,019	851,460
Import of 1846	1,107,305	136,005	1,689,794
Import of 1847		26,921	1,134,226
Import of 1848			
Import of 1849			
Import of 1850			

* The fiscal year 1842 ended on the 30th September. Since then, the returns of imports have been made up to the 30th of June. The imports of 1843 in the table are therefore only given for nine months.

The table of imports of woollens shows how far our manufactures fall short of supplying the home demand; and the last table, how far our wool product falls short of furnishing the raw material for even this insufficient supply. Each million of dollars in the right-hand column of the last table, represents (with the exception, perhaps, of 1840, 1841, and 1842) about 10,000,000 pounds of wool.

This very year (1850–51) many of the smaller manufactories are stopping *for want of wool.* There is not enough in the home market, and wools are now too high abroad for profitable importation. The general impression is, that less wool was grown in the United States in 1850 than the preceding year, (the causes of which will be hereafter adverted to,) and the Hungarian war, and, perhaps, some other causes, have diminished the foreign supply.

In as favored a wool-growing country as the sun shines on, and where the home production is favored by a discriminating duty of 30 per cent. ad valorem, we suffer not only foreign cloths and wools to come into our markets, but we *actually suffer our manufactories to languish for want of raw material!*

In 1847, Samuel Lawrence, Esq., the leading woollen manufacturer in the United States,* wrote me:

"*The business of manufacturing wool in this country is on a better basis than ever before, inasmuch as the character, skill, and capital engaged in it are such that* FOREIGN COMPETITION IS DEFIED. *A very few years, and all articles of wool used here will be of home manufacture.*"†

The same gentleman recently wrote me:‡

"*The manufacture of woollen goods is now so far advanced in this country, that it will go forward quite as rapidly as* THE PRODUCTION OF WOOLS WILL ALLOW."

PROFITS OF SHEEP-HUSBANDRY IN THE UNITED STATES.

The Northern States.—Let us ascertain the actual cost of producing wool in New York. Flocks of part Merino or Saxon blood, producing wool quite up to the average article in market, are worth, say, $1.50 per head in the fall, and lambs half that price. The annual product of wool is about 3 pounds per head, and of lambs, 80 per cent.; or, if the latter is less, by reason of the number of wethers in the flock, the *growth* of the latter will give a corresponding increase in profit. One hundred sheep, properly littered, and with shelters,§ will make forty loads of manure during five months confinement to dry food. Prime grazing lands, with suitable house, barns, shelters, fences, &c., for carrying on sheep husbandry, are now worth $20 per acre, in the most retired grazing districts. One acre of such land will give subsistence, summer and winter, to three ordinary-sized fine-wooled sheep. The following presents the fair ordinary debtor and creditor side of the account with a flock of sheep:

* Mr. Lawrence (in connection, I believe, with his brother, Hon. Abbot Lawrence) has far the most extensive woollen manufactories in the United States.

† For the rest of this important letter, see Sheep Husbandry in the South, pp. 124, 125.

‡ January, 1851.

§ If sheep are not sheltered, they make the same quantity of fecal manure, but it does not convert the same quantity of litter into manure, and a considerable portion of it is wasted by floods, evaporation, &c.

Dr.

100 sheep, to interest on purchase money	$10 50
To interest on 33⅓ acres of land, at $20 per acre	46 66
" curing and storing hay on 11 acres of above	13 75
" expense of shearing	4 00
" salt, tar, and summer care	4 00
" labor of foddering, &c., during winter, say	5 00
" loss by death, 2 per cent. above value of wool pulled from skins	4 00
	$87 91

Cr.

By 80 lambs at 75 cents per head	$60 00
" 40 two-horse loads of manure, at 50 cents per load	20 00
" summer manure, say	7 91
	$87 91*
" value of 300 pounds of wool to be added	

It would be absurd, as the least intelligent farmer is aware, not to estimate the manure among the important receipts of sheep husbandry; and sheep manure made under shelter, the richest of all other farm manures, excepting the dung of fowls, is worth *more* per load than the above estimate, as any one will ascertain who will make an experiment with it on a crop of Indian corn, turnips, &c., of the amount of it which 100 hundred sheep, properly littered, under shelter, will make. I speak from 20 years' experience in this branch of husbandry. What I mean by "properly littered, under shelter," is, that the sheep shall have a proper shed or house accessible to them at all times, and thus be littered down with a moderate thickness of straw, say twice a week—but the sheep not fed in the house. If fed in the house, they would make a much greater amount of manure than I have named. The summer manure is not commonly thought of, because it is scattered over the fields when made. But its effects in *enriching the pasture*, or in *preparing it for a grain crop*, are worth more than I have set it down at—between 23 and 24 cents per acre, per annum. The whole above estimate is intended for flocks numbering say 300 and above. For one single hundred, the cost would be a little more. The common estimate among farmers in New York, who keep small flocks, is, that it costs $1 per head to keep sheep throughout the year; but then in small flocks the returns are usually better. The sheep get a better range, more condition, and consequently more wool, and the lambs are larger and will sell for more. It is, therefore, also the common estimate among farmers, that the lambs and manure will pay for keeping the sheep, and that the *wool is net profit.*

According to a table formerly by me, the average price of wool per pound from 1832 to 1845, inclusive, was 39¾ cents.† This would give a net profit of $1.18⅝ per sheep, or $3.56¼ per acre—a fraction over 17¾ per cent. on the value of the land. Many excellent farmers in New York and New

* Note by the Editor.—Mr. Randall's calculations are very extravagant. One hundred sheep, (half males,) will not produce 80 lambs worth 75 cents per head, nor will the hay from 11 acres, after manuring the land to keep up the supply of mineral elements removed in the crop, yield dung and urine to the amount of $20. So much *value* in manure from hay, which it costs but $18.75 to gather, (which manure the meadow that produced the hay really needs,) cannot be realized.

† For Table, see "Sheep Husbandry in the South," p. 53.

England keep large flocks of sheep on lands worth $40 per acre—and still find, as will be seen, a better remuneration than the legal rate of interest on money.

Still, causes are operating which are rather diminishing than increasing this branch of husbandry throughout New York and New England. These are the extraordinary recent profits of dairying, and the prospect that they will be continuous—the far better adaptation of the climate to cows than to sheep—the perfect knowledge of all sensible agriculturists, that they cannot compete with the Southern or even the North-western States in wool-growing, and the strong temptations which frequently occur to part with sheep.

The comparative profits of dairying it is not necessary here to discuss. They have, recently, undoubtedly come to equal or exceed those of wool-growing: they are generally thought by farmers to exceed those of ordinary flocks of sheep. The impression also generally and justly prevails, that our climate is a severe one for sheep, where they are kept in any considerable numbers, unless they are well sheltered in winter, and receive considerable other care; and, when these expenses are added to those of foddering five months, every intelligent farmer knows that he cannot compete with wool-growers in a region where lands are far cheaper, the expense of foddering, shelters, &c. far less. The 5° of the wool-zone, north of 40° on the east and 45° on the west shore of the continent, may be considered the DAIRYING-ZONE of our country. Our farmers believe that south of 40°, (on this side of the Mississippi,) though the cost of keeping cattle may be less, butter and cheese can never be produced which will compete in quality with those articles manufactured in New England, New York, Northern Pennsylvania, &c.* Dairying is therefore regarded as not only as much or more profitable at present, but as holding out the greatest prospect of permanence in profit. The temptations which the Northern farmer has to part with his sheep are manifold. The consumption of mutton is vastly increasing in the cities and in the country. The average prices of the better qualities have become above those of *beef in the New York and Boston markets.*

Every small village even now affords an active mutton-market in the fall months, in proportion to the number of the population. I have put down the average price of lambs at 75 cents per head in the fall—but, so far as my experience extends, every fat earlyish lamb readily finds a market at $1 to $1.25 per head, with the country butchers. Ten or 20 lambs are thus killed for consumption throughout the country, where, a few years since, one was killed. And the same remark would apply in nearly as great an extent to fat sheep. Farmers very wisely kill more of them than formerly, to obtain their fresh meats. Pelts (skins with the wool on) have been so high this past fall, that vast numbers of sheep have been killed, because the pelts and tallow, and the meat of those fat enough to eat, would exceed the ordinary price of sheep.

The tendency of all these things is to break up great flocks kept for wool-growing purposes in the north, and to substitute breeds of greater size and earlier maturity, to meet the demands of the provision-markets. Within 20 years, and perhaps half that time, very few sheep will probably be kept in the old Northern States for wool-growing purposes. This husbandry

* And it is also believed that the States west of Pennsylvania do not now, at least, produce as good butter and cheese, if they ever can. I see no reason why they cannot, when the domestic grasses are generally introduced in the Western States.

may first flow west, but ultimately, as soon as *the population take the necessary steps*, it must go SOUTH of 40°. This is as inevitable as the laws of cause and effect.

The Southern States.—Other things beside climate being equal, the country lying south of 40° on our Atlantic, and from 45° to 50° on our Pacific shore, *are equally or more healthy for sheep* than the countries lying north of them. Sheep are there exposed to no more diseases than in the north—they are not so much exposed to catarrhs or colds—and late lambs, old or feeble sheep, &c. are less liable to be cut off by the winter climate. These facts I have learned from answers, received from gentlemen of the first character in nearly all the Southern States, to inquiries in regard to this and kindred topics which I have been pursuing for years.* Their replies have been uniform in tenor on this point, and, within the last few years, I have sent colonies of Merinos to a large number of localities—embracing almost every variety of Southern climate, soil, verdure, &c.,—and, although I have aimed, as far as practicable, to keep myself informed of the history of every such colony, I have yet to learn the first instance where the sheep have not thriven and been substantially free from disease.† Spain, the native country of the Merinos, and where they flourished most successfully for ages, though farther north than our most Southern States, is, at the same point of elevation above the sea, warmer than the latter.

The effect of warm climates on the staple of wool is to make it *longer and softer*, and thus more valuable. This was the concurrent testimony of the numerous wool-merchants, staplers, &c., who were examined at the investigation into the state of the woollen trade, &c., in the British House of Lords, in 1828,‡ as it is of the most eminent growers, manufacturers, staplers, &c. of our own country.§

And the Southern fine wools are in *all* respects of the most valuable and desirable quality. Mr. Samuel Lawrence, who has purchased largely of them, writes me, (January, 1851,) "The unprecedented success of 'sheep husbandry' in New Holland illustrates the truth that southern latitudes are favorable to the production of fine wools, and the superior flocks of Virginia, Kentucky, and Tennessee prove that those of the other South-western States of our country are peculiarly adapted for this invaluable staple."

After speaking of the "sheep husbandry" of England, where sheep are grown principally for mutton and manure, where wool is but of subordinate consideration, he adds: "My impression is it will be for the interest of the flock-masters in the Northern and Western States to pursue a similar course:" and thus, (for such is his meaning,) give up wool-growing to the Southern States.

The Western States, even north of 40°, can, no doubt, from the cheapness of their lands, raise wools at a better profit than New York and New England, but they have the same long winters and period of dry foddering;

* For some of the most interesting of these, up to 1848, see "Sheep Husbandry in the South."

† Besides the case of an individual in Virginia, who wrote me that two lambs sent him had been afflicted by some disease unknown to him, I have not heard of one being ill—not *even on the low rice-lands* of South Carolina.

‡ See Bischoff on Wools, &c., vol. ii. pp. 118 to 200; or, for an abstract of it, "Sheep Husbandry in the South," pp. 28 to 29.

§ Mr. H. Blanchard, of the Kinderhook Wool Depot, recently wrote me that he had observed this fact in the wools received by him. Other testimony of this kind will be found in "Sheep Husbandry in the South."

and consequently it places an insuperable and eternal barrier in the way of their competition with equally productive lands, as low in price, from five to ten degrees further south.

The profits of sheep husbandry in the South are multifarious, beyond those simply of direct profit on capital invested; as, for example, to constitute the basis of amelioration in exhausted soils, and of a system of convertible husbandry. But it is only with the first that we now have to do, and what are the direct profits on capital invested.

Lands containing more or less herbage, on which sheep will subsist and thrive, can be found in all the Southern States at $1, and often as low as 50 cents per acre.* These lands consist of worn-out cotton and tobacco lands, and those naturally unadapted to those staples, of mountain sides, and, west of the Mississippi, of the prairies: even the forests will subsist sheep. Mr. M. R. Evans, of Mobile, Alabama, recently wrote me that his own and some other flocks had subsisted throughout the year and kept in fine condition in the *pine forests* about Mobile, without being once fed. Eastern Virginia and Kentucky do not probably demand to exceed one-third, and certainly not to exceed one-half of the winter feed of New York and New England; and south of these, on large ranges, sheep will subsist the year round without fodder, unless on very high lands. But if the number of sheep were largely increased, it would become necessary to provide winter feed, either dry fodder or some green crop, like rye. Mr. Evans also wrote me the following exceedingly interesting facts:

"I lived three years in western Texas, before my location here two years ago. I had there 1,000 head of sheep, and can say without hesitation that the Musquvoit prairies of that section offer greater inducements for wool-growing and sheep husbandry than any country I know any thing about. Sheep are hardy as goats—no disease—no ticks—and they yean both spring and fall. Musquvoit grass is an evergreen. I have seen the prairies in winter as green as fields of wheat in April; and no shelters are necessary. And then the herbage and grass of those rich prairies are now nutritious, and much larger numbers of sheep may be kept together. Land is cheap there, and the purchase of a quarter section gives privilege over thousands of acres. The country is healthy, with an abundance of pure water. I could procure a fat mutton there at any season of the year. I knew one man who had over 2,000 head in one flock, and when the Mexicans were prosperous about San Antonia, twenty or thirty years back, some of them had flocks of five to ten thousand subsisting on the prairies the year round."

This reduces the cost of growing wool to a mere trifle! General Houston fully confirms the statement of Mr. Evans, and thinks that those evergreen prairies include the greater portion of a country six hundred miles long and three hundred broad!

It is difficult to fix on a proper estimate of the interest on those lands which should be devoted to wool-growing in the States south of Virginia, for, at best, it would be but nominal. Summer pasture costs *nothing*, now, on "*the range*" (unenclosed lands) in those States.† The rye or barley pastures for winter can scarcely be counted as an expense, because the crop

* I regret that limits do not permit me to give particulars and authorities here; but I must again refer to "Sheep Husbandry in the South," where these are pretty fully given, though I am in possession of later ones of great interest.

† See Report of Hon. R. F. Simpson, late M. C. from the Pendleton District, South Carolina. Sheep Husbandry in the South, appendix, p. 398.

is not thereby lost. Farmers in the Pickens, Greenville, and Spartansburg districts of South Carolina will winter sheep for ten cents per head, and often warrant against losses by death.* In many other regions, the cost would not exceed this, even where they were *hired* kept. But we will suppose *unenclosed* lands to cost $1 per acre, and that one acre will give subsistence to two sheep. It would require the labor of a man to oversee 600 sheep. This labor would be worth, in the South, about $75 per annum, and I put the extra labor of shearing half the price of Northern day-laborers, or $12½ per hundred. The account would then stand thus:

Dr.

To interest on 300 acres of land at $1 per acre	$21 00
" " 600 sheep at $1 50 per head	68 00
" labor of one hand	75 00
" extra labor for shearing	12 00
" salt, say	5 00
" loss 2 per cent. above value of wool pulled from skins	12 00
	$188 00

Cr.

By 1800 pounds of wool at 33⅓ cts. per pound	600 00
†480 lambs, at 75 cts. per head	360 00
	$960 00
Add, for manure	

Manure improves the quality of land and makes it susceptible of *carrying more sheep* or raising *more grain* in the same proportion in the South that it does in the North. To say that one acre, with privilege of range, will support but two sheep, is a low estimate: I have also put the average price of fine wools at a very low mark, lower than they have averaged for the last 20 years. I have done this to cover all contingencies, trouble, and expense of marketing, &c.

It would not probably cost any more in wooded regions to fence sheep-walks into very large fields. It would raise the value of lands, but it would dispense with the labor of a shepherd to every, say, 600 sheep.

By the above estimate, the cost of producing wool in the South is between 9 and 10 cts. per pound; in the North, *nearly three times that amount.* But I am satisfied that wool can be produced at 8 cts. per pound, to almost any quantity, in the South, and it frequently now is, as I know, at a cost not exceeding 5 or 6 cents per pound.

Can any portion of the world grow wools cheaper than this? And to show the unutterable absurdity of allowing South American wools, with a 30 per cent. duty against them, to drive ours out of our markets, let us look at a few facts.

The duty on wool costing 7 cents, is 2 cents and 1 mill per pound. This wool is imported in the grease and dirt, and will lose about half weight by washing, so that every pound of *wool* actually pays a double duty, or 4 cents

* Hon. R. F. Simpson. See his letter to me, in Sheep Husbandry in the South, pp. 59, 60.

† Note by the Editor.—Six hundred sheep (half males) will not rear 480 lambs; nor half of that number, one year with another, without unusual care.

and 2 mills. If, on the other hand, the wool is washed prior to exportation, the reduction of weight one-half would require a doubling of the price. A pound of wool, in reality, in either event, costs 14 cents, and pays a duty of 4 cents and 2 mills. To this, cost of transportation must be added. Thus, if the *revenue laws are not fraudulently evaded,** every pound of the so-called 7 cent wools costs not far from 20 cents in our market; twice and a half the cost of producing wools of *more than double the value*, (unless there is fraud,) in vast portions of our Southern territory, to say nothing of extraordinary localities, like those described in Texas.

THE BREED OF SHEEP ADAPTED TO WOOL-GROWING.

This topic requires little discussion, as, for general *wool-growing* purposes, there is but one breed in the world entitled to a moment's consideration. This is the Merino.

The Merino has, by breeding and cultivation, been divided into varieties, some larger and carrying more wool than others, some finer, and some coarser. Size, within moderate limits, is not *per se* a matter of any consequence: nor is the amount of wool per head, provided the smaller sheep bears as much in proportion to its consumption as the larger. By a universal law, the larger animal of the same species consumes a proportionably greater amount of food than the lesser;† and the true question for the farmer to ask, in determining his best variety, is not, how much wool will a given number of sheep produce, but how much wool will the herbage of a given number of acres produce? Deep, rich, luxuriant, and unfailing herbage will carry *large* animals; that which is less abundant or nutritious, or is liable to become parched or poor, is better adapted to those of moderate size. Precisely the same rules apply here that do in breeding horses or cattle; their size should *be adapted to their feed*—should *not be too large for their feed.* Very large or very small animals, of any kind, I never have thought so hardy, healthy, and capable of taking care of themselves, as those of medium size.

Shape is of much more consequence than size. This should indicate hardiness of constitution; and here again the rules are much the same that we would employ in judging of other animals where speed of motion is not required. A sheep should be broad and straight backed, round carcassed, cylindrical, rather than tunnel-shaped, (that is, carrying its breadth and depth into the fore-quarter, instead of tapering off in the shape of a tunnel,) with short and straight legs; the neck full, round, particularly so at its junction with the body, and set on in a line with the back; the head small, conical, and well carried up, the eyes lively, and the countenance bright and pleasing.

* As they no doubt most shamefully have been, by a fraudulent system of invoicing. A sends out B and C to Buenos Ayres; B buys a good quality of wools, and pays the true value for them, 14 cents, perhaps. He then resells these wools to C for 7 cents, and they are invoiced accordingly. C is not informed that there is any collusion, and therefore is *not* bound to know it! This is *said* to be the modus operandi; but, after all, if the revenue officers understand their duty, and rigorously perform it, there is no need of such a fraud becoming successful. No artifice of this kind could, for a moment, mislead a respectable judge of wools.

† Spooner put this at 3½ per cent. of their weight, daily, in dry hay or its equivalent; wet places at 2½. My experience would say, half-way between. But whatever the per-centage of consumption, it is *proportionable* to the weight.

The quality of the wool is a question of circumstances; but, in the South, the finer grades are indicated, because it is in these qualities that other regions can less contend with them, and have less inducements to attempt it. Merino wool ranges from the finest Saxon to medium. The Saxon Merino, or Saxon sheep, is ordinarily a comparatively tender-constitutioned animal, because, in his breeding, every thing else was, for a long time, sacrificed to the *quality* of the wool, and he degenerated in constitution. Merinos, descended from the original Spanish family, can now be found, which equal ordinary grades of Saxon in fineness, and they usually are thicker woolled, and are a hardy sheep. I consider them therefore decidedly preferable to the Saxons, for those who do not intend to pay a much more than ordinary attention to the care of their sheep, and especially for new beginners in the husbandry, who require a hardier sheep. Whatever the grade of the wool, economy demands that it be *thick* on the animal, not only to make a good return for the food consumed, but as a protection from the weather. It should extend evenly all over the animal, except on the legs below the knees, and on the face; on the latter it is unsightly, of little value, and frequently impedes the sight of the animal, so that it falls an easy prey to any enemy. It should be as even as practicable in length and *quality*, all over the animal. The wool should open a pure, glittering white, with some, but not an excess, of oiliness, and the skin should be mellow, and of a bright pink, as contradistinguished from a livid or tawny hue.

Pure-blooded sheep are, of course, more desirable than any other, and, in the male progenitor, it is the height of folly to use any but a pure-blood animal, under any circumstances. But, to attempt to fill up our unoccupied sheep lands exclusively with pure bloods would be a matter requiring much time and expense; and it is perfectly well known to all practical breeders, that sheep of a most desirable quality are readily, and in *three or four generations*, produced by crossing any good, strong, healthy stock of ewes with pure-blood rams of *the proper stamp*. The readiest and most economical method, therefore, is to select from the stocks to be found in the country, and thus cross them; and it is always well to have a small supply of pure-blood ewes, both to supply rams and to gradually grow a pure-blood flock. In obtaining these, great care should, of course, be had, not only to *individual excellence*, but to *absolute and undoubted purity of blood.*

With good Merino rams, the second or third crop, with the most ordinary ewes, will produce decidedly more wool per head than I have estimated, as the average of our country and the quality will be fully up to the average of those now ranked in the general class of fine wools. At the third or fourth cross, it may be made to rank almost in the first class. These facts I have practically demonstrated in innumerable instances. The practice of crossing with existing or coarser breeds has been that of Australia, the Cape of Good Hope, Buenos Ayres, Southern Russia, and all other new wool-growing countries.

AGRICULTURAL EDUCATION.

We have received from the Hon. Marshall P. Wilder, chairman of a board of commissioners appointed by the Legislature of Massachusetts, an extended and interesting report on the subject of agricultural education. It contains an instructive account of the principal colleges and schools in England, Scotland, Ireland, France, and other continental nations, designed to teach the several arts and sciences which pertain to rural affairs, from the pen of Professor Hitchcock, who devoted some months, while abroad, to collecting the information given. The Royal Agricultural College at Cirencester has six professors and 700 acres of land for agricultural purposes. The object of this institution is to prepare young men to become intelligent proprietors of farms, or to superintend in the most skilful and successful manner the farms of others. From the unhappy operation of *caste* in English society, says Professor H., and from the want of governmental patronage, this college is not so well attended as its founders anticipated. There are accommodations for 200 students, but only 50 now belong to the school. Those residing in the building pay $355 annually; those who board elsewhere, $175. Formerly, the school was open for the sons of the smaller farmers, but could not find support on that plan, and it was found that, if these attended, the wealthier classes would not send their sons. The price, accordingly, has been raised, and none but the sons of gentlemen, such as clergymen and wealthy laymen, now attend. None of the nobility send their children, although many give their money for its support.

The impassable barriers of *caste*, happily, do not exist in this republic; and it would be impossible to establish an experimental farm of 700 acres, erect suitable buildings to accommodate 200 students, appoint six able professors, aided by museums to illustrate natural history, comparative anatomy, vegetable and animal physiology, and provided with a chemical laboratory for making original researches, cabinets of minerals, and all other needful appliances, and not have the institution crowded with students.

The agricultural school at Grignon, near Paris, is in a much more flourishing condition. "In going through a stable," says Mr. H., "containing a number of fine cattle, I observed one young man, with water and a broom, cleaning the legs of an ox which had lain down in his leavings. The director whispered to us that that young man was the son of a wealthy banker. Indeed, the pupils all appeared as if they had not been accustomed to labor. Formerly pupils were admitted from the laboring classes to attend the lectures, without residing in the institution, but they are now excluded. They now pay 750 francs, or $138, for board, and receive nothing for their labor. This institution receives $1,100 annually from government."

Already it has sent out nearly 600 pupils, and the present number is about 80. The farm connected with the institution contains 750 acres. The system of instruction and study is extensive and thorough, embracing algebra, geometry, mechanics, surveying, levelling, stereometry, (measuring solid bodies,) linear drawings, in the mathematical sciences; meteorology, mineral chemistry, mineralogy, geology, and botany, in the physical sciences; organic chemistry, or agricultural technology, agriculture, arboriculture, sylviculture, veterinary art, agricultural zoology, and equitation, in what are denominated technological sciences; and rural architecture, forest economy, farm accounts, rural economy, and rural law, in the noological sciences. There are six professorships, and three years are required to go through with a course of study.

At Versailles there is a National Agronomic Institute, employing nine first-class professors and 3,650 acres of land. The report of Professor Hitchcock fills over ninety octavo pages, and we regret our want of room to give copious extracts from this truly valuable contribution to the agricultural literature of the United States. It is a work of great labor and condensation. Without the text, the thirteen tables would be nearly unintelligible. The following summary, however, will indicate the territory surveyed:

"But though my list is doubtless deficient, I have been amazed, as I doubt not the committee will be, at its extent. The following summary will bring the whole subject under the eye:—

SCHOOLS.	Superior Schools.	Intermediary Schools.	Inferior Schools.	Special Schools.	Connected with Colleges and Universities.	Total.
In England	1	...	4	...	...	5
In Ireland	1	25	34	...	3	63
In Scotland	...	...	...	...	2	2
In France	5	...	70	...	...	75
In Italy	...	...	1	...	1	2(?)
In Belgium	...	3	2	1	3	9
In Prussia	3	2	12	13	2	32
In Austria	4	...	3	25	1	33
In Wurtemberg	1	2	1	3	...	7
In Bavaria	1	1	32	1	...	35
In Saxony	1	3	...	1	...	5
In Brunswick	...	1	1	...	...	2
In Mechlenberg Schwerin	...	1	...	...	...	1
In Schleswig Holstein	...	2	2	...	...	4
In the Principality of Anhault	1	1	...	...	...	2
In the Grand-Duchy of Hesse	...	2	...	...	...	2
In the Grand-Duchy of Weimar	...	...	...	...	1	1
In the Duchy of Nassau	1	...	...	...	...	1
In the Electorate of Hesse	1	...	...	...	...	1
In the Grand-Duchy of Baden	...	1	...	...	...	1
In the Duchy of Saxe Meiningen	...	...	1	...	...	1
In Russia	2	10	51	4	1	68
Total	22	54	214	48	14	352"

The 22 "superior schools" in the above list will rank with our best colleges in the extent and variety of sciences studied, while the 54 "intermediary schools" will compare favorably with most American colleges. It is remarkable that the United States should not contain a single institution of the kind, and that all efforts to establish one in the great State of New York, for the last thirty years, should prove unsuccessful. Nor has the report of the Massachusetts commissioners been favorably acted on, even in a State so distinguished for its liberality to all other educational institutions. One serious impediment has been the lack of well-qualified gentlemen to fill the several professorships. These must be educated in Europe before we can establish a first-class professional school. When medical schools were first founded in this country, nearly all our teachers of anatomy, physiology, surgery, theory and practice of physic, &c. were educated abroad.

Professional schools of a high character could be established in no other way. Doubtless, Congress might establish an institution of the scientific grade of West Point Academy, and procure such gentlemen as Leibig, Agassiz, and Boussingault, to serve as teachers until a reasonable number of talented Americans could be prepared to fill professorships in State agricultural colleges. At present, we not only lack institutions of this kind, but gentlemen duly qualified to teach all the sciences that legitimately appertain to the noble profession of agriculture and husbandry. The people of the United States have over three hundred millions of dollars invested in domestic animals, and if a young farmer engaged in stock-growing wishes to study the digestive organs, the muscles, nerves, or blood-vessels of the horse, cow, sheep, or hog, there is not a museum in all America where this can be done, and he must cross the Atlantic for the purpose, or remain in ignorance. We do not depend exclusively on books to teach the anatomy and physiology of man, but make dissections, have ocular demonstrations, and valuable museums still further to illustrate all parts of the system, both in a healthy and diseased condition. Why should we be so unwilling to form agricultural museums? Why so reluctant to provide facilities for the successful study of the organization of valuable domestic animals, with a view to preserve their health, increase the growth of flesh, fat and wool, and the production of milk, butter, and cheese? Will it be said that a knowledge of all this living machinery can be of no value to the country? Is there no chance for additional improvement in thirty millions of sheep which elaborate wool and mutton, nor in the five or six millions of cows which yield all the products of the dairy in the United States? On the contrary, is there an intelligent man in the Union who does not know that nine-tenths of all our domestic animals, from the horse down to dung-hill fowls, are susceptible of very great improvement?

In 1818, William King, of Wurtemberg, established an Institute of Agronomy and Forests on the royal domain, of some 825 acres, having one director, six professors, four functionaries charged with various labors, besides two tutors who hear lessons in the school. The instruction given is embraced in *forty courses*, divided into three groups: 1. Agricultural matters. 2. Forest matters. 3. Auxiliary sciences. In the 1*st* course are included—1. Of climate; 2. Of soil; 3. Of manures; 4. Of tools and implements of tillage; 5. Of clearing up of ground; 6. Of meadows and pastures; 7. Of agriculture in general: this is divided into ploughing and other tillage, seed-plots, of grain and root-culture, threshing and preservation of grain, &c.; 8. Of special agriculture. All cultivated plants are treated of particularly. 2*d* course—Viticulture; 1. Culture of the vine; 2. Wine-making. 3*d* course—Culture of fruit-trees. 4*th* course—The rearing of cattle; the races; the crossing; the young. 5*th* course—The rearing of the horse; natural history of the horse; different methods of raising; choice of animals for reproduction; treatment of mares; treatment of colts. 7*th* course—Rural Industry in *winter*, the manufacture of beet-sugar; of liquid manure; of malt beer and brandy. In *summer*, manufacture of beer, vinegar, cider, lime, and draining tiles. 8*th* course—*Rural Economy:* Valuation of real estates; general circumstances of the country; of farms in general; of different parts of the same farm; of the home means of maintaining its fertility; of systems of culture; of labor and the internal organization of a farm; relation between the number of beasts and land worked; of capital of the undertaker or farmer; of the different modes of working a farm. 9*th* course—Agricultural book-keeping, &c.

We omit all the details on "Forest Matters," although forest-culture is destined to become an important interest in this country much sooner than many suppose.

3. AUXILIARY SCIENCES.

1*st* course—Higher arithmetic. 2*d* course—Algebra. 3*d* course—Planimetry. 4*th* course—Stereometry. 5*th* course—Trigonometry. 6*th* course—Applied geometry. 7*th* course—Mathematics applied to forests: 1. Of the culture of trees and of the entire forest; 2. Of the increase of trees; 3. Of the valuation in money of forests. 8*th* course—Physics. 9*th* course—Mechanics. 10*th* course—Chemistry. 11*th* course—Oryctognosy. 12*th* course—Geognosy. 13*th* course—Vegetable botany and physiology. 14*th* course—Special and rural botany. 15*th* course—Zoology. 16*th* course—Veterinary medicine; 1. Natural history of our domestic animals; 2. Anatomy of do.; 3. Animal physiology; 4. Care to be taken of animals; 5. Of the medicines proper for slight diseases; 6. Description of diseases, pathology, and therapeutics; 7. Veterinary surgery; 8. Internal diseases of animals, and murrains. 17*th* course—Of forest law. 18*th* course—Rural constructions. 19*th* course—Of preparing plans. 20*th* course—Drawing of machines.

To illustrate these courses of instruction, the means seem to be very ample at Hohenheim. They are as follows:—

The operations on a large farm annexed to the Institute. A forest of 5000 acres. A botanic garden. A library open twice a week. A geological collection. A mineralogical do. A botanical do. A collection of woods, seeds, and resins, from the forest. A collection in comparative anatomy. Do. of specimens of wool. Do. of agricultural products. Do. of models of instruments for tillage. Do. for physical science. Do. for chemistry and laboratory.

Students board where they please, at a price from $24 to $120 per annum, but lodge at the Institute. The number of students in 1849 was about 100, but it had been 140 for many years. No less than 1650 finished their education at this seminary within 31 years. Dr. Hitchcock pertinently asks—"How is it possible that so many, having gone through such a thorough system of instruction, should not exert a powerful influence upon agriculture throughout the community?"

If the number of students appears small, it must be borne in mind that the small town of Hohenheim has 7 agricultural and horticultural schools of an inferior grade.

In Saxony, there is a superior school, with 9 professors, and a domain of 7,355 acres. Brunswick has a superior school with 13 professors. This practice of subdividing the business of teaching among so many professors, each of whom gives his undivided attention to the advancement of a particular art or science, secures that pre-eminence in German universities and scholars for which they are distinguished. Is it not possible for the United States to have one school worthy of the republic?

MISCELLANEOUS COMMUNICATIONS.

Delaware County Institute of Science, Pennsylvania,
Hall of the Institute, January 7th, 1851.

Dear Sir:—I am directed by the Institute to communicate to you their thanks for many packages of valuable seeds, reports, &c. from your office, and to say that the institution has directed a large share of its attention to agricultural subjects, (a majority of its members being thus practically engaged,) and will receive with pleasure, and test by suitable experiments, any seed or grain, &c. you may forward in future. The lively interest felt in the agricultural department of your office, will, at all times, secure the hearty co-operation of the institution, to the extent of its limited means.

I have the honor to be, &c.,

JOSEPH EDWARDS,
Corresponding Secretary.

To Hon. THOMAS EWBANK,
Commissioner of Patents, Washington, D. C.

Lima, Delaware County, Pennsylvania, January 7th, 1851.

Sir:—Your Agricultural Circular, dated August, 1850, was duly received, together with a note acknowledging the receipt of our communication in 1849. The Delaware County Institute of Science, under whose instructions that and a former report were made, having received the circular through our representative in Congress, directed the undersigned to prepare a reply in conformity with your suggestions. Many of the queries in the present circular are but slightly variant from a portion of those of former years, which, though then answered in detail, may, under the probability that each report will reach the hands of other readers, justify a review of our agricultural experience and condition, even if it shall involve the necessity of occasional slight repetitions. To enable the practical agriculturist to appreciate fully the information furnished by your correspondents, a general view of the local natural conditions, such as the character of the soil, climate, elevation, general humidity, &c., so materially influencing the result of any system or experiments, should, we conceive, in all cases, be particularly given. Delaware County, Pennsylvania, is situated on the west side of the River Delaware; the centre at about 15 miles W. S. W. from Philadelphia, and crossed north of the centre by the 40° of N. latitude; territorial area, 177 square miles; population, 24,640, or 140 to the square mile, containing the earliest settlement in the State. The surface is undulating, with a general inclination to the S. E., and rises gradually from tide-level to a mean elevation of about 450 feet at its N. W. boundary. An alluvial belt, bordering on the River Delaware at tide-water, is succeeded north-westward by a band of primitive rock formation, covering the remaining surface of the county, first, by a zone of gneiss, some 4 miles in width, extending from N. E. to S. W. nearly, followed by a belt of serpentine, of nearly equal width, and the latter by a band, some 8 or 10 miles wide, characterized by various modifications of gneiss and kindred rocks, extending beyond the limits of the county to the slate-ridge bordering the primitive limestone-valley of Chester County. Trap-rocks, in a few localities on either side of the serpentine belt, have protruded to the surface in the eastern sections of the county; mica slate near the centre, and limestone in a few detached spots in the extreme west. Interspersed throughout the serpentine belt, are comparatively large areas of silicious rocks, in various forms and compounds, requiring large and frequent supplies of fertilizing agents to maintain a satisfactory degree of productiveness. The more generous qualities of the soil, in other and adjoining sections, need much less artificial aid. The whole surface of the county, with trifling exceptions, is, however, in a high state of cultivation. In common with all the territory bordering on, and contiguous to the west bank of the Delaware, this county is traversed by numerous mill-streams, generally having their sources north-westward beyond its limits, and, by channels deeply-indented, nearly parallel, and from 2 to 3 miles asunder, which discharge their waters into tide-water, in the Delaware, on the S. E. The valleys of these streams are intersected on either side by continually recurring minor valleys and their accompanying streams, deriving their sources from springs on every farm, and frequently in every field, up to the dividing-ridge, at a mean elevation of about 200 feet above the creeks. This rolling character of the surface, with scarcely any declivity too abrupt for cultivation, or a single acre too low for drainage, with everywhere an abundant supply of streams and springs, is well-adapted to the business of dairy husbandry. These streams, great and small, meander through valleys of various widths, moderately fertile, of rapid descent, with gradually sloping sides, generally admitting of irrigation almost continuously throughout their extent. Thus almost every farm in the county has, or may have a portion of natural meadow, watered by the overflow of streams, or artificially by irrigation: in either case they are highly productive, and furnish two crops for hay annually, and perpetually, together about 2½ tons per acre, of the very best quality for dairy stock, without exhausting the soil, or other cultivation.

The character of the soil varies essentially in different localities, as may be inferred from the description of the rocks already given, embracing every variety, from nearly sterile to highly fertile. Clay predominates in the S. E., in the vicinity of tide-water, (except the alluvial of the river flats,) and also in a few detached localities inland; but the largest portion of the surface consists of soil formed from the disintegration of the local rocks, and may be termed a sandy or gravelly loam, impregnated everywhere by more or less ferruginous matter, and nearly destitute of lime; this latter defect has, however, been to a great extent corrected within the last 30 years, by a liberal admixture, applied in the course of cultivation. In the serpentine belt, magnesia and chrome exist to an extent, in many spots injurious, if not destructive to vegetable life. To neutralize the defects, and render available all the advantages now afforded by our varieties of soil and situation, have taxed the ingenuity and the industry of our ancestors through the five preceding generations. The entire territory of the county, except in the vicinity of villages and manufactories, is divided into moderate-sized farms, varying from 20 to 200 acres each, but principally from 60 to 100 acres; and these, whatever their size, into from 7 to 12 enclosures, viz. one natural meadow, one in timber, and the residue, more or less, for cultivated crops. The farm-buildings are mainly constructed of stone, and sufficiently capacious to admit the storage of the whole produce of the farm, and shelter for all stock, carriages, farming utensils, &c. In all cases, when practicable, the farm buildings are located in the immediate vicinity of a spring of water, over which is erected a substantial stone structure, and other appliances suitable for conducting the operations of a dairy, and, when convenient, the stream therefrom passes through the barn-yard, for the use of stock in the winter. The high estimation in which the fresh butter, veal, and poultry produced in this section of the State, are held in the markets of Philadelphia, New York, Baltimore, and Washington, and the present facilities of reaching them at a trifling expense, have rendered the production of these articles the most profitable application of the soil. To furnish the greatest quantity of suitable provision for dairy stock is, therefore, the leading object of the farmer, and gives character to our entire system of cropping. Experience has proved that land laid down in grass will not produce the maximum quantity beyond 4, or at most 5 years, in succession, without reploughing, whatever may be the natural or artificial stimulants; and as this has become the most profitable and desirable crop, the cultivation of the several grain crops follows as a matter of expediency, rather than choice. Thus influenced, our system of cropping may be briefly stated as follows, viz.: First, Indian corn, succeeded in the following order, by oats, wheat, and grass; the latter depastured the first year after the wheat has been removed, cut for hay the second and third years, and then appropriated to pasturage until reploughed; each field receiving like treatment in all respects as that preceding it. Thus every farm presents at all times the following phase:—One field under cultivation with Indian corn, one with oats, one with wheat, one or two producing grass for hay, (as there may be more or less natural meadow,) and the residue as pasturage. On small farms, the oat crop is usually omitted, and the corn followed in the same year by wheat. This would in all cases be adopted in practice, but it involves a heavy amount of labor in removing the corn crop from the ground, and time, in covering it with manure, which cannot at all times be effected in due season. The culture which experience has proved the most profitable for each of our course of crops is as follows:

INDIAN CORN.

Of the cultivated crops, this is the leading and decidedly the most important and profitable to the Delaware county farmer. Aside from the quality more or less used as food in various forms, in almost every family, it enters extensively, in as great a variety of forms, into the entire system of the farmer, furnishing in large proportion the most economical and desirable *extra* food for working-cattle, horses, beef-cattle, hogs, dairy stock, and poultry, and from the comparative certainty of obtaining a crop, under all the vicissitudes of season and accidents, it would be hazarding little to say that 50 per cent. of the entire profits of our agricultural operations (exclusive of dairying) flow directly or indirectly from the production of Indian corn alone.

In autumn, winter, or spring, old pasture ground (the older the better) is broken up, from 6 to 8 or more inches in depth, and so remains till near the planting season, when the surface is thoroughly broken with the harrow, laid off into squares, by furrows, with the plough, 4½ feet apart, and 4–5 or more grains planted with the hoe, and covered to the depth of two inches, at the intersections, between the 20th of April and the 10th of May. When the plants are some 2 or 3 inches above ground, the cultivator is used freely in each direction between the rows, and when 6 inches high, the number of plants in each hill is reduced to 3, or at most 4. Supplying any deficiency by replanting, and stirring the surface every third week (or oftener, if the weather is dry) with the horse cultivator, until the ear sets, comprise the usual and generally the only after-culture required. The depredations of *birds*, the *wire* and *cutworms* are generally limited to the first 4 weeks after planting. The most effectual remedy for the cutworm consists in ploughing the ground during the preceding autumn or winter; for the others, none is known. Injury by moles can be in a great measure prevented by frequently stirring the ground. About the 15th of September, when the *husk* of the ear gives signs of ripeness, and the grain is *nearly* hard, the whole crop is cut off, and shocked 48 hills together, around 4 hills left standing for the purpose, and secured at the top to prevent the admission of rain. After standing thus some 3 or 4 weeks, the corn is husked and stored in open lathwork cribs, 3 feet wide, of any length and height, and covered with a water-tight roof, exposed to the open air on every side. The stalks, with the husks and leaves upon them, are bound in convenient-sized bundles, and stacked or secured under shelter, if possible, until used. The occurrence of drought or early frost frequently causes the appearance of premature ripeness in the stalk and the leaves, and the grain, though it acquires a degree of hardness, is shrunken and movable on the cob, under the finger. Experience has proved that the sap-vessels in the stalk continue to act, and, if permitted to stand, will generally mature the grain satisfactorily. Almost every known variety of corn has been introduced and cultivated here experimentally to a sufficient extent to develop their respective character and general adaptation to our soil and climate: in all cases, however, after a few years' cultivation, the effect of the latter, or, possibly, occasional contact during their growth with the cultivated varieties, tends to reduce them to a general conformity in habits, appearance, and quality, with the common standard type already in use, viz. ear from 8 to 13 inches in length, cob white, 1½ inches diameter, from 12 to 20 rows of grain, compactly seated on the cob, and weighing from 50 to 60 pounds per bushel. A yellow variety, called Oregon corn, at the Patent Office, whence the seed was received, has become a favorite with many, and its cultivation is increasing, and three varieties of white, viz. Baden, Lloyd, and Rowsie, also received from the Patent Office, have been experimented upon sufficiently to establish the character with which they came recommended; but it is questionable whether either of them offers any permanent advantages over that already in use.

The corn crop until recently has been required to depend entirely for its support on the natural fertility of the soil and stimulants derived from a fresh-turned sod. The latter is indeed an indispensable requisite for a full crop, under any system of management, or on any of our varieties of soil, however productive they may generally be. No moderate amount of manure is adequate to sustain a second consecutive crop, nor indeed a full crop from any ground under cultivation the preceding year. Light manuring *in the hill* has long been practised on small parcels with marked benefit, but the recent extension of the use of *guano* on wheat ground has enabled those using it to dispose otherwise of a portion of their barn-yard manure. Land destined for corn has recently participated in this surplus with most decided advantage, and it is highly probable that the increasing use of that article (guano) will thoroughly revolutionise our system of manuring, and that the corn crop will eventually be the exclusive recipient of the home-made manure, as that of wheat has hitherto been. The sandy and gravelly loams on the more elevated land, distant three or more miles from the river, are better adapted to the production of this grain than the clay soil below, over nearly the whole surface of the country. However, the soil, solar heat, moisture, and length of season are so favorable to its cultivation as to produce, in average years, from 35 to 65 bushels per acre, (as the quality and natural strength of the soil may vary,) with suitable attention, *without* manuring, and a fourth or a third more if manured. The cost per bushel to the producer, when delivered at the mills, under the treatment sketched above, after making a reasonable allowance for the value of the stalks, is estimated closely at from 20 to 25 cents per bushel of 56 pounds, and the present value for new crop, 55 cents. The most recently-approved method of feeding to horses is in the whole grain; to horned cattle, in the form of meal, frequently mixed with an equal quantity of oatmeal; to hogs, the the same, after fermentation, except in the last stages of feeding for slaughter: then whole grain, and pure water for drink. Cooking the meal, and also the grain, is frequently practised on a small scale with decided advantage, but no experiments are known to have been made with sufficient accuracy to serve as data to estimate the extent of its economical advantages. The whole crop finds a ready demand at home—at the mills, factories, public houses, and dairymen, and also for feeding the large droves of beeves during their transit through our county from the South and West to the Eastern markets: in this case, it is fed in the ear, as the most advantageous and economical for the drover. The crop suffered severe injury the present year, from the violent storms of the 19th of July and later; and the great quantity of rain during the season was detrimental to crops generally, and particularly on clay soil, retarding the ripening some ten days. It escaped the frost, however, and the crop altogether is above an average one, and has been well secured.

OATS.

The oat crop, in our system, is almost invariably restricted to land cultivated with corn the previous year, and, owing to the common opinion that it is a great impoverisher of the soil, is in no great favor with the farmer. But for the small expense attending its cultivation, the convenient time of sowing and harvesting, and also the necessity for cultivating the ground preparatory to the wheat and grass crops in the succeeding autumn, which perhaps it serves well, it would be generally abandoned. Corn ground of the preceding year is ploughed at any convenient time, when the frost will permit, in the spring, not later than the 1st of May; 3 bushels of seed per acre are sown immediately, well harrowed, frequently passed over with the roller, and left without further attention, until it ripens, generally late in July, when it is cut with the cradle, bound in convenient-sized sheaves, and secured in the barn. The whole crop of 1850 was entirely prostrated by the storm on the 19th of July. Much of it could not be bound, but was stored in the barns in bulk. The quantity was about equal to an average, and the quality fair. No manure is applied to this crop: thin soil, if the season is favorable, is well adapted to this grain. On strong ground, the straw grows rank and weak, is liable to fall, and the grain perish. The crop is very susceptible of injury from drought, during any stage of its growth, but singularly exempt from the depredations of insects or other enemies. Under favorable circumstances, from 30 to 50 bushels per acre are the usual yield, if cultivated with proper care, without strict regard to the quality of the soil. A white, and also a black variety, have been cultivated here many years, and esteemed the best adapted to our locality. The cost of production is estimated to average 21 cents per bushel: the usual value from 30 to 50 cents; at present 44 cents. The whole crop finds a ready market in the county, and is used as food for horses in the whole grain; for dairy cows and hogs, in the form of meal, usually mixed with equal parts of cornmeal.

Barley and Rye, formerly cultivated extensively here, have been superseded by oats and wheat respectively. A blight attacked the latter some fifteen years since, and has continued to affect the small quantities occasionally cultivated, except on serpentine soil; if otherwise, however, the highly improved condition of our farms renders the cultivation of wheat more profitable. The cultivation of beans and peas is restricted to the garden, exclusively for table use. Wheat is one of our standard crops, and uniformly takes its place as that last cultivated in our system previously to the grasses. The thorough working of the soil and the high manuring necessary for both of these, admitting as they do of the simultaneous introduction of their seeds, render this arrangement at once the most judicious and convenient. All our varieties of soil, when highly manured *at the time of sowing*, will produce wheat satisfactorily under favorable circumstances of season, &c. On naturally strong ground, and particularly on clay soils, a heavy growth of straw frequently proves detrimental to the crop of grain, increasing its liability to fall previous to maturity, and especially so when abundant. Rains are highly beneficial in promoting a full crop on lighter soil in more elevated situations. The favorite practice until recently has been, to manure the ground but once during the usual course of cultivation, and that *always* at the introduction of the wheat and grass crops, the last of the series. Experience has abundantly proved that manure applied to corn-ground in the spring of the year, is not sensibly beneficial to a wheat crop, if following in the autumn, though the grass crop succeeding bears evidence of the usual durability of its effects. Thus, a direct and invariable proof is furnished that the first virgin virtue of fermented manures is essential to a full development of the wheat crop; or possibly from a continued fermentation in the vicinity of the roots the necessary stimulant is drawn. Various opinions prevail in respect to the most judicious mode of applying manure to secure the best results, at once, to the wheat and the succeeding grass crops, the latter esteemed the most important; and as various methods, with this object in view. Spreading it on the surface and turning it under with the oats stubble in August, where it is suffered to remain until seeding-time, when, by reploughing, it is returned to the surface, has many advocates. Spreading it after the first ploughing, and turning it under when preparing for seeding, is also extensively practised. These are the methods generally in use, but experiments are continually being made to solve this interesting question. Observing the superior growth and yield of wheat, and the flourishing condition of grasses, on a small portion of a field, where, merely from convenience at the time, the manure was spread on the surface *after* the last ploughing, and harrowed in with the grain, the writer was induced to use the like treatment with the entire crop in 1849. The result to both the grain and following grass crops was so highly satisfactory, that the same method has been continued with the present growing crop: the manure (from the barn-yard) was well rotted, and, together with the grain and grass seeds, mixed with the surface some two or three inches deep, by using the corn-cultivator instead of the harrow for that purpose. The present appearance of the crop warrants the opinion that both the wheat and timothy need, and are receiving, at the shallow depth to which their roots have penetrated, the greatest possible amount of benefit from the manure at this tender stage of their growth; and the inference is fair that any surplus, after supplying the wheat crop, will be much longer available to the succeeding grass than if placed at the outset at the extreme depth to which the mature roots shall penetrate. Some forty years back, a white, beardless variety of wheat, called "Jones," after enjoying exclusively the favor of farmers of that day, ceased to yield satisfactorily, and was discarded. A variety, still cultivated by a few—the "red-chaff bearded"—supplied its place, and continued without a rival until some fifteen years since, when its productiveness began to fail. It also fell into disrepute, and gave place to almost every known variety of winter wheat, which by turns succeeded each other, and had their year of eclat, to pass into oblivion as their predecessors. The "Chinese," "blue-stem," "Genessee," "Henderson," "Stewart," "Mountain," and "Mediterranean," have each walked over the course, and, except the two last, have nearly disappeared. The "Mountain," introduced about the year 1844, soon led to high hopes of its adaptation to our locality. The first, second, and third years of its general use, it succeeded to admiration; but last, and the preceding year, owing to its late ripening, (about the 10th of July,) it was struck with mildew, and simultaneously attacked, while in the milk, by a small, wormlike, reddish insect, whose depredations on the grain almost literally annihilated the entire crop of that variety, in a large portion of the county, and, with it, its former popularity. The "Mediterranean," introduced some twelve years since, has become a steady dependence under all vicissitudes. Its exemption from the "fly" served at once to extend its fame—a character which, unfortunately, departed early. Yet, notwithstanding the fancy article above-named passed over the scene in the mean time, its comparative excellence, by contrast with them, is more thoroughly appreciated, and at this moment it reigns in public estimation without a peer. Its good qualities consist in admitting of early or late sowing, more productive than other varieties on thin soil, early ripening, (about 10 days in advance of other kinds,) by which rust and mildew are nearly uniformly escaped: it probably escaped the ravages of the insect described above for the same reason. Flour, white and excellent; grain, large and full, weighing from 60 to 65 lbs. per bushel. The objection urged against it is the weakness of the straw, which causes it to fall occasionally, on very fertile land, before perfectly ripe, and renders the harvesting troublesome and expensive. Various modes of preparing the seed have from time to time been recommended, and in some instances practised, such as soaking in ley of wood-ashes, lime-water, salt-water, &c., but no advantages have resulted to induce a continuance: the only caution observed is to select the fairest portion of the recent crop, clear of blight, and to thoroughly separate any extraneous substance. The main dependence is placed in the preparation of the ground rather than that of the seed. In very rare instances, and these as a matter of convenience, wheat is sown on small lots of fresh-turned sod, and frequently on ground from which a potato crop has been removed, in both instances with moderate success; but the usual course, as before given, consists in preparing recent oats-ground, by some of the modes described, by mixing thoroughly with the soil from 25 to 30 ox-cart loads of stable manure, or 400 lbs. of guano per acre; then sow, broadcast, from 7 to 9 pecks of seed, harrow the surface thoroughly, and sow from 4 to 6 qts. of timothy-seed, immediately before rain. On flat ground, inclining to clay, covering the grain by light ploughing is frequently practised with advantage.

When the drill is used, from 5 to 7 pecks of seed per acre are deemed sufficient. The corn-cultivator is, in some instances, used for covering the grain, instead of the plough, harrow, or drill, as the condition of the soil or surface may render preferable. In all cases where guano is used, the plough is preferred, to prevent, as far as possible, its contact with the atmosphere. The usual time for sowing embraces the last 20 days of September and the first 20 days of October. The advantages of any time intermediate are wholly dependent on the after state of the season. When very dry, the early sown is attacked by the Hessian fly, and the check it receives from this and the lack of moisture is seldom entirely overcome. The principal advantage of early sowing consists in the opportunity afforded to the timothy to acquire sufficient root to resist the injury inflicted by alternate freezing and thawing during the ensuing winter: it is the more important crop, and very susceptible of damage from this cause. If the autumn continues mild and moist, with but little early freezing, that sown so late as the middle of October, or even later, frequently produces the heaviest crop, and but a few days difference in the time of ripening is observed to result from as many weeks difference in the time of sowing. The Mediterranean ripens usually about the first of July; other varieties, about the 10th. When harvested, the crop is stored in barns, and recently the threshing-machine is employed, as early as convenient, to anticipate the usual depredations of rats and mice. The crop of 1850, up to the middle of June, progressed favorably; but the constant humidity of the air and the large quantity of rain caused rust and mildew to attack all late varieties. This, in connection with the destruction by the unknown insect referred to, reduced the entire yield some 20 per cent. below our usual average. The whole crop of the county but partially supplies the local consumption, and finds a ready market at our mills, at Philadelphia prices ranging from $1.25 in August, to $1.04–$1.10 subsequently. The general yield of wheat per acre is progressively increasing in this county, owing to the constantly improving condition of the soil. From 15 to 20 bushels per acre, twenty-five years ago, was deemed a full crop, on our best soils. Under our improved system of cultivation, and greater attention to liming and manuring, less than from 25 to 30 bushels, on like soils, in favorable seasons, is not satisfactory. About that time, wheat had become an exceedingly uncertain crop, by the constantly increasing injury inflicted by the Hessian fly. The old "red chaff" was almost the only variety then in use, and generally sown early. The fly became so destructive as almost to deter farmers from further attempts to cultivate wheat. It was found, however, that, by late sowing, say from the middle to the last of October, for a number of years, it almost disappeared from the county; but that variety of wheat ceasing to yield satisfactorily, other more productive kinds were introduced, and they were proved to be most prolific when sown from two to four weeks earlier. The "Mediterranean" was one of these, the first; then followed the "mountain" and others, all of which escaped the fly for a time, even when thus early sown: they were consequently deemed fly-proof. The usual time of sowing was anticipated, in many instances, to the last week of August. The fly has returned again, and they attack indiscriminately every variety, thus inducing the belief that the previous exemption from the ravages was not owing to the kinds of wheat in use, but to *their absence*. Reflecting farmers are of opinion that their return is consequent upon very early sowing, and that the only relief will be found in a return to that practice which formerly proved effectual. The *weevil* is not known to us as a scourge to the growing crop. They frequently infest barns and mills. The remedy for the farmer is easy, and consists in stacking at a distance for about three successive years, and they entirely disappear. Our last crop, particularly the late-ripening varieties, and especially the "mountain," were attacked by a little reddish-yellow worm in the grain, *while in the milk*, and the destruction, in many instances, was almost complete. Its ravages were at an end when the grain became hard; and it was probably owing to the grains of the "Mediterranean" being in this situation when it made its appearance, that it alone escaped. This insect was called by some the "red weevil;" but it had none of the appearances nor characteristics of a weevil. It came with the mildew. Under the microscope, no legs were discoverable, nor any thing like a mouth for biting, but only for sucking; nothing like teeth, or any thing calculated to answer their purpose, could be discovered: the organ reminded every one who thus examined them of the mouth of the fish called sucker; hence they cannot be classed with the weevil family. From 10 to 50 were to be found in each head of wheat; often a dozen in the same pod. The number was so great, that the floors of the wagons and the barns, when storing the crop, bore the appearance of being covered with red dust. They continued to live, without sensible alteration in appearance, or further injury, many weeks. Their presence in the former crop is supposed from a similarity of its general appearance and light yield, attributed, at the time, to mildew alone; but they were not noticed. They are strangers to us, and no remedy for their ravages is known, save in sowing the earliest ripening varieties, and hence but little other than the "Mediterranean" was sown last fall.

CLOVER AND GRASSES.

The paramount importance of our grass crops, and the necessity for stirring the soil, at intervals of not exceeding 6 or 7 years, to insure the greatest aggregate yield, are the inducements to pursue as short a rotation of cultivation of the cereals as is found compatible with this main object. A three-years course of corn, oats, and wheat, has been reluctantly adopted as serving the desired purpose, and admitting of a convenient distribution of the farming operations equally throughout the business season. A most desirable modification would be effected if the wheat crop would admit of following that of corn directly, in the same year, with safety to it and the grasses, without an intervening oat crop. The principal difficulty to be removed is the additional labor and time necessary to haul and spread some 25 to 40 loads of manure per acre, after the heavy work of removing the corn from the ground, the commencement of which is not usually earlier than the 12th or 18th of September, thus delaying the *act* of *sowing* beyond a safe season for either grain or grass seed, particularly the latter. The well-established necessity for the application of manure, in some form, *at the time of sowing these seeds*, has, hitherto, rendered this large expenditure of labor and time essential conditions of such modification. It is now believed that the use of guano as a substitute for stable-manure may enable our farmers to make this desirable change without unusual risk to the after crops; some progress has already been made in its support. Guano, in quantities of from 300 to 400 pounds per acre, has been used frequently within the last 3 or 4 years, instead of stable-manure, on wheat ground, with effects entirely equal in benefit to that and the succeeding grasses. In a few instances, when sown very late, and particularly after the removal of corn, uniform success has resulted. If no serious objection shall present itself in further practice, and the hope entertained from this partial experience be realized, the stable-manure may be applied to the corn-ground in the spring, by which its ripening season will be accelerated some 10 days, to be followed in the fall by wheat and timothy, treated with a light dressing of guano, *in good season* for the security of both: the oat crop omitted and a return to grass crops, at the end of the second instead of the third year, as heretofore. Timothy and clover (together) are the grasses cultivated for hay and pasture, nearly to the exclusion of all others. Herd and orchard grasses are, in a very few instances, cultivated in orchards and moist situations, but the difficulty of eradicating them when desired is a serious objection to their use. The treatment of timothy has been noticed:—that of clover consists in merely sowing from 4 to 6 quarts per acre of seed, on the growing wheat-ground, in the month of March or early in April, after severe freezing has passed; the surface at this time, in drying after winter frosts, is divided into numerous small fissures, into which a portion of the seeds falls and takes root at once, thus receiving the necessary moisture, and protection from frosts and the drying winds usual at that season. If the weather continues dry after the wheat has been removed, both the timothy and the clover will languish, and care is required that they shall be protected from close pasturing—if wet, a heavy growth will follow, and admit of pasturing freely. In the following year, the proportion of the clover to the timothy will be larger than is desired for first-quality hay, and is frequently devoted to pasturage; the second and succeeding years, the relative proportion changes, until about the fourth, when the clover will have nearly disappeared, and the timothy be no longer in quantity to furnish a satisfactory crop of hay: it is then appropriated to pasturing stock until reploughed for corn. The production of these grasses, and particularly clover, may be greatly promoted, and the latter in moderate quantity indefinitely continued, by occasionally top-dressing them with about one bushel of plaster per acre, say every second year. The chief dependence of the farmers of this county for winter support for the comparatively large farm and dairy stocks, everywhere kept in number up to the extreme limit of subsistence, is on the clover and timothy hay thus produced, assisted as far as possible by that procured from natural meadows, corn-fodder, straw, &c. Previously to the introduction of clover and timothy, about the commencement of the present century, and within the recollection of our old farmers, the only supply of hay was limited to that procured from natural meadows, watered by the overflow of streams or by irrigation: hence the value of farms bore a close proportion to the quantity of such land on each: those destitute of such a resource were esteemed of little comparative value, having been already exhausted by continued cropping, and no means of resuscitation could be drawn from the soil. Necessity thus induced a resort to mineral substitutes: lime and plaster were applied, at first cautiously and hesitatingly, subsequently in profusion; and, at this day, *uplands*, with the assistance of home-made manures thus produced, are made as productive in grass as the best meadow-lands, and full crops of the cereals are obtained. In the course of the necessary preparation, no attention is required to natural meadows, except to regulate the flow of water when irrigated, and, when the utmost possible amount of hay is desired, to avoid pasturing them at any time. The quantity of fertilizing matter deposited from the overflow will fully sustain the constant cropping, and, with care, will largely increase the productiveness: leached ashes is found to be the best known top-dressing for portions not within the reach of water, and plaster on every part has proved highly beneficial. The quantity of clover and timothy (mixed) hay, produced as above, will vary from 1 to 3 tons per acre, as the soil and season may be adverse or favorable, and estimated to average, in a series of years, 1½ tons annually, from all cultivated and meadow ground: from the former, in one crop harvested from the 20th of June to the 10th of July; from the latter, in two crops—the first from the 15th to the 30th of June, the last in September. The late crop, (1850,) owing to the great abundance of rain and high temperature during the growing season, is believed to be equal to the largest ever produced in the county; and, as a consequence, the market value is about 20 per cent. below the average, say from $10 to $12 per ton at the close of the year. Timothy produces but one crop of seed or hay annually: the seed ripens about the 20th of July, and is harvested as wheat. The growth of clover is continued throughout the season: the seed is procured from the second crop, permitted to ripen late in August or in September. As pasture, timothy is highly relished by all kinds of farm-stock—clover is a great favorite with horses and hogs, but becomes loathsome to horned cattle if confined to it even for a few days; when depastured in connection with the natural grasses, and free access is permitted to either at will, its full value is realized. There is difficulty in arriving at a correct estimate of the cost of growing hay per ton, on upland, since it would necessarily include a portion of the expense and value of the manure applied to the preceding grain crops. Apart from these, however, the cost would be limited to the interest on the value of the ground, taxes, &c., and the expense of securing, amounting together to about $8 per acre, or $5.40 per ton, on upland, and $9 per acre, or $6 per ton, for meadows, the latter including two separate crops.

After the second or third year's crops of clover and timothy hay have been taken the diminution in quantity progresses rapidly, and its place is supplied with like rapidity by a spontaneous growth of white clover and green grass. These grasses furnish the most grateful food in the form of pasture and hay to all kinds of stock, and are estimated more valuable for beef or dairy cattle than any other known to us; the growth is rapid when moisture is abundant, but they languish in drought, owing to the slight depth penetrated by the roots. The clover is said to be an introduced grass—when, or by whom we are unable to say; the yield of seed is large, but none is secured. Every part of our land is charged with it, and to whatever length of time cultivation may be continued, when permitted to rest white clover will make its appearance at once, and, in the space of two or three years, these grasses occupy the ground, to the exclusion of nearly every other. Their productiveness is greatly promoted by top-dressings of plaster, wood ashes, and other manures. At the end of 6 or 7 years from the previous ploughing, the surface becomes hardened by the feet of cattle, in common parlance "sod-bound," and the regular course of cropping is repeated.

ROOT CROPS.

Turnips, Carrots, Beets.—Turnips are grown in small quantities, for table use alone; generally sown in gardens and borders of cornfields late in July or early in August, when the corn needs no further work upon it. The crop is a precarious one, and frequently fails from partial drought. Ashes, rubbish from the wood-yard, and other refuse and rich earth were, until recently, the usual manures applied. A few recent experiments with guano have proved it to be incomparably superior to any other for this crop, and it is probable further trial may induce greater attention to it.

Carrots and beets are also produced in small quantities for table use. Some ten years since, a spirited attempt was made to introduce sugar-beet as a standard crop. Their cultivation was attended with success in almost every instance, and their value as food for cattle and hogs was generally admitted. The yield was from 400 to 800 bushels per acre in field culture, but ripening too late in the season to be succeeded by wheat and grass without interfering with other important operations on the farm was an objection, and but few are now to be seen in the country. As winter food for store hogs they are preferable to grain, and their cost less than one-third. The usual practice was to plant in ground suitable for potatoes, laid off by furrows 18 inches apart, treated with a moderate quantity of well-rotted manure on very rich earth, two or three seeds deposited together at 6 inches distance, and covered with the hoe; when the plants are some 3 or 4 inches above ground, thin out, leaving one only; as their growth progresses, feed off every second beet, and leave the number to ripen 12 by 18 inches. The season for planting and harvesting, and also the treatment throughout, are similar to that of the garden beet. The usual way of preservation in winter is the same as potatoes. When fed to hogs, no preparation is necessary; to cattle, they are required to be washed clean, cut into pieces, and, when desired, dusted with any kind of meal. When fermenting manure is used, cover it two inches deep with earth, then plant and cover again. When fed to horned cattle, owing to its slight purgative quality, a simultaneous use of hay, straw or corn fodder is required.

Potatoes, Common and Sweet.—The common potato is cultivated in this county to the extent of consumption, and, in the eastern section, for the Philadelphia market. The planting season is from the 10th of March to the 1st of June. Early planting, say from the 10th to the last of April, has been generally preferred since the prevalence of the "rot;" by admitting of harvesting previous to the usual copious rains late in September, loss by that disease has been to a good degree avoided. Late planting, when the months of July and August are wet, succeeds well, and, before the appearance of that disease, was chiefly practised for a winter supply. Apparently, owing to the unusually large quantity of rain in the months of July, August, and September, in 1850, the early planted crop was backward and the quality indifferent. The disease became very prevalent in September, and continued, causing a heavy loss. After being gathered and stored, they were attacked by another disease called "black rot," for which no remedy is known. When stored in confined cellars, its progress was rapid and destructive, and the quantity left by both diseases is small and the quality very inferior. Altogether, this season has been more disastrous to this crop than any since 1846. The latter disease was observed immediately after the potatoes were stored away, presenting a slightly shrivelled skin and numerous small specks of white fungi on the part affected under the skin; the substance became slightly hardened and of a dark brown-color; thus it progressed till the whole was destroyed and dry. No evidence is afforded of the disease being communicated to another by contact, but the inferior quality of all favors the opinion that none are in a strictly healthy condition. The usual cultivation consists in spreading about 40 cart-loads of slightly fermented stable manure upon an acre of *sod* ground, (if convenient,) or that cultivated the previous year with corn or oats, at any time in the spring. For planting, plough the field as usual, and drop the potatoes 8 or 9 inches apart in every second furrow; harrow the surface, or permit it to remain until the plants are some 4 or 5 inches high, when the surface is thoroughly broken by the harrow, without regard to the tops; before the tops fall, pass the corn-cultivator freely between the rows until all grass and weeds are destroyed; if the surface is flat or inclined to clay, throw a light ridge on each side with the plough: proper care afterwards to prevent the growth of weeds, &c. is all the attention required until the crop is ready for gathering. The manure, in some instances, is placed in the furrows under the potato as the planting proceeds, but with no visible advantage. Soil inclined to sandy is esteemed preferable for this crop, and it is less liable to suffer from disease. About 500 lbs. of guano are found to equal the usual quantity of manure, and its use for this purpose is increasing. Lime also is much used, and is believed by many to improve the quality of the potato sensibly. No preparation of the seed is practised beyond reducing to the proper size, if too large; but small tubers about 16 to the pound are generally used whole, and preferred by many to large ones divided. The "Mercers" are cultivated almost to the exclusion of all others; some of the latter are occasionally introduced and tried, but none are found to be preferable, and soon disappear. The average of our crops for a series of years may be placed at 100 bushels per acre. In favorable seasons and soil, 150 bushels are obtained, but it is doubtful whether there is any progressive increase since the "rot" made its attack in 1843, or that by the present practice any very material increase in the product per acre can be obtained. The writer of this, a few years since, made an experiment to test the capacity of ground equally manured, to produce potatoes when planted in rows at less than the usual distance apart. On one-fifth of an acre, eight cart-loads of manure were spread in the usual way on the sod; one-third was planted with potatoes in every third furrow; one-third in every second furrow, and the remaining third in every furrow, at the distance of 9 inches apart in the furrows; dressing the crop was performed in the usual manner until it required the last culture; the last third received a thorough dressing with the hoe, and the others with the plough. The result was 60 bushels of prime potatoes, exclusive of small ones, or about 300 bushels per acre. The product of every row was measured separately, and the average found to be the same. Thus proving, in this instance, that ground equally manured will produce one-third more if planted two feet apart, or two-thirds more if planted one foot apart, than if at the usual distance of three feet; in other words, three bushels if planted in every furrow, to one bushel if in every third furrow, as is the present practice, with only the additional cost of seed and extra labor of the last dressing with the hoe, when planted so close as to yield the greatest quantity. The present year, (1850,) the most unfavorable of many years past for the potato crop, from 1½ acres of ground, 278 bushels of potatoes, large and small, were gathered, grown in rows two feet apart; usual cost of production estimated at 36 cents per bushel.

FRUIT CULTURE.

Considerable attention is given to the varieties of fruit suitable for table use at home, and for the Philadelphia market. These include apples, pears, peaches, plums, cherries, and grapes: apples are grown in quantities sufficient to meet those demands; but the more profitable use of the land for other purposes restricts the orchards to a few acres. None are cultivated for exportation. Much care has been recently observed in selecting the most valuable varieties and in their management: proper trimming, and yearly washing the bodies and principal branches with soft-soap, mixed with a solution of saltpetre, and also the removal of the earth, 6 inches deep and three feet in diameter, from the stem of the trees, and occasionally *ploughing the soil*, is the usual and necessary treatment practised. A white worm, infesting the body at and below the surface of the ground, is the great enemy to the apple-tree. Its seat is believed to be in, and its presence owing to the wound inflicted in grafting: it generally manages, with all our care, to produce premature decay and death to the tree. The only known remedy practised is to expose the part attacked to the frosts of winter. Hogs and cattle thrive well on the fruit when green, in connection with other food; but the unlimited use by dairy-cows, in some instances, almost suspends the secretion of milk, destroys their appetite, or deprives them of the power of eating other food, and nearly paralyzes their legs and feet. Horses become fat in a very short time when permitted to range in the orchard. For winter feeding, they are very nutritious, and relished by all kinds of stock, but no experiments are known to test their comparative value with potatoes. Our locality is well adapted to the pear-tree, and by quite spirited exertions we continue to avail ourselves of the advantage. The new and choice foreign varieties have been added to our former catalogue, with a fair prospect of success: a solitary instance of the blight, with the supposed cause and remedy, will exhibit in a nutshell the result of general experience. A young pear-tree, growing in a grass-sod, near the dwelling-house, bore fruit abundantly from an early age until 1842. It was then included in a newly located garden; the grass-sod was permitted to remain some 20 feet in diameter, under the tree; until 1844, the tree continued healthy and fruitful as before; in that year, the sod was removed and the ground cultivated; one of the principal branches was blasted the same year. The following year, the tree was fruitless for the first time, and wore a general sickly appearance, with a few small blasted branches. The greater exposure of the roots to the vicissitudes of extreme heat and cold was the supposed cause, and the surface was again covered with the sod; the tree recovered slowly, and has since become healthy and very prolific; other trees near it, but not included in the garden, have continued uniformly healthy and fruitful: the soil is a rich sandy loam; the situation, a south-eastern exposure, inclined at an angle of about 5 degrees. Peaches are cultivated for market in moderate quantity, with about the usual success. The trees are uniformly attacked at an early age by the worm, in the stem at the surface of the ground. Many devices have been put in requisition as preventives: exposure of the parts to winter frosts, a bank of earth around the stem during summer and removed in winter, straw-covering for the stem, white-washing, ashes, tan, salt, lime, &c., around the stem at the roots: all, however, have alike failed to preserve the tree, beyond the sixth or seventh year. The yellows also performs a full share in the destruction, for which no remedy or palliative is known. The past 20 years have witnessed the introduction of many excellent varieties of plums, but their cultivation is discouraging; the fruit is frequently attacked when nearly full grown, by the "black rot," and perishes before maturity. This disease varies in intensity in different seasons, but comparatively few escape at any time. The injury inflicted by an insect on the branches has almost annihilated it in many localities. Some 12 years since, the writer was surprised by a few of the unsightly blotches on his young trees, but strict vigilance in removing them on their first appearance during 2 or 3 years was sufficient to destroy them; none have since appeared, notwithstanding at the distance of one-third of a mile many trees continue to be disfigured by them. Cherries are numbered among the valuable fruits that flourish in this county with complete success, and almost without an enemy. Many of the most excellent varieties known have been introduced, and succeed to entire satisfaction in situations elevated 80 feet or more above the creek valleys: cherries are also, in common with pears, found to succeed best where the earth near and under the trees is permitted to remain uncultivated. Grapes, suitable for table use, have within the last 20 years obtained a place in almost every garden in the county: some of the more delicate varieties are cultivated under glass, but generally those more hardy and native to our climate are preferred: among which the Catawba, Isabella, and Schuylkill are the favorites. These, when the season is moderately dry, ripen satisfactorily; when otherwise, they scarcely arrive at maturity before being overtaken by early frost; this was especially the case the present year, (1850.) All kinds also suffered seriously from the rot: the Catawba least, and the Isabella to the greatest extent here, as elsewhere. We perceive no remedy is known, and fears are entertained, from its progressive increase, that at no distant time we shall be deprived of the enjoyment of this delicious fruit. Its appearance has not been noticed in the wild-grapes in the forest, and a few choice kinds transplanted into our gardens, though greatly improved, have thus far escaped. No wine, except for family use, is made in the county. The preceding includes all articles of field-culture with us, and the processes, application of manures, &c., in general practice. But few particular instances have been given, for the reason that in the anxiety to make the most profitable use of every discovery or improvement, they are, when established, at once adopted into our system, and their influence mingled in producing the results given under the foregoing heads respectively.

MANURES.

The improvement of the soil is progressing by every practicable means throughout the eastern counties of this State. In this county it is, beyond all other considerations, the leading object of the agriculturist. Every fertilizing agent in reach is put in requisition for that ultimate purpose; lime, plaster, bone-dust, poudrette, and guano, are each, to a greater or less extent, drawn upon as aids to the large quantities of domestic manures made at our barns, stables, hog-pens, &c. Lime is used indiscriminately on all kinds of soil in this county, with decided advantage; nearly the whole of our arable land has been treated within the last 25 years, with liberal dressings of from 50 to 100 bushels per acre, and much of it repeatedly. The form of applying it is merely to slake and spread it as nearly uniform as possible over the surface, either of sod or broken ground, at any season of the year, or in any quantity desired. In every instance its effects are immediate, decided, and permanent. The opinion has many advocates, that, while it continues in the forms of caustic and hydrate, its energies are much more active as a fertilizer, than after its return to that of a carbonate; hence, that dressings of 30 to 40 bushels per acre, repeated periodically at the end of 8 or 10 years, are preferable to a larger quantity at longer periods. Plaster is used extensively as a top-dressing on grass grounds, in quantity from 1 to 2 bushels per acre. Its advantages on clay soils are not so decidedly marked as on others. The benefit received by all the grasses, and particularly clover, is at once evident after copious rain, and is continued, at least to the fourth year. An increase of one-third in the quantity of clover, and a fourth in that of the native grasses, together with earlier and later vegetation, and their uniform deep-green color, are the common proofs of its value on the sandy and gravelly loams of this county. It is also used extensively on the young plants of Indian corn, but by many its benefit in this case is doubted. Bone-dust and poudrette have also been used to some extent, the former with entirely satisfactory results: spread over or mixed with the soil in the course of cultivation, the benefit received from it is immediate and lasting. Their use, however, has been checked by the recent introduction of guano, which, from the high character it has already acquired as a fertilizer of the soil in every form and under all conditions, promises fair to withdraw attention from these, if, indeed, it shall not materially diminish the usual exertions in accumulating the ordinary stock of domestic manure. It is probably too early to pronounce definitely upon its relative value, in comparison with the mineral and vegetable resources thus far relied upon, and which have changed many large districts of our previously exhausted Atlantic border to a highly productive condition, within the recollection and under the persevering industry of the present generation. But that it will form an important epoch in our agricultural history, the brief experience already had leaves no room to doubt. The most judicious form and mode of applying it are yet the subject of experiment, and opinion is not yet established on this interesting point. The volatility of its fertilizing properties has, however, suggested the necessity of mixing or covering *at once* with the soil, and this is the present practice. To secure uniformity in spreading, it is previously pulverized finely, and mixed in any proportion with plaster, fine earth, &c., and spread with the hand; plaster is preferred by many under the impression that a portion of the volatile salt becomes thus fixed and secured from loss, while it is otherwise well suited to the purpose. Plaster, in the proportion of 1 peck to the bushel of guano is generally used; some experiments go to show that *ashes* wholly neutralize its volatile qualities, and that lime does so partially. On corn, oats, wheat, turnips, potatoes, carrots, and the succeeding grass crops, its effect is immediate and highly satisfactory. On all our soils, and particularly on thin and those exhausted by long cropping, its productive energy, when used to the extent of 300 to 500 pounds per acre, is equal to a heavy dressing of stable manure. Its use is increasing rapidly, notwithstanding the price has advanced 50 per cent. since its first introduction. The importance of securing the largest possible quantity of domestic manure, as the most reliable source of agricultural prosperity, is

well understood here, and every convenient means is resorted to, to effect it: all refuse vegetable matter is collected and deposited in the cattle-yards and hog-pens; earth from ditches, hedges, &c. is frequently used to pave the yards, stables, and pens, where it remains through the winter, to absorb the urine and other valuable liquids. The corn roots with the earth adhering to them, after the removal of the corn crop, are in many instances used for the same purpose. The whole of these, when the manure in the yards is turned and heaped in the following spring, are mixed with it, and form a covering to protect it from exposure to the weather, and to imbibe the volatile matter thrown out in the process of fermentation, and thus acquire a value equal to the vegetable matter with which they had been associated. The manure heaps thus protected remain until fermentation has ceased, and until the land intended for a wheat crop is prepared to receive it. When convenient, the manure is kept under sheds or other shelter, and is esteemed one-third more valuable than if exposed to the weather.

METEOROLOGY.

The state of the weather, throughout the year 1850, has been the most favorable, in this region, for the agricultural interests, within our recollection. The quantity of rain was abundant, and distributed in suitable quantity and time for every growing crop, except potatoes, which are believed to have suffered from the excess. Under the influence of abundant moisture, accompanied by high temperature and unusual electric disturbance, vegetation was impelled to an extent rarely witnessed, if indeed it has ever been exceeded; a brief suspension of rains occurred very opportunely at harvest and seeding-time, but was not productive of serious check to vegetation, owing to the large quantity of moisture previously collected in the soil. The violent storm on the 19th of July almost entirely prostrated the oats and corn crops. The former partially, and the latter satisfactorily recovered from its effects, without serious loss, except additional expense in harvesting the oats. The loss of life and property occasioned by the lightning was large beyond precedent, and its frequency and severity without a parallel. The months of October and November were mild and comparatively dry, and the farmer was enabled to close his out-door operations in good season, without obstruction from frost or wet.

The accompanying table has been prepared from the meteorological journal kept for our Institution, and is believed to conform to your "suggestions," and may embrace all that is interesting to the agriculturist.

Meteorological Table for 1850, *at North Latitude* 39° 55′ 18″, *Longitude* 1° 36′ 10″ *East from Washington City.—Elevated* 175 *feet above tide-level.*

1850	Mean monthly Temperature by Fahrenheit. Thermometer changed every observation, to avoid reflected heat, at the following hours, daily. Sunrise. °	9 A. M. °	12 M. °	3 P. M. °	Sunset. °	9 P. M. °	Highest. °	Lowest. °	Range. °	Monthly mean temperature at 6 observations daily. °	Atmospheric Pressure. Monthly mean of Barometer.	Highest Ascent.	Lowest Descent.	Range.	Number of Days. Cloudy weather prevailed on.	Thunder and lightning on.	Aurora borealis.	Rain fell on.	Snow fell on.	Inches of rain and melted snow.	Prevailing Winds during the greatest number of hours in each day. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.	Calm.
Jan.	29.85	34.29	39.25	39.	35.84	34.19	58	9	49	35.32	30.11	30.57	29.47	1.10	22		4	11	6	4.52	5	3	11	3		1		7	1
Feb.	29.68	35.	40.32	42.10	36.36	30.61	58	11	47	35.81	29.97	30.73	29.18	1.55	12	1	1	7		4.14	7	2	4	3	2	5	1	4	
March	31.58	38.16	42.51	42.76	40.90	36.20	67	17	50	38.68	29.95	30.40	29.16	1.24	15		6	14	6	4.47	12	3	8	2	2			4	
April	37.30	46.58	52.48	53.10	47.	42.86	73	26	47	46.58	29.98	30.81	29.80	1.01	19	1	2	11	2	2.69	6	3	3	3	4	3	4	4	
May	47.	58.67	63.	62.61	56.22	53.	80	31	49	56.75	29.92	30.31	29.44	.87	15	6	2	16		5.56	6	6	3	5	1	4	3	3	
June	60.01	71.40	78.82	79.38	62.86	66.71	88	46	42	69.79	30.06	30.37	29.70	.67	12	11		9		3.47	4	3	5	3	4	3	5	3	
July	67.29	77.67	82.87	82.54	74.20	73.16	90	49	41	76.29	30.02	30.20	29.87	.33	15	9	1	11		6.29	4	2	5	7	3	2	4	4	
Aug.	68.96	70.69	76.09	77.42	67.87	67.42	87	51	36	70.62	30.02	30.30	29.50	.80	16	12		14		6.81	6	3	8	1	2	4	6	1	
Sept.	55.96	65.01	69.50	71.03	63.28	59.88	82	40	42	63.98	30.06	30.36	29.79	.57	10	6	2	9		7.57	6	2	9	1	6	5	1		
Oct.	43.16	52.74	59.10	60.83	53.70	48.29	73	24	47	52.88	29.92	30.24	29.34	.90	11	5	1	9		.97	9	3	3	2	2	4	7	1	
Nov.	40.28	45.70	50.90	52.	47.03	48.20	71	24	47	46.61	30.05	30.31	29.63	.68	16		1	8		2.65	5	5	6		3	3	5	2	
Dec.	29.96	33.51	37.84	38.	35.25	32.87	54	12	42	34.84	30.02	30.55	28.90	1.65	18			12	5	4.65	6	4	7	3	1	2	5	3	
Yearly Mean	44.62	52.47	57.72	58.27	51.76	49.	90	9		52.80	30.07			1.83	181	51	20	131	19	53.79	76	39	72	33	30	36	41	36	1

Total number in the year.

DAIRY HUSBANDRY

Engages the attention, directly and indirectly, of a large portion of our population, and the high character of the produce, and particularly of butter, in the New York, Baltimore, and Philadelphia markets, sufficiently attests not only a judicious discrimination in the choice of stock and their general management, but intimate knowledge of the most approved method in the delicate operations of its manufacture. In the selection of cows for the dairy, (almost exclusively from those driven into this county from the midland districts of this State,) preference is usually given to fair specimens of our native breeds over any pure blood or cross of imported stock. A stock thus selected, dry and comfortable shelter, a sufficiency of good hay and corn fodder, in the winter, with about 6 or 8 quarts of wheat bran, or its equivalent in corn and oat-meal per day, when in milk, free access to water, and general cleanliness, are the necessary preliminaries to a successful year's operation in the business of dairying. The usual management in a well-conducted dairy is nearly as follows, viz.:—At four or five weeks old the calves are slaughtered and the process of butter-making commences. The cows are milked in the morning and evening, and the milk strained at once into pans from 4 to 6 quarts each, and placed in a well-aired milk-house, in water, to the depth of 4 or 5 inches, at a temperature of about 52° Fahrenheit, there to remain *but* 36 *hours*, until the cream is separated. If the cream will not "ripen" in that time, the process should be accelerated by the addition of milk previously soured, to be placed in the pans previous to their receiving the new milk, that the latter shall become thickened at the end of that time, and the cream removed. If permitted to remain in contact with the milk longer than 36 hours, that peculiar sweetness and freshness which characterize Delaware county butter will almost invariably be destroyed. Great care is required in separating the cream from the milk, to prevent, if possible, even the smallest quantity of milk from passing into the cream-cans. These cans should contain about from 4 to 5 gallons, and when filled, placed in water as deep as they will stand steady, and their contents stirred twice daily. The cream should be churned at the end of three or four days at farthest, in a revolving churn, without stoppage during the process, or permitting the escape of the accumulating gas. The temperature should not vary much from 60° Fahrenheit, nor the process be completed in less than 30 or more than 60 minutes. The desired time can be very nearly attained by close attention to the temperature of the cream and to the velocity of the churn. When the butter has gathered to the size of peas, the churning should cease, the butter-milk be withdrawn, and about one-fourth the quantity of clear, cold water returned into the churn. After 3 or 4 turns, draw off the water, and return one half the quantity, as before, and repeat a few turns of the churn. Drain the water well off by a few direct and reversed motions of the churn. Add fine, clean Liverpool salt, at the rate of 11 oz. to 30 lbs. of butter, or, which is nearly equivalent, to 30 quarts of good cream put in the churn. Turn the churn 3 or 4 rounds, and reverse, and the butter will be thoroughly salted for use *while fresh*. It should remain in the churn in this condition for half an hour, that the salt may all be dissolved, when it will be ready for working and sponging. The operation of freeing it from moisture is performed by placing it, when taken from the churn, on a table with a lever attached, and pressing and turning it frequently, using a sponge covered with a cloth, to absorb the moisture, till no more appears, when it will be ready for weighing and printing in any desired form. The most material points in the manufacture of butter are, first, that, to secure the maximum quantity without injury to the quality, *the cream shall be separated from the milk at the end of 36 hours;* secondly, that the cream in the cans shall be kept at a temperature of about 52°, and stirred twice in 24 hours; thirdly, that, in the process of churning, *gas or air generated in the course of the operation shall not be permitted to escape from the churn.* It is believed to contain all the rich aroma of the cream, and by thus confining it in contact, it is imbibed by the butter while forming. In summer-feeding dairy stock, a principal object is to induce the cows to eat the largest quantity compatible with full health. This is most readily accomplished by frequent change of pasture, with free access to water and salt. The natural grasses furnish the most grateful and richest pasture, and produce the best quality of butter. Clover, as has been said, is relished by horned cattle but for a short time only, if confined to it; but when allowed to range at will in it and natural grasses together, its full value as pasture is realized. The annual production of butter per head, in our dairies, fluctuates, with the abundance or scarcity of summer pasture, from 125 to 150 lbs., and occasionally something above these numbers. The quantity produced the present year (1850) has been above the average, if not the very highest. In a few instances, above 200 lbs. have been obtained from small dairies of choice cows. These instances occur, however, under extraordinary care and cost, but may nevertheless furnish valuable hints to the dairyman. The value of fresh butter in Philadelphia market varies, during the season, from 16 to 40 cents per lb., and will average 25 cents or upwards for all qualities. The cost of butter to the producer, interlaced as it is with our entire system of agricultural operations, cannot even be approximated, and we are deterred from the attempt. No cheese is made at our dairies. The sour milk is fed to hogs, and estimated to produce 80 lbs. of pork for each cow in the dairy. The average value of calves is about $5 at 4 or 5 weeks old.

Neat Cattle.—But few of these are raised in this county. The more directly profitable application of provisions when fed to dairy cows induces a dependence for recruiting their numbers on those driven from districts in this State north and west of us, not in convenient reach of a market for fresh butter and veal. A few, however, from choice cows, are occasionally reared, and prove that our dairy stocks would be highly improved in appearance and quality if more generally resorted to. The usual practice is to permit the calves to remain with the cows until 5 weeks old, then separate them into adjoining fields, to prevent the usual fretting of both, and leave the calves to take care of themselves. Clover pasture is preferred to any other until they are 3 or 4 months old. Their value at 3 years of age, or with their second calf at their side, varies from $25 to $35, according to their promise of future profit. These limits in price will also apply to fair and good cows at the drove-yards in March, April, and May, and indeed, in limited number, at any time: dry cows of like quality command about $10 less per head than those accompanied by a young calf, or approaching that condition. We possess no data for estimating the precise value of corn in producing beef, or the comparative value of the different stocks of cattle named as feeders.

Hogs.—Various breeds of hogs have been introduced into this county, and much attention has been given to improving the stock by crossing them

in every direction. The present favorites are the result of these efforts, and inherit a liberal and perhaps barely predominating share of the "Berkshire" introduced some 15 years since. The comparatively small bone, and the disposition to take flesh and fat readily at all ages under light feeding, compensate satisfactorily for a lack of growth to a size common to some others. Their usual weight, when fat, at the age of 12 or 14 months, will average something less than 300 lbs., on the usual fare, but may, by high feeding, exceed that weight by a fourth or a third. They depend mainly on the refuse of the dairies and on pasture and nuts for their summer subsistence, until 4 or 6 weeks previously to being slaughtered, when they are fed liberally on *whole corn.* A large number of hogs are fed at our dairies wholly on sour milk, placed in pens at 4 or 5 weeks old, in March, April, and May, and kept until September and October, when they are slaughtered and sold at the Philadelphia market at from 7 to 10 cents per lb.

The foregoing embraces all the important operations to which our agricultural industry is directed, and the conditions under which it is pursued. If not too lengthy and tedious for your examination, we trust some things may be found serviceable to you in making your annual report.

Very respectfully yours, &c.

JOSEPH EDWARDS,
JOHN MILLER,
Committee of Del. County Institute of Science.

London, July 11th, 1850.

My Dear Sir:—Mr. Francis Bonynge has addressed to me a communication upon the cultivation of tea, which I transmit to you, and beg that it may be placed in the hands of some one from the South who takes interest in multiplying the productions of our soil. I believe the experiment of raising tea is now being tried in South Carolina. I sent, a few weeks since, a communication from a gentleman upon the subject of the production of the silkworm. This paper, with samples of silk, &c., was addressed to the Secretary of State. I have heard nothing from it. Will you do me the favor to ascertain whether the box containing the silk, with the papers that accompanied it, was received? It has appeared to me that silk can be produced in the United States with profit. With respect to the cultivation of tea, it would be satisfactory if some of our friends in the South would try the experiment. Will you favor me with your opinion upon the above subjects?

I am, my dear sir, most respectfully, your ob't serv't,

ABBOTT LAWRENCE.

Hon. Thomas Ewing, &c. &c. &c., *Washington.*

TEA CULTIVATION.—ASSAM, INDIA.

London, July 8th, 1850.

To His Excellency ABBOTT LAWRENCE, &c. &c.

Sir:—With reference to the subject of the interview with which you honored me a few days ago, I beg to submit the following observations on the cultivation of tea in India and China.

I have been cultivating the tea-plant, and manufacturing tea for five years in India, in a district east of Assam, called Namroop, and also in Assam itself. The tea-plant has been found in an indigenous state in the valley of Assam. Assam extends from 25° to 28° north latitude, and from 94° to 97° east of Greenwich, being within one degree of the western province of China, Yun-nan.

The valley is one of the most fertile in India, and enclosed on all sides by the Himalaya Mountains. The Great Bramapootrah, which is the united channel of the Dihing, the Dibong, and the Dihong rivers, divides the valley in its centre, which is also fed by numerous tributary streams, in its course to Goalparah, stated to be as many as 60. From the diversity of its soil and temperature of its climate, almost all European and eastern products might be raised within its circle.

TEMPERATURE.

The mean annual temperature is ....67°
The four hottest months ....80°
The colder or winter months ....57°

RAINS.

Rain commences in March, and continues until October, giving fully seven months of wet weather.

PRODUCE.

Rice, which is the food of the people. Yams are found in great abundance (uncultivated) in the jungles; some of them weigh as much as 16 pounds, and are a very good substitute for the potato. There are several kinds. The natives rear the silkworm, and weave the silk into cloth, which is the principal, I may say, their only clothing. Cotton of a superior East India kind, is produced, but only cultivated with other crops at the same time. The erea copera is a course kind of silk, from an insect reared on a plant of that name, resembling a nettle. There are stick-lac, gum, the India-rubber tree, the tea-tree, the wild coffee-plant, and the nutmeg-plant. There are salt springs, petroleum springs, and coal in abundance, all over the country. Gold-dust used formerly to be collected in the streams when slavery existed in the country.

THE INHABITANTS OF THE FOREST

Are the elephant, rhinoceros, tigers, leopards, the jungle-dog, the jackall, the elk, deer, musk-deer: the bison is found higher up to the north, and also the buffalo and wild-hog.

THE NATIVES OF ASSAM

Are, without exception, the most demoralized of all Indians, the cause of which may be almost wholly attributed to the use of opium. Until 1839, they had scarcely any idea of money: their diet is rice, sometimes boiled, but oftener simply steeped in water. They eat fish, fowl, the wild-hog, and, when killed in the chase, they eat the buffalo, rhinoceros, and elephant.

The evil consequences of the use of opium, which sometimes sells for its own weight in silver, are, that the natives are dwindling away. An opium-eater is not long-lived, and his life is one continuous scene of misery. He is a thin, emaciated being, has no energy, no care for aught but to procure opium; if he cannot get it, he casts himself on the ground, rolls about in the most gloomy horrors, crying, in a heart-rending voice, "Khane ne! Khane ne!" "There is no opium." In this state he would sell his nearest kin for this honored drug; he would freely part with wife or child, if he had a child, which seldom the opium-eater has, for it destroys the generative powers, and there are seldom more than one or two children in any family, and sometimes whole villages of women are to be found with scarcely a man. I have been somewhat out of the latitude of my subject, in thus bringing the valley of Assam immediately under your Excellency's observation, as the indigenous locality of tea in India.

SOIL FIT FOR TEA.

A reddish loose soil, in which ochre is pretty abundant.

Localities.—Table-lands and around the bases of hills are best. Lands which are low and on which water rests, such as paddy lands, or slightly elevated lands among paddy grounds, being always cold and wet, are unfit for tea. High table-lands, which are of dry and stiff soil, sides of mountains, after a moderate elevation, are also very unsuited, and the produce will not pay for the cultivation. However, the plant will grow in all the above places. Moisture is very necessary for the plant; that is, such moisture as will pass away and not keep the ground cold. In Assam, there are seven months of rainy weather, and therefore irrigation is unnecessary. On the Kamaon hills, where the government of India are carrying on tea-planting, no success will or can attend the speculation. There are three years of irrigation required, and the plant takes, consequently, seven to eight years to arrive at its full yield, and even then the produce is very poor with regard to quantity, though in quality it may be superior.

The plant in Assam arrives at its full yield in four or five years, and will with care continue in a healthy state for 20 years, and there is no irrigation required because of the long duration of the rains. There are, however, in March, only a few necessary showers, and April is not what may be called a wet month. The rains are heavy in June, July, and August, and wear away by the end of September.

PRODUCE OF THE PLANT, AND AGE.

The plant is raised from seeds. Plants might be raised from slips also, but it would not answer beyond the mere fact of an experiment. Tea-seeds being sown in December, the plants therefrom could be transplanted during the following rains; that is, from June to the end of the year. The plant should be transplanted before it is two years old.

Seeds may be sown in November, December, and January. The young plants should be planted the following September, October, and November —this would be the first year. A few leaves ought to be taken off the young plant the second year. Thus, it will yield about 40 lbs. per acre on the third year. On the fourth year, the produce per acre would be about 150 lbs. On the fifth year, the produce should, in a rich soil, be 320 lbs. per acre of 43,560 square feet, *and so continue for at least* 20 *years*.

In the following *estimate*, I have made the second year the first, because the expense of putting the seeds into the ground is little or nothing. The estimate is made out of what the cultivation of 1000 poorahs, or 1250 acres, of land, and the manufacture of tea thereon, would cost for four years, with the probable return in Assam, India.

ESTIMATE OF EXPENSES AND RETURNS ON A CULTIVATION OF 1250 ACRES, OF 43,560 SQUARE FEET EACH.

First Year, that is, the year of transplanting, say from Nov. to Nov.:	
1 superintendent, at £600 per annum	£600
1 first class assistant, at £300 per annum	300
1 second " " at £180 " "	180
Clearing 1250 acres, transplanting, and keeping clear for the year	975
Elephants and horses	120
Buildings, tools, &c.	400
Total	£2575
Second Year:	
European superintendence, and native head establishment, &c.	£1440
Weeding and hoeing	475
Manufacturing, say 40 lbs. of tea per acre, 50,000 lbs.	500
Chests, packing, and transit to Calcutta, 1200 miles	200
Total	£2615
Third Year:	
European and native establishment, elephants, &c.	£1740
Hoeing and weeding	470
Manufacturing, say 200,000 lbs. of tea	150
Chests, packing, and transit to Calcutta	1000
Total	£3360
Fourth Year:	
European and native head establishment, elephants, &c.	£1800
Hoeing, weeding, &c.	470
Manufacturing, say 360,000 lbs. of tea	1575
Chests, packing, and transit to Calcutta	1800
Total	£5645

Produce first year, none of any consequence.	
" second year, 40 lbs. per acre, say	50,000 lbs.
" third year, 160 " " " "	200,000 "
" fourth year, 300 " " " "	375,000 "

It will be observed that the clearing of 1250 acres, transplanting, and keeping clear for the year, is put down at £975. This is what it would cost in Assam. This item in America would probably vary very much—but of this your excellency will be the best able to judge.

Wages in Assam, as herein estimated, are about seven shillings a month, without food or any other allowance. There will be a very material difference, therefore, if we calculate the amount of American hire of labor by that of Assam: but other matters must be also well weighed, viz. the amount of work an American laborer will do, and that an Assamee will perform.

I see the cost of hoeing an acre of land 12 inches deep, under the Fermoy Farming Society—the laborer earning 1*s.* 2*d.* per diem—is stated to be 13*s.* 4*d.*; however, one-third of the labor would not be necessary for land, to fit it for the tea-plant.

There is another consideration: miserably poor and indolent as the Assam laborer is, he is also dishonest, and, without constant supervision, will not work at all. Hence, there is about £1600 of the £5645 for such supervision, or about 29 per cent. This would be greatly reduced in America, —if we also take into consideration the intelligence and energy of the Americans, and the probability there would be of all the rolling being performed by machinery.

In the estimate I have given, I have only made the Assam laborer work about 5 hours per diem, and that in such a manner as he does work.

Your excellency will see, by this estimate, that the expense, when the tea-plant is in full produce—that is, the fourth year after transplanting—of cultivating the soil and manufacturing the tea, packages, and packing, and transit by the rude country-boats of India, 1200 miles on the Bramapootrah, is about three-pence farthing (3¼*d.*) the pound.

Taking the above considerations together, as well as the cheapness of timber in America, and the little expense at which it may be cut up by the sawmill, I have no doubt the American tea should not cost more than what it has been made to appear in my estimate for Assam. Even admitting that it cost one penny a pound more, which would be a great deal, still I suppose you cannot have your teas at the ship-side, at Canton, for less than one shilling per pound: I mean, of course, the average. You take a far superior tea from the Chinese to the English, and the average of English teas, being some 40 millions of the inferior black kinds, and 13 millions of green and superior black, was, in 1848, at the ship-side in Canton, one shilling per pound.

TEA CULTURE IN CHINA.

Having made, for your excellency's consideration, these brief remarks on the expense of cultivation, I will now proceed with a brief notice of the tea localities of China, in the following order:

1*st*. Temperature.
2*d*. Soil.
3*d*. Geographical position.
4*th*. Whether, if the cultivation diverge from that position, the tea will be of good quality, and profitable for commercial purposes.

Temperature.—Mr. Bell, in his book on the tea cultivation in China, says, a temperature of a mean annual of 62° to 67° is the best. From my experience, I can state that tea will not produce, or rather will not be productive, so as to pay for labor, under excess of heat or cold.

The temperature of Jogan, in the Tokeen provinces, N. lat. 27° 4′, nearly agrees with that of Assam with regard to cold—the heat being somewhat greater, viz.:

		Assam.
Mean annual	70°	67°
Four hottest months	82° 15′	80°
" coldest "	57°	57°

Mr. Bell states, "The Bohea country, in Tokeen, lat. 27°, differs little from the Hyson-green districts in point of temperature. The tea-men," he says, "describe the fall of snow, as well as the thickness of the ice, as somewhat less, and the cold generally less severe; that it is a mountainous district, with sheltered valleys, fenced and protected from the cold north-easterly and north-westerly winds by the lofty and continuous range of mountains which forms the barrier between this province and those of Che-Keang and Keangse."

"In the green-tea districts, lat. 29° 58′, the leaves," says Mr. Bell, "of the first gathering were injured by the frost and snow which had fallen in April of 1809."

Shanghae, which is about 90 geographical miles to the north of the green-tea district, that is, N. lat. 31° 20′, must evidently be too unfavorable for the economical cultivation of the tea-plant for commercial purposes, although, for domestic use, it may be cultivated in sheltered places. Mr. Fortune states that, in July, the thermometer stood, in the shade, at 100°. This is 6 degrees of heat greater than that of Calcutta; and the sun of Bengal is too powerful for the tea-plant. Mr. Fortune further adds, that the thermometer was as low as 26° in 1844–45, and that the remains of the cotton and other tropical plants were destroyed by the frost; and that the Chinese asserted that the year was a mild one—"therefore," says Mr. F., "I have little doubt that in the worst years the thermometer may be found at 20° below freezing-point, or at 12° Fahrenheit, and perhaps lower."

At Pekin, N. lat., Mr. Bell saw the plants in a garden, as big as a currant-bush, unproductive, and kept as curiosities. Therefore, I should say that, from Shanghae northwards, tea would not answer for commercial purposes. Again, if we go down to N. lat. of Amoy, 24° 30′, and Quangton, 30°, it is well known that the leaves are very inferior. Mr. Bell says the Amoy (Ankoy) teas are very inferior, and those of the province of Quangton of still greater inferiority.

I would observe, therefore, that China cannot very materially increase the exports of tea, and that the country, being subject to greater degrees of heat and cold than any other kingdom under the same latitude, would be less suitable than many countries in which it has never been thought of.

Soil.—It has been supposed that the Chinese bring their barren mountains and hills under cultivation. They may do so; but they can never make barren or sterile mountains or any unfavorable soil bear productive tea-trees. It is a physical impossibility for the tea-plant to be productive in any other than a rich, deep soil. Hill plants, but not barren hill plants, may produce a small quantity of a fine description of tea, but it will be at a heavy expense.

The plant has but a single root, which grows directly downwards, and, if any article opposes its direction, it remains dwarfish and sterile, or otherwise it dies. I have taken up a tea-tree some 40 feet high, and its branches extending over a space of some sixteen feet in diameter: its root was about 3 feet 9 inches in length, with a few straggling fibres growing out from the main one.

The Catholic missionaries replied to some inquiries made of them, (these missionaries, and they only, make their way into the interior of China,) that "the soil should consist of a vegetable mould, sprinkled with sand, light and loose, and rather moist." And again, "the tea may be planted either in a rich or a poor soil, sandy or garden-soil, but that which is moist is most suitable, and the eastern aspect the best; but garden grounds and the embankments of gardens and fields are the most favorable."

Gutzlaff says: "Tea grows on the most sterile grounds, on the sunny ridges of hills, principally between north latitude 25° and 30°, in the province of Tokeen, Che Keang, and Keang-see, and almost all over the Chinese empire. Like the vine, the quality of its leaves depends very much on its soil. It grows in the most barren soil, but the leaves are coarse and unfit for use."

Mr. Fortune states that "the soil in the tea districts is of course richer in the northern provinces than in Quang-tong. In Tokeen and Che Keang it is a rich sandy loam." "Tea-shrubs will not succeed well unless they have rich soil to grow in."

What is the geographical position?—Mr. Bell states that "it has been observed that the Chinese universally agree, from remote antiquity to the present time, that only the Bohea Mountains produce the highest-flavored black tea. They moreover affirm that it is only in the central division of these mountains, which are known to the Chinese by the appellation of Vuy-shan, (inner mountains,) where the highest-flavored teas are produced; and that the teas deteriorate in quality, till, in some of the remote districts, the leaves are thin and poor, have no fragrance or sweetness in infusion, and no labor can make them good." And, "the Ankoy teas, grown in the vicinity of Amoy, 24° 30′, are for the most part inferior; and the Honan and Waping teas, of Quang-ton, may be given as examples of still greater inferiority. The vast inferiority of the flavor of Twankoy tea, the product of the green-tea hills, (with little or no attention paid to its culture,) to that of the Hyson, of the highly cultivated plant of the plains, would be apparent and interesting to any one disposed to try the experiment." Also: "The towns which extend 70 ly (23 miles) from Vu-ye Shang, are called Py-keen-tien, Cza Ty, Tang-moa-kown, Nan-nang, &c. &c: the leaves are thin and small, and of no substance; and whether green or black, or made with much care, yet they have no fragrance. Tea is also produced as far as Yew-ping Shang, Gen Nong, Kien Yang, Hew Shang, and other places, but is unfit for use."

"The extent," says Gutzlaff, "that produces the best Bohea, is no more than 40 ly, or 12 miles, in circumference. The total of the tea-plantations, as taken from official statistics, are 500,273, which may be set down as varying from a few perches up to a few acres."

Whether, if the tea-plant cultivation diverge from certain localities, the tea will be of a good quality?—The latitudes for the tea cultivation in China are 27°, 28°, 29°, and 30°, and probably extend from the east to the west of China along these latitudes, over through the Singphoo country, Kooking, and Assam. I have never heard of it being discovered on the west side of the Burampotree or Bramapotree, in an indigenous state. But I cannot conceive that there is any obstacle against it being extended far to the west, through these latitudes, until the hot winds of Hindostan would interfere with its progress.

Valleys seem to be the favorite places in the east, being protected from the great extremes of temperature, and from the clouds being driven into the valleys and retained there by the contrary winds entering into them from the different breaks in the amphitheatre of mountains around, causing a greater and more incessant fall of rain. However, as already stated, China is subject to greater extremes of heat and cold than any other country, perhaps, in the world, placed in the same parallels of latitude; and therefore must be less suitable than more temperate climates for the production of this plant.

From the 31st degree of north latitude, northwards, the winter is too severe, as well as the heat of summer too intense, for the profitable cultivation of tea. Even in the green-tea district, lat. 29° 58′, the trees have to be bound round with straw to protect them from frost and snow. And, again, if we go down to the 24th deg. of N. lat., we find the teas of (Amoy) Ankoy very inferior, and those of Quang-ton, (Canton,) N. lat. 23°, of still greater inferiority; and also, that "tea deteriorates in quality, as the plantations diverge from the Bohea hills, till, in some of the most remote districts, the leaves are thin and poor, and have no fragrance or sweetness in infusion, and that no labor can make them good."—*Ball.*

"Teas of the neighborhood of Canton—the quality is such that no process of manufacture would render them suitable for the British market."—*Mr. T. A. Gibbs, evidence before the British parliamentary committee.*

"The tea viridis," says Mr. Fortune, in writing on Chusan, "is cultivated everywhere, but, if we except a small quantity sent over to the mainland, the whole is used by themselves. Every small farmer and cottager has a few plants on his premises, which he rears with considerable care, but seems to have no wish to enter into its cultivation on a larger scale. Indeed, it is questionable whether it would answer, as the soil is scarcely rich enough; and although the shrub grows pretty well, it is far from being as luxuriant as in the large districts of the mainland." Chusan is in N. lat. 30°. Thus we see, whether the exportation of tea be at Canton, some 1000 miles from the Bohea district, of a very difficult inland transit, or at Shanghae, or by caravans to the north and north-west, that the export, in these different directions, to Great Britain and America, and to Russia, Lama, &c., is supplied from the 28th, 29th, and 30th degrees of north latitude.

ITS INTRODUCTION INTO AMERICA.

I have so far entered into this subject to show your excellency not only the conditions of soil and temperature necessary, but also what ought to be avoided. Superficial observers of the tea-plant suppose, because the plant is to be found over nearly the entire extent of China, that therefore it will be productive everywhere. Such statements ought to be carefully guarded against.

What has defeated its successful cultivation in India? Erroneous ideas, coupled with a discouraging government.

Therefore, such should be carefully avoided, in introducing tea into America. A first failure would probably throw it back for a series of years, and this would be a serious loss. Taking into consideration the mighty extent of America, its great and commanding position, its tremendous strides towards being not only one of the greatest nations on the globe, but one of the richest, most populous and considerable of the five divisions of our earth,

I have no doubt, nor can there be any doubt, that there is a vast field in America for the cultivation of tea, coffee, indigo, &c.

Should your government undertake to introduce it, I beg to offer you my humble services. The cost would be but trifling, and the great requirement of America for this object is, that its government do get up gardens for the growth of tea-seeds. This necessary step toward this important object is easy, and requires, as I have already stated, little outlay. I feel an earnest wish that your excellency consider this paper attentively, and that your excellency would, immediately, and without waiting for reference to your government, take on yourself to forward this cultivation in America; because, by your delaying for a reply from Washington, the years 1850 and 1851 will be lost; and the *onus* of your acting on the suggestion which I would, if these papers meet your excellency's approval, offer you for your guidance, would not be as much as £100, probably not £50; and you would, for this sum, have some value for the money, in case your excellency's government declined taking up the subject as a government matter. Therefore, leaving these considerations for your excellency's minute and grave reflection, I will beg, as you have been graciously pleased to direct me, to give you a slight account of myself.

I am one who, as many of the children of the fair Emerald Island, had to seek a livelihood in a far distant land. I left, seventeen years ago, the domestic fireside of my foster-father, in the Town's lands of Ballentuber, four miles from Ballemahon, in the county of Longford, and proceeded to Dublin. After being placed under the Rev. Mr. Barrows, to get some little education, in addition to the very little I had, I was sent out, in April, 1835, in the bark Enmore, of Liverpool, commanded by Lieutenant Swanson, R. N., a connection of my mother. I was nearly wrecked off Liverpool, and ultimately arrived at Madras, in August, 1835. From Madras, I proceeded to Calcutta, where, after a stay of three weeks, I was put into a boat on the Ganges, to proceed upwards of 1200 miles, with native servants and native crew. Rustic as I was, I had greater disadvantages still to contend with. It was the first time I had ever been thrown on my own resources, and for the first time, too, I found myself alone, to deal with men of whose language I did not understand one word—nor did they of mine. However, what I could not make them understand by signs, I had to do myself; and by the time two months and 16 days had passed, when we reached Turackabad, on the Doab, I could explain some of my ideas to them.

In the districts of Turackabad, or Tully Ghen, about 90 miles above Cowanpoore, I remained till the end of 1839, engaged in making indigo and manufacturing saltpetre. I then returned to Calcutta, and was induced to proceed to Assam, to enter into tea-plant cultivation. I got some 8 or 10 acres of land, down in Assam, and was quietly proceeding in my labors to do the best I could in that wild, depopulated region.

Government, the Honorable East India Company, had military possession of Namroop, to the east of Assam Proper, and was desirous to take actual possession of it; and, with this view, induced a native chief to work some tea-lands on government advances, and undertook, through its own superintendent, to cultivate other lands, called Koojoo. The superintendent was not a very active man, and failed. Government then applied to the Assam Tea Company to take up the cultivation of the land, proposing to them to build a brick building for the military guard at Koojoo. The Assam Tea Company declined, whereupon the government did a second time propose to that body to cultivate the lands, waiving the above request. The company again declined. Government then induced me to cultivate the lands, and verbally promised me the protection and the good-will of government, and directed me to put in an application as usual for the lands, in a written reply to which they stated that I would get a lease of the lands as soon as surveyed, and that there was a guard to protect the place. For the space of four years, the government permitted me, in every confidence in its sincerity and good faith, to cultivate the lands; but, after these four years, withdrew the guard, which, a few months prior, I was given to understand, by the governor-general's agent, would not be removed, and without giving me any notice whatever of the removal. Within the then five years, these Tartars had twice rebelled against government, and only a few months before was the last rebellion put down; and at the time of depriving me, unprepared, of the protection of the guard, the chiefs around me were in irons in their powder-magazine of Debroo Ghen. I was thus exposed to a savage, infuriated people, attacked at midnight, and escaped through a most miraculous incident. The Tartars got into the verandah of the house before I saw them—in fact, it was only that instant that I providentially awoke. When I saw them, I started out of bed, and cried out to the two men who should have been watching at the door, but who, unfortunately, went to sleep. They were instantly cut down, and a rush made at my bed. I met the party with the discharge of one of the barrels of my gun, one of whom, receiving its contents, fell into the bed, and, in the dark, was cut in pieces, under the supposition that it was me. While this was going on, I was standing on the other side of the bed, considering what was to be done; but finding some of the party was coming round in my direction, I laid the gun, which was heavily loaded with three pistol-balls and shot, across the bed, and fired a second time into the party, who, terrified, rushed out of the house—except the man on the bed and two more, who then fell—but placed a guard at the door to prevent my exit. The table on which I kept my ammunition was upset, my Tartar swords had been carried off, and there was nothing left for me but to escape. The house was a mat-house, and I got out over the matted wall and clung to the roof until the party, who were on the same side of the house, looking for a light, passed round to the front, when I dropped down, and wandered that night and the following day, pursued by these savages; and at last, faint from loss of blood by the leeches, and suffering from enlargement of spleen and intermittent fever, I reached a guard-house some 16 miles distant. Government refused me any compensation or amends whatever, and told me there would be no guard placed at Koojoo again; nor would they fulfil their promise to me to give me a lease of the lands. The consequence was, I lost, of £5,000 outlaid, £3,000 and my five years' time. And the reprehensible and unmanly falsehoods were put forward by the local authorities, with which the whole body of the government has identified itself, that I irritated these people to attack me by beating them and not paying them their wages. When I showed them that throughout Assam wages were paid in advance, then they told me that I beat them and pleased them afterwards. These are the verbal statements to me by Mr. Shepherd, the chairman, a month ago. I have applied to get these charges made openly, and in writing; and, as yet, government has not replied to my application. Thus it is, that, under plea of ill-treatment of a third party, they violate their written and verbal engagements to me.

Under these circumstances, I am placed in a painful position—for Mr. Shepherd and his co-directors, having the full consciousness of the wrong that has been done me, instead of dealing openly with the matter, throw every obstacle in my way:—first, they oblige me to send my papers out to India, after retaining them two months in Leadenhall street; then, when they come home, they keep them two months more before they give me a reply; then they make the above statements, and, when I wish to have them in writing, keep silent for another two months, and, lest I should trouble them again on the subject, refuse me my documents, which they had twice directed me to call for, and twice declined to give up—and then come out with the statement that they were left in Bengal. After much difficulty, I could get only unattested copies—copies pretended to have been received from Bengal; but which had not even the usual signature of the clerk who copied, nor that of the head of the office in which they were stated to be copied.

Under these circumstances, I may well turn my thoughts to your land of liberty, and, like my countrymen, seek an asylum and a home in its bosom; and, for this purpose, I trust I may meet your kind offices, for which I will feel duly grateful.

I beg here to copy a few extracts from a letter of the governor-general's agent on the east frontier, dated,

"*On the River*, 24*th July*, 1849.

"*To* Frank Bonynge, Esq.

"*Dear Sir*:—I was favored with your note of the 11th, from Kedgeree, last evening, and, in reply, I have simply to say, that I was not aware of any thing like a feeling on my part to keep you out of any tract you could fairly be put in possession of; and you will have found, the moment I knew the Assam Company were willing to resign the plantations you wished for, I immediately wrote you to that effect.

"You may remember that I took much interest in your first commencement of operations, and was willing to assist you to the best of my power, and have never ceased to regret the circumstances which caused you to retire from manufacturing; as it always appeared to me, that of all the persons who have embarked in these speculations, you were the most likely to succeed, and to do justice to our indigenous tea and capabilities of raising China tea, by your untiring activity and the ability and zeal in the cause which you evidently had evinced. * * * *

"I am, dear Sir, faithfully yours,

"FRAS. JENKINS."

I will, with your permission, submit to you a copy of a letter I am now about to draw up, on my case, to the East India Company Directors, so that your excellency may know my case the better, and clearly understand my position. I have the honor to be, Sir,

Your excellency's most humble and obedient servant,

FRANK BONYNGE.

Litchfield, Conn., December, 1850.

Sir:—In reply to a few of the inquiries in the circular issued from the United States Patent Office, under date of August 26th, 1850, (one of which I have received per mail,) I have only given my own opinion, or estimate, without consulting with the farmers in other sections of this town. I know not how extensively the above-named circular has been distributed among them, or how extensively such or similar inquiries have been answered and published in former reports, as I have had only the one for 1848; but, in that, I observe very few statements either of the farming or mechanical interests of this State.

CORN.

The varieties most esteemed in this section are the eight-rowed yellow flint, and white flint, as they are earlier and less liable to be injured by frost. I think the average product per acre to be about 40 bushels. Some extra fields go as high as 80 or 90. The average cost of production per bushel is probably *more* than 50 cents. The practice has formerly been to plough the land in ridges, by turning two furrows together, and plant on the ridges, about 3 feet apart, and 4 or 5 kernels in a hill; but the system of clean ploughing is now practised a great deal, and to advantage. We hoe our corn but twice, although a third hoeing would be highly beneficial; but then our haying is upon us, and must be attended to.

The best method of feeding corn, decidedly, is to grind it. If for beef, ground with the cob, and fed dry; if for pork, shelled and mixed with about one-third as much other grain, and scalded.

OATS.

I think the average yield of our oat crop is something less than corn. Three bushels are usually sown on an acre of land. Oats, mixed with corn, for hog-feed, are coming into favor very much, as the animals like it better than clear cornmeal, and will fatten faster, fed with it.

CATTLE.

The cost of rearing neat cattle till three years old may be put down as follows:—1st year, $7; 2d year, the same, as they will live on coarser fodder; and, the 3d year, at about $9; making $23 at three years old, which is as much as ordinary animals will sell for at that age. But those heifers which promise fair for cows will bring from $25 to $30, and fairly matched steers, $60 or $80 a pair. Extraordinary steers, sometimes $100 or $120 a yoke, at that age.

Cows for the dairy average about $30 in the spring, and $18 to $20 in the fall of the year.

FATTENING PORK.

The cheapest method, in this section, where grain is comparatively high, is, I think, to take spring pigs and feed them with the slops of the dairy, with a little provender mixed in, until September; then, in addition, boil the refuse potatoes and apples together, and feed for 6 or 8 weeks; afterwards for a few weeks, with provender scalded.

Weight.—275 or 300 lbs. of pork, is a fair weight of a pig of 9 or 10 months old, but one cwt. added to that, is no uncommon occurrence.

The comparative value of apples with potatoes, when fed as above, is, perhaps,—one bushel of apples boiled with two of potatoes is worth as much as three bushels of potatoes, although *not* worth as much when fed alone.

With respect,

CYRUS CATLIN.

Hon. Commissioner of Patents.

Louisville, Kentucky, December, 1850.

Sir:—Having by request prepared the accompanying meteorological table for insertion in several publications about to be issued, I have sent you a copy, although the tables embrace more than would seem to constitute a proper answer to the inquiries propounded in your circular. It will be an easy matter to glean out what may be deemed useful for your report, and reject the balance.

It is gratifying to the lovers of accurate knowledge to witness with what rapidity the science of meteorology is winning the confidence and favor of the agriculturist. But as the number of co-laborers in the field of exploration is yet quite too limited, I shall perhaps best subserve your wishes by confining my few remarks to details suggestive of the advantages which may be expected to accrue to the arts of husbandry, pomology, and horticulture, by calling in this science to their aid. In horticulture, what may be considered the greatest triumph of the present, if not of any age, is the successful growing in northern Europe of the new water-lily, a gigantic native of the equator, one single leaf of which measures more square inches than a farmer's dining-table, and which said single leaf contains airducts and vesicles enough to displace more than 20 gallons of water—thus enabling it to buoy up the weight of a man. But this triumph has been won by a meteorological analysis of the conditions with which this lily is surrounded in its natural habitat, and a copying of the same in its new abode, not even omitting in the waters of its new home the almost scalding temperature and whirling motion of that leviathan of rivers, the Amazon, in whose broad waters this remarkable plant delights to dwell.

In agriculture, there are many plants grown that are exotics, that are introduced either from the north or from the south, and that will mature best as grown in the colder or warmer portions of the growing-season; indeed, I think there are very few, that fully answer the farmer's wishes, planted without regard to this fitness of season. It is true, we cannot now follow all these plants to their native wilds, in order to ascertain how much of water and how much of heat best promote their thrift. But, by the aid of a series of well-conducted meteorological observations and the simultaneous thrift of cultivated plants, nearly the same ends are accomplished. There is no fact plainer than the truth that this knowledge is desirable. The true inquiry is, do we possess it? I think not; and I will refer to the culture of a single article, both to prove a want of this knowledge and the agency of meteorology in leading us to truth. The article referred to is the sweet-potato. I think, in the neighbourhood of Louisville a great deal of labour is thrown away by anticipating the season for planting this esculent—by forcing it into the open air before the mean temperature has risen to summer heat, the plants remaining stationary or dying, and weeds taking possession of the ground; thus giving occasion for at least one hoeing more than a later transplanting would require. This opinion is founded upon the following facts: that is to say, I have grown the potato for market for some 20 years, and I think the planting this season may be said to range between the middle and last of May, sometimes a little sooner or later. Once only in that time have I known the sweet-potato to do well planted in the open air before the first of May. Again, it has been a practice, in my family, to give the sets in the hot-beds too small for use at the general planting, to the servants, for their patches or family gardens. It has been again and again remarked, during this 20 years experience, that these very late plants, in the family-gardens of the servants, have secured a better "*stand*" —a more uniform growth—and, when the cultivation has been good, a yield nearly, if not quite, equal to that of the main crop. Again, the summer of 1846 was one of the longest and hottest experienced in this climate, the mean heat, from April to October, being about 71°. This season was too long for the growth of the red sweet-potato, planted in May; and it was in housing this crop that I was first taught to know that potatoes may be "*frost-bitten*" before it is yet cold enough to freeze; or, what is the same thing, acquire that flavor generally supposed to result from the action of frost. I take the following extract from my diary, under date of October 11, 1846: "Cooked, on the 9th and 10th, two lots of red potatoes, supposed to be over-ripe—the root plump, but skin blotched with dark spots; eyes, at point, decayed—from whence I conclude that a sound sweet-potato has all its eyes plump, however little developed, whilst a decaying of the eyes, either at the side or end, will impart a bad flavor to the whole tissue." These facts themselves appear to me sufficient to warrant a belief that the whole of a long summer is not needed for growing this potato, and that, if so, it is false economy of labor to be in too much haste to plant. But a history of this year's crop is to the point, and conclusive. The past spring has been cold, dry, and backward. No living man, perhaps, has an experience old enough to have seen summer crops so unpromising at any former harvest as they were at the last; sweet-potato sets had hardly begun to vegetate at the period they were transplanted in former years; yet, under the growing influence of a temperature, although not remarkably high, yet uniformly so, throughout July, August, and part of September, the yield of this crop brought to perfection in less than 90 growing days is considerably above an average in quantity and of good quality; nor is any part of the result ascribable to increased fertility of soil, the field cultivated being an old potato-ground, unmanured.

The pomologist, in search of useful facts, will from this science derive no less assistance than the farmer or gardener; and I will close this article by a single experiment, in illustration. In 1840, strongly suspecting intense cold to be one of the causes producing blight among fruit-trees, and aware that (in consequence of the power on the part of trees to grow for one season after receiving a death-blow in the trunk or large branches) the only symptoms capable of pointing to the true harm-producing agency are often obliterated by time, before the casual observer suspects the presence of injury, I then determined to invoke the assistance of the unerring instruments of meteorology as sentinels to sound the alarm on every visitation of intensity of heat or of cold, hoping that, if either of these violent powers were the culprit, I should be able to detect him "*flagrante delictu*," or that, by a continued record of facts, the case of his guilt might be made out upon the evidence of circumstances.

In Kentucky, the first remarkable spell of intense cold occurring within the last ten years, happened in December, 1846, a month which would have done credit to a New-England winter, its mean being 26°, and the thermometer at one time, for the space of forty-eight hours, not rising above 10° above zero; for some days the expansion of trees in the forest produced a continued cracking, not unlike the promiscuous firing of small arms.

On the occurrence of a thaw, and immediate examination, many peach-trees were found to have the bark burst throughout the extent of the trunk: the bark on the branches of one or two pear-trees was found to give way to the touch, and, out of a lot of 60 hardy young cherry-trees, about half were entirely killed, or so injured as to produce death. In a small orchard of plums measuring six inches in diameter, and very thrifty, about half a dozen had the bark entirely separated from the alburnum—in most of them the fact not being discernible except by pressure, and, when touched, the bark being found to hang loosely on all sides of the trunk. In two cases the bark was burst, as in the case of the peaches, and, on making any two horizontal sections on the trunk, the intervening bark might have been rolled off. It is needless to add that these plum-trees all died, and that the first outward evidence of disease or injury in those cases where the bark was loosened, but not burst, was a gradual shrivelling of the bark on the coming of hot weather.

Very respectfully, L. YOUNG.

A TABLE

Showing the Monthly and Annual Mean Temperature for Nine successive Years, beginning in October, 1841, and closing in September, 1850; also the Monthly and Annual Fall of Rain for the same period, in the vicinity of Louisville, Kentucky.

	October.		November.		December.		January.		February.		March.		April.		May.		June.		July.		August.		September.			
	Total.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean heat.	Rain in inches.	Mean annual heat.	Yearly rain in inches.
1842	49.5	4.54	46.	4.60	35.8	4.14	36.5	3.61	38.8	6.40	53.8	2.67	58.	2.05	60.5	4.88	68.	7.48	70.	3.42	70.	1.30	65.	1.94	54.4	46.68
1843	51.	1.89	36.5	2.30	36.	3.12	33.	3.40	28.	2.06	30.	2.75	54.5	5.11	65.	6.45	73.7	3.15	75.	5.89	72.	3.54	70.	3.79	52.5	45.47
1844	49.5	3.82	42.3	3.78	37.3	2.98	33.8	2.46	39.7	1.68	47.	3.28	66.	3.28	67.3	7.12	72.6	4.64	77.4	6.76	72.	2.95	67.8	.76	55.8	48.41
1845	51.7	3.47	46.4	2.28	38.5	1.82	29.4	3.01	42.3	2.68	47.	5.98	62.3	8.04	61.7	1.45	74.2	3.78	76.	4.34	76.	4.85	67.5	4.13	56.	45.19
1846	54.	1.76	48.4	1.85	26.8	1.41	38.2	2.86	34.8	8.06	47.6	3.11	59.6	3.50	68.7	4.78	69.8	7.09	77.7	2.78	77.3	5.78	72.3	2.46	55.5	40.80
1847	56.2	1.78	47.2	2.36	43.	7.84	34.	3.81	38.5	5.01	48.2	6.14	59.	3.27	61.	1.80	71.5	4.99	74.9	2.24	71.8	2.80	66.9	3.94	55.8	45.98
1848	56.8	5.08	48.	5.19	35.8	6.40	40.4	4.25	40.	4.46	47.	3.52	54.5	1.32	69.8	5.10	72.4	3.28	78.	11.47	74.8	5.56	64.3	1.84	55.8	56.90
1849	52.7	2.46	37.9	4.75	43.2	10.90	32.6	5.58	32.6	3.06	49.9	4.08	58.	2.28	61.2	4.29	72.	4.65	72.	4.07	71.	2.78	71.	1.01	54.2	49.78
1850	58.	4.69	49.7	1.38	32.	7.55	37.	6.20	36.	4.48	42.5	8.18	49.8	5.09	57.8	2.48	69.2	9.24	76.	8.17	75.	5.84	65.7	2.55	53.58	63.25

A TABLE

Exhibiting for Nine successive Years the Semi-annual and Annual Mean Temperature, Aggregate of Rain, Extremes of Heat and Cold, Beginning and End of the Growing Season, also the Hottest Month, and its Mean Temperature.

Years.	Coldest day of the year.	Height of mercury.	Hottest day of the year.	Height of mercury.	Half-yearly mean of heat from October to April.	Rain in inches from October to April.	Half-yearly mean of heat from April to October.	Rain in inches from April to October.	Annual mean of heat from 1st October to 1st October.	Rain in inches from October to October.	Spring growth, beginning, as indicated by the fall of peach-bloom.	Days preceding above heat of 45.	Close of growing season as indicated by first frost.	Degrees of cold.	Hottest month.	Mean of hottest month.
1842	February 17	4°	September..11	98°	43.5	26.16	65.	20.32	52.4	46.68	March 27	33	October 10	30	July	70.
1843	do. 16	— 3	July.......... 1	95	36.5	15.55	68.5	29.98	52.5	45.47	April.........25	27	October 14	25	July	75.3
1844	January 29	— 4	August......20	98	41.2	17.90	70.3	25.51	55.8	48.41	March 29	26	October 12	30	July	77.4
1845	December......19	3	July..........15	96	42.5	19.19	69.9	26.60	56.	45.19	April.........10	33	October 15	28	July	7.
1846	December...... 2	—10	August 6	100	40.9	18.96	70.9	26.34	56.5	40.80	April.........10	33	October......18	29	July	7
1847	January.........11	— 9	July 19	95	43.5	26.89	67.5	19.04	55.5	45.98	April.........15	32	October......15	27	July	7
1848	January........10	— 6	June..........27	98	44.5	28.88	68.	28.02	55.7	56.90	March 29	26	September..28	30	August	7
1849	February 19	— 7	August.......22	89	41.4	30.78	67.	19—	54.2	49.78	April......... 5	31	October......10	29	July	72.
1850	February 4	1	July........... 6	91	42.	32.40	65.6	32.9	53.6	65.25	April.........19	28	October...... 6	30	July	76.

WHEAT.

Different kinds of summer wheat have been universally cultivated in this vicinity until recently, and the farmers have been under the necessity of abandoning it almost entirely, for the reason that it has proved almost an entire failure. Within the last three or four years, the farmers have been experimenting with winter wheat, and have found their experiments crowned with success beyond their expectations.

I have now before me the statements of Robert Johnson, of Gorham, Cumberland County, Me., in which he states, that he has raised this season, from one bushel's sowing, 29 bushels; said one bushel was sown upon 157 square rods of ground, upon which were spread two cords of compost manure, and sown in the month of August, 1849. In conversation with Mr. Johnson, he says, "I should recommend sowing with the wheat two bushels of oats the acre, as the oats would get quite a growth before the frost would kill them down, and then make a covering for the wheat through the winter."

CORN.

The most esteemed varieties are the large yellow, 10 to 20 rows, and the long eight-rowed, both of which are good varieties; but by observation I have found that the greatest crops come from the large variety.

The average product from an acre is about 35 bushels, although in some instances the product has trebled it. The best method of culture is to spread the manure, plough immediately, and harrow well, and plant in squares about 3 feet and 8 inches apart, and cultivate both ways with a horse. For feeding, I grind the ears and wet up with hot water for hogs; and for cattle and horses, mix with chopped feed and wet up together.

The manure formed by hogs, while consuming 20 bushels of corn, if they are well supplied with loam and muck, will add greatly to the crop, say one third.

HOGS.

The best breed, as has been proved, in this vicinity is the cross of the Berkshire and grass breeds.

The cheapest method of making pork is to procure early pigs and keep them until about nine or ten months old.

The best method of putting up pork that I have ever found is, first, to let the hog remain long enough after slaughtering for the animal heat entirely to subside. This I consider of great importance. I then cut and salt in sweet barrels, with Turk's Island salt, ground, and I use three-fourths bushel to the barrel, and then make a strong pickle, and fill up. For hams, immediately after cutting up, I pulverize saltpetre and rub the fleshy parts thoroughly with this powder, and let them lie 12 hours. I then pack them in barrels, using one-fourth bushel of the same kind of salt as for pork. I then make a pickle, by using one gallon of the best of molasses, ½ lb. saltpetre, and as much salt as will dissolve. After lying long enough for the salt to strike through, I smoke with corncobs, and find it to be nice.

APPLES.

The cultivation of fruit is receiving increased attention, and it is found that the raising is a profitable business. The best varieties for winter use are the Baldwins and Russets, and are found to keep sound longest when kept as cool as can be and not freeze.

GRAPES.

Some few individuals have bestowed some attention to the culture of the grape with good success. I saw, the past fall, four vines of the white Sweetwater, which had been cultivated four years, and upon the four vines I should judge there were 4 bushels of very fine grapes. Some clusters would weigh upwards of a pound.

JOHN SAWYER RAYMOND,
Cumberland County, Maine.

Thomas Ewbank, Esq.,
Commissioner of Patents.

Meadville, Franklin Co., Miss., Dec. 25, 1850.

Dear Sir:—Your agricultural circular of the 26th of August was handed to me some time since. I have delayed responding to your queries, to collect the desired information. I proceed to give you the result of my imperfect inquiries in relation to the agricultural interests of this section of country.

We raise no wheat, barley, or rye. Cotton and corn are the principal productions. In fact, we raise so little of any thing else, that we call these our only crops. We generally plant about half and half, that is, one half corn, the other half cotton. The number of acres thus planted is about 16 to the hand. So one hand is said to cultivate about 8 acres of cotton and 8 of corn. The average crop per hand is about 200 bushels corn, and about 5 bales of cotton. An acre planted in corn seldom produces more than 25 bushels; nor does an acre of cotton often produce more than ⅝ of a bale. There are lands that produce more; but there are others that produce less. Five-eighths is about a general average. The weight per bale is averaged at 400 lbs.

We sell nothing but cotton; that is, we carry nothing else to market. For this we get 13 cents per lb., making $52 per bale. The cost of conveying to market is about $2 for each bale. When we sell cotton, we purchase supplies for the next year. Those supplies consist of meat, for which we pay $13 per bbl., negro clothes, sugar, coffee, &c. &c. The whole *outlay* for each negro, per year, is about $25, not including herein the costs of corn, potatoes, garden vegetables, &c., consumed by each. The whole cost of supporting each negro here cannot be less than $35 per annum.

When we plant 8 acres of corn to the hand, we seldom fail to make plenty. But cotton, for a few years past, having borne a good price, many of our farmers have gone half mad; planted nearly all their land in cotton, and but little corn. The consequence is, that corn has become scarce, and commands a high price. I paid, on the 20th, almost as high as $1.25 per bushel. We could, were we not so absorbed in cotton raising, raise hogs enough for our own meat. A few sensible old farmers do this, but the most of us abandon every thing for the sake of cotton, and so we depend almost entirely upon the more northern States to furnish us with this most essential commodity. We might raise many things we do not—and which we will not, so long as cotton brings its present price. Sheep would flourish here with a little attention; but, as it is, we raise but few for home purposes. Cattle and horses might be raised to advantage. We raise no horses, at least so few, that we may count them none. We are indebted to Kentucky and the other more northern States for our supplies of horses and mules. Great droves are brought down and sold among us every year. The price, this year, for a good working-horse is no less than $100; for a good mule, $120; saddle-horses of the best quality at from $200 to $275.

Milk-cows sell for $10 and $12 per head. We have but few, and make no cheese—a little butter for family use. Cattle are little or no trouble: they raise themselves. We seldom feed them, and it is only the cows and oxen we ever feed, and these only in the severe winter months. We use oxen principally for drawing our cotton to market. Four yoke can draw 6 bales. Oxen sell for $35, $40, and sometimes as high as $50 per yoke. We gather a little crab-grass for hay, and sometimes a few pea-vines, with which, together with the shucks of the corn, we feed the oxen while working. We also give them a little corn. We gather all the blades from the corn for fodder, upon which we feed the horses during the working season.

The usual mode of feeding horses while working is to give them 15 good ears of corn and 2 bundles of fodder three times per day—morning, noon, and night. We employ, or ought to employ, one horse to every hand. It is not much trouble to make corn, but cotton requires a great deal of ploughing and hoeing. We are compelled to work it all the time we are not engaged in our corn, to make a good crop. When we have finished working it, we then have to pick it. No time is then to be lost. This keeps us busy until near Christmas.

We raise no tobacco or hemp; we raise a little rice about in the wet spots; also a little sugar-cane, more for the curiosity of the thing than for any real profit. We never make sugar. We sometimes mash the cane and make a little molasses for home use. A negro man hires for $135 per annum; a white man for about $15 per month. Overseer wages range from $20 to $25 per month.

We manure nothing but corn. This we manure with cotton-seed, at the rate of one double handful of seed to the hill of corn. Corn thus manured will produce large and fine ears in the poorest land.

Yours, &c.,

D. C. GRAHAM.

Clarksville, Red River County, Texas, Dec. 16th, 1850.

Sir:—The "Agricultural Circular" issued from your office, and bearing date the 26th of August, was this day handed to me by the postmaster at this place.

In the outset, it may not be improper for me to remark that agriculture, *as a science*, is with us yet in its infancy. Very little attention is paid to the quality or kind of seed, except cotton; and such a thing as fertilizing or manuring land is never dreamed of. This county possesses a variety of soils—from the black, sticky land in the prairies, to the light, sandy soils of the "barrens." Wheat is grown to some extent—none, however, for transportation; the crop being generally about sufficient for home consumption. The time of seeding is from the 1st of October to the 15th of November; though many plant much earlier than that—say, 1st of September, provided there are seasonable rains enough about that time to cause the wheat to come up early. This, however, is not generally the case, inasmuch as the beginning of our autumn is unusually dry.

Thirty bushels are the average yield per acre.

We harvest from the 15th of May to the 1st of June.

During a residence here of several years, I do not remember having ever seen a single bushel of wheat in the least damaged by weevils.

CORN.

The most esteemed variety with us is the yellow. The average yield is about forty bushels per acre. The land is first prepared by very deep ploughing, and is most generally planted in drills. Very little is consumed in feeding hogs. Oats, barley, rye, peas, and beans grow well, and yield abundant crops. Oats and rye yield astonishingly. The cost of raising cattle amounts to nothing more than the time consumed in marking and branding. Cattle are penned once a fortnight and salted, which is necessary to keep them gentle.

Cattle require no feeding. In spring and summer, the grass upon the prairies furnishes excellent grazing, and the wild rye, cane, and winter-grass in the bottoms, furnish food during winter.

From 8 to 10 dollars is the usual price of cattle, at 3 years old. The value of good cows in spring is $10—in fall or winter a trifle higher, say $12. The cattle here are all native animals. Many are turning their attention to cattle-raising. Two thousand head or upwards are annually shipped to New Orleans. They are shipped down Red River, which is the northern and eastern boundary of this county. The cost per head of shipping to New Orleans is from 5 to 6 dollars. The price of prime fat beef, butchered, is from 2¼ to 2½ cents. On foot, any quantity can be purchased at 2 cents. *Hogs.*—We have several different breeds and crosses. The Irish graziers, I think, do best here—at least, they are, among hog-raisers, preferred to any other. Hogs are never fattened upon corn, from the fact that they fatten themselves in the woods, upon acorns, which, of course, is the cheapest method of producing pork and bacon. Bacon or pork fattened upon acorns is considered by many as being much sweeter and better flavored than that fattened upon corn. There is one objection, however, which I have to mast-fed pork, and that is, the lard is never so firm, hard, and good, as that of hogs fattened upon corn. The acorns of the post-oak and over-cup trees are considered the best mast for hogs.

COTTON.

The average yield of clean cotton in the prairies is about 1000 pounds, and about the same in the wooded uplands and barrens. In the river bottoms, however, (Red River and Sulphur,) where most of our large cotton plantations are situated, the yield is from 1600 to 2000 pounds per acre.

It must be borne in mind, however, in connection with this fact, that the bottom lands of Red River, as cotton lands, are not surpassed by any in the world.

RICE

Has not been cultivated to any extent, most of the crops having been planted merely for experiment. I am fully satisfied, however, from the specimens which I have seen, that rice can be successfully cultivated upon our uplands and prairies. Potatoes, both Irish and sweet, grow well. I do not now recollect the average yield. The best manure for Irish potatoes is rotten chips, decayed wood, straw, &c. The best system of planting is in rows—cutting the potato—leaving an "eye" upon each piece. Sweet potatoes yield more planted in hills. With us, the Spanish potato is the most prolific.

Very respectfully yours, &c.

FRANK H. CLARK.

Erie, Pa., December 27th, 1850.

Mr. Ewbank—*Dear Sir*:—I have received your agricultural circular, asking for information on various subjects. I shall endeavor to answer some of them.

First, *Wheat.*—The kinds most esteemed here are those that ripen early—as the Mediterranean and Etrurian. This last is a wheat I received, a few years ago, from the Patent Office. It is a very superior wheat in every respect. It is a bald, white chaff, white wheat—ripens early. I sow two bushels per acre—plough but once, 8 or 10 inches deep—go over with the large cultivator—sow, and harrow in.

The yield per acre is on the increase. I average about 25 bushels per acre—this year, over 25 acres. I have no one settled rotation of crops; sometimes we sow on clover-sod, once ploughed—then corn, then barley and seed down. At other times—first corn, then barley, then wheat and seed down. Wheat is worth $1 per bushel.

Corn.—The most esteemed variety here, is red-cob gourd-seed. The best system of culture is to drill and work entirely with the cultivator.

Rape.—I have cultivated this crop for several years, and find it very profitable.

The soil for growing rape on should be rich and clean. A thorough old-fashioned summer-fallow is probably the best for the rape crop. It should be sown the last of August—three pints of seed to the acre. It will be ready to cut in the last of June, or first of July. We cut it with large reaping hooks, and lay it in small bunches to dry, for eight or ten days. Then, with a large cloth spread over the hay-ladder, we proceed to haul in, and thresh with a flail immediately. The greater portion of the chaff is to be raked off, and the remainder left, with the seed, one or two weeks, on the barn-floor to dry.

It will produce from 30 to 50 bushels per acre. I have raised the highest figure. It is worth $1 per bushel in Erie.

Rape-straw is useless, except for manure.

These few remarks I submit.

Truly yours,

ROBERT EVANS.

Potosi, Grant Co., Wisconsin, December 24th, 1850.

Sir:—I have the honor to acknowledge the receipt of your circular of August 26th, 1850, through Hon. O. Cole, and, in answer to your inquiry in relation to fattening pigs, &c., I beg leave to communicate the result of a careful experiment.

In October last, I selected from my stock two pigs, of the same age, and, apparently, alike thrifty; one, however, weighed 260 pounds, the other 247 pounds. Immediately after being weighed, they were put in different apartments of the same house, kept dry and warm, and fed with great care for 40 days; then they were again weighed, and slaughtered. The heaviest pig was fed with cornmeal, mixed stiff with cold water; the other, with shelled corn, with plenty of pure water for drink. The one fed with meal consumed 425 pounds, and gained 63 pounds, live weight; the pork weight, or weight after dressing, was 267 pounds. The other ate 308 pounds of corn, and was found to have gained only 33 pounds, live weight, his pork weight being 231 pounds. By subtracting the pork weight from the live weight, the amount of offal is ascertained, which, in this experiment, proved a fraction less than one-fifth of the live weight. If one-fifth be deducted from the amount each pig gained, we then have the true gain, in pork weight, produced, which was *six and three-fourth* pounds for every 56 pounds of meal, and *five* pounds for every 56 pounds of corn.

The pigs were a cross between the Byefield and Berkshire, the best and most profitable breeds—the corn, yellow-dent, or Cleveland, a variety held here in great esteem.

Very respectfully yours, &c.

J. E. DODGE.

Hon. Thomas Ewbank,
Commissioner of Patents.

Fair Water, Wisconsin, December 12th, 1850.

Sir:—Let me inform you, and the public, a little concerning my method of building a fence. Not that I am presumptuous enough to believe that I have hit upon the *best* method under all or even most circumstances; but because I imagine that it may be of "real practical value" to *some* farmers in this wide-extended Union. In the first place, I get rails as long as convenient, say from 10 to 12 feet, and strew them, 7 in a bunch, so that the ends will touch the whole length of the line on which the fence is to be built. (If the rails are small, more will be necessary.) Then, I prepare stakes and caps, after the following manner, viz.:—The stakes I cut 7½ feet in length, and split them out, say 4 inches square. Sharpen one end for driving into the ground—the other is fitted to a 3 or 3½ inch auger-hole, about 3 feet from the end. These should be made of the most durable timber to be had. Charring the part driven in the ground will prevent decay wonderfully. If your fence is 6 rails high, you will need ½ as many stakes as rails. The caps should be cut 20 inches in length, and split-out 6 inches wide by 1½ or 2 inches thick. The distance between the inner edge of the holes should be about 5 inches. You will need one-half as many caps as stakes, and, perhaps some more, unless you have good timber, and are careful to try every stake, so as to be sure that none are a size too large. After making a good bench to stand upon to use the sledge, you can commence putting down the stakes: about 2 feet in the ground will be sufficient. If the ground is hard, a "crowbar" will be necessary to make a hole. You will lay the bottom rail as you desire the stakes. When you get the fence 5 rails high, put down the cap, laying the top rail above it. For 12 feet rails, about 3 feet "worm" will be sufficient, or 18 inches from the centre each way to the outside stake. Do not make the fence entirely straight; for, in that case, the rails will slip by at the ends, and your fence will be all in a heap in one year. A fence 6 rails high, built in this way, is better and more secure than one 7 rails high, of old-fashioned zig-zag fence. The difference in the number of rails required is nearly enough to pay for the stakes and caps; but the greatest advantage is, that the winds will not affect it, and it is an "impassable barrier" to cattle, &c. When built, it looks farmer-like, and, indeed, it is so. It may be no new "wrinkle" to many—yet, I presume, there are thousands who have never thought of it. Without adding more, let me subscribe myself a friend to improvement.

Yours, &c.,

H. B. EVEREST.

THOMAS EWBANK, Esq.
Commissioner of Patents.

Golden Grove Tea Plantation, Greenville, S. C., Jan. 9th, 1851.

Sir:—I have received your favor of the 7th ultimo, together with a copy of a communication from Mr. Frank Bonynge, for which I am much obliged. The history of China is an imperfect record of past events. The curiosity of the public mind, in its researches, is soon bewildered and lost in its attempts to unravel the fabulous and unauthentic stories of a semi-barbarous nation. No satisfactory accounts relative to the time when the use of tea was introduced into the empire have been transmitted to us. It appears, however, that it was in use during the Tsing dynasty, in the latter part of the fourth century, and how much earlier no record shows.

During the Tang dynasty, in 780, a duty of 10 per cent. was levied upon all tea brought from beyond the mountains, where it grew spontaneously. During the reign of Moor Tsand, 824, this duty was raised to 50 per cent. in order to replenish the imperial treasury; not an unusual excuse for taxation in more modern and enlightened times. In 1023 to 1063, large factories were established, and tea became an article of extensive commerce in the empire. The use of tea was introduced into Thibet in the ninth century, when Chang-loo was sent thither by the emperor, as ambassador; for, at that early period, there seems to have existed a greater freedom of international association than at present. The Thibetians, observing the ambassador's preparation of tea in his tent, inquired about its qualities. "It is," said Chang-loo, "a drink which relieves thirst and dissipates sorrow." A recommendation of greater accuracy could hardly have been given by any Chang-loo of the present day. A disposition to possess this sorrow-healing beverage soon manifested itself, and a distribution of several packages, just sufficient to establish the use and create a demand, was made by the ambassador among the courtiers.

In Japan, the use of tea was known in 810. The plant was not introduced until 815, when two Buddhist priests brought some young shoots from China. These flourished, and the use of tea became general in Japan.

Soon after its introduction into England, in 1657 to 1666, the tea-leaf was a court luxury, and sold as high as \$25 to \$45 a pound. In 1678, the English East India Company commenced the importation of tea, as a regular article of commerce, and the annual quantity received from China at that time, amounted to 4718 pounds. For ten years, from 1700 to 1710, the importation amounted to less than 800,000 pounds, or an average of less than 80,000 a year. It was still a luxury confined to the wealthy, and used in small quantities, with cautious economy, out of cups containing about a table-spoonful. Since that period, the quantity of tea imported from China into England amounts to between 50,000,000 and 60,000,000 pounds annually.

As we indulge curiosity in looking back for many centuries, and inquiring by what means, at what time, and under what auspices the tea-plant was introduced into foreign nations, so our posterity may have the same curiosity to learn at what time and under what circumstances it was introduced into our own country; nay, we need not wait for posterity to disclose a kindred curiosity of this inquisitive character. It is now actively alive and looking for an authentic solution. As the history is short, and may gratify the wishes of some, and perpetuate a record of facts, and especially as I am now in health, and hold the evidence in my hands which has not been communicated in writing, I feel it of sufficient importance to give to the public.

An unbelieving world would call the introduction of the tea-plant into the United States as an article of commerce, an accident. A Christian would call it an unequivocal mark of the special providence of God, leading to events unlooked-for, unexpected, undesigned, and so entirely alien from any human calculation, that the weakness and humble condition of the agents employed would seem to be inconsistent with a favorable result of such a great undertaking.

I have an only child, a daughter, born in London, who married the Rev. Edward K. Maddock, in Sydenham, near London, where I then resided, in 1840. In 1842, he was appointed, by the East India Company, a chaplain in the British army in India. He sailed with his little family in November for Calcutta. After a short residence at Barrackpoor, about sixteen miles from Calcutta, the bishop appointed him to the military station at Meerut, north-west provinces of India. The heat of the plains (latitude 29 to 30 north) was so oppressive, that Mrs. Maddock was, for the security of her health, advised, during the summer months, to remove to the Himalayas Mountains, about eighty miles from Meerut. By the English overland-mail, we corresponded monthly. On the 30th of October, 1846, she wrote me a familiar letter, which I received in New York, the 22d February, 1847. In that letter she gave me the first intelligence I had received of the formation of the tea plantations in the north-west provinces of India by the East India Company, as follows:—"In my next, I shall be able to tell you something about the tea now growing on these mountains. We are going to stop with the superintendent of the botanical gardens, Dr. Jamison, on our way homeward: he has promised to let us taste the tea. We hear that it surpasses the China tea, and is likely to become a most valuable speculation to the East India Company. The present tea plantations are near Almarah.

Some of the tea has been sent to London, and sells there for $1.50 the pound." Thus, we see, that we owe the whole of American tea enterprise to the familiar letter of a lady, writing without the slightest idea and wholly unconscious that it was designed to be the instrument of conferring upon the United States the greatest agricultural boon recorded since the introduction of the cotton-plant. No sooner had I perused that letter, than the idea burst upon me, that if the tea-plant could be successfully cultivated upon the mountains of Himalaya, as well as in the territories of Assam, there could be nothing in the ordinary course of vegetation to prevent its growth in the United States. From that hour, I devoted myself to the introduction and cultivation of the tea-plant in the United States. I did not seek the employment. It sought me. After three years' labor, and repeated disappointments, I have the satisfaction to inform you that I consider the greatest and most trying difficulties surmounted. The year 1849 was fatal to my imported tea-plants and tea-nuts. All perished in transportation; but Providence directed events to a different issue the last season. My plants and nuts came to hand in the finest possible condition, and I have availed myself of the blessing by greatly extending my plantation of the first quality of tea-plants, and still continue to enlarge the boundaries of tea-nut cultivation. The art of transporting plants and nuts securely, so great a distance, was entirely unknown, because without a precedent. All failed in their various attempts to accomplish the end. Final success rendered it absolutely necessary for me to devise a plan of operations more likely to prove successful. In this attempt, my views were carried out in China, and crowned with signal and complete success. The nuts arrived late, and but few germinated before summer closed. Those few, together with a good proportion of the tea-plants, thrive remarkably well, and now look strong and healthy. Experience has taught important lessons, and more are to be learned in this interesting art, before we can bring tea cultivation to its ultimate perfection in this country,

Your obedient servant,

JUNIUS SMITH.

Courtland, Lawrence County, Alabama, December 4th, 1850.

Sir:—Accompanying this, I send replies, in part, to questions contained in a circular from the United States Patent Office. The replies are not of a character to add much to our reputation as agriculturists or planters, and it is to be regretted that our country is not managed in a manner calculated to reclaim the lands and make them as productive as they no doubt would be under an improved mode of culture, which they are undoubtedly susceptible of. Should the communication be acceptable to you, I shall be gratified.

Wheat.—The crop is too uncertain, and is only cultivated principally for the use of those who have produced it. The early varieties are preferred—average yield, 10 bushels per acre: no preparation previous to sowing: the wheat is sown broadcast, and turned under with a one or two-horse plough, as the disposition of the person seems to suggest, and left to its fate. The crop is rarely interfered with by the fly. It is sown in September, and harvested in June: price $1.50 per bushel.

Corn.—The large varieties of white are preferred—product per acre, 30 bushels; culture very defective, as it is generally where cotton is produced. Much the greater proportion is fed in the ear; no attention paid to collecting manure—the cotton-seed not used for planting, being the principal dependence for manuring in the hill of corn in the exhausted portions of the land.

Oats.—There are three varieties cultivated here—the rupple, very productive, and well adapted to cotton plantations, as it is later than any other variety; the black oat, several weeks earlier, and very desirable because of its great weight and yield. The common, a mixture of white and black. Quantity of seed per acre, one to one and a half bushels is generally sown—yield, 15 to 20 bushels per acre. The small yield is to be ascribed to the careless manner of putting in the seed, which is generally on rough land and ploughed in.

Barley not cultivated; only used for winter pastures. Rye is similarly used.

Peas.—A very valuable crop, excellent for all kinds of stock, and the best reclaimer of land known to us. The vines that are left, after feeding the peas, improve the land in a remarkable degree: product per acre not known, as they are rarely gathered in a manner to ascertain.

Clover and Grasses.—The land here is admirably adapted to clover, if once firmly set. The yield is abundant, and the land much improved by the deposit of leaves and stalks, as it is rarely, if ever, saved as hay. The herds-grass and orchard-grass are best suited to the soil and climate, as far as ascertained.

Dairy.—But little attended to, as there is no market convenient for any surplus.

Neat Cattle.—Not desirable, unless for milk and beef to a limited extent; are considered injurious to the land when pastured during the winter.

Hogs.—Those most highly esteemed are the Berkshire, grazing, and Woburn, or a mixture of the best stock of the country with the above kinds. The course pursued in producing pork here is by no means cheap, requiring feed until slaughtered; the corn and attention required generally being of more value than the pork. The climate is changeable, and it requires strict attention to save meat that will be palatable.

Sheep and Wool.—Sheep thrive well, if attended to, and produce good wool, and a fair yield. Peas and vines are superior, for winter food, to any thing I have known them to be fed on. The county is well adapted to produce all that sheep require, and, with proper attention, there is no doubt that the raising of sheep and wool would be profitable.

Cotton.—Average yield of clean cotton per acre, 180 pounds. Cost of production, 6 cents per pound, when the same hands cultivate the usual quantity of land in corn, say 7½ acres. Crops are best grown in rotation, with cotton, corn, and peas; the next year in oats. The rust is by no means common here. Preventives against the army and boll worms: the army-worm has appeared but one season, and then so late as to do no injury: the best preventive against the boll worm is to make the ridges for the cotton in the early part of winter, so that the worm that makes the fly may, if not destroyed the next summer, be exposed to the cold, and be killed. Early ploughing for cotton at all events is considered preferable, and, if done as above-mentioned, much will be gained. In making the ridges, 4 or 6 inches are the usual depth for ploughing with two-horse ploughs.

The subsoil plough has not been used to any extent, but is spoken favorably of by those who have used it. Cotton-seed is very superior as a fertilizer, if rotted, or the vegetative principle destroyed. Cotton lands can best be improved by planting corn and peas after cotton, and oats after the corn and peas, leaving the oats on the exhausted portions for stock. It is believed that cotton does not require deep tillage until the land becomes too close to admit of the absorption of water from the rains to promote vegetation.

Root Crops and Potatoes.—Irish potatoes are an uncertain crop. Sweet potatoes are cultivated to a considerable extent: product large, but rarely measured. Turnips are the principal root crop. It is produced by most of our farmers, but not offered for sale.

Fruit Culture.—The climate is better adapted to the production of the peach than any other kind of fruit. Apples are to be met with of good quality, but the trees are short-lived, and would not be profitable unless in particular situations. There is more attention paid to orchards now than formerly. No grapes, unless to a very limited extent, and no wine.

Very respectfully, your obedient servant,

JOHN M. SWOOPE.

Hadley, Hampshire County, Mass., January 6th, 1851.

Sir:—An agricultural circular from the Patent Office, bearing your signature, has been sent to me by the Northampton postmaster, requesting me to contribute to the objects of which it treats. Feeling deeply my incapacity to answer, satisfactorily to myself, even the questions contained in the circular, much more that of giving information to the agricultural community, is my only apology for thus postponing a duty, which, although difficult to perform, yet has a bearing upon a great cause that has ever been to me most interesting and precious.

In enumerating and remarking upon our staple crops in this section of the Connecticut River valley, permit me, sir, to call your attention to one which is not noticed in your circular, but which ranks among the first in our list of staple crops. I refer to broom corn, the culture of which is by no means confined to this valley. The virgin soils of the West furnish their hundreds of tons annually for the manufacturers here. A rich, warm, alluvial soil is best adapted to this crop. It can be raised any number of years in succession, on the same ground, without a deterioration of soil or crop, provided 8 or 10 ox-loads of good rotten manure are placed in the hills at the time of planting. The average product per acre is about 700 pounds of brush and 70 bushels of seed. The cost of labor on an acre is about $15. Very few crops leave the soil in better condition.

The kind of Indian corn raised here is yellow and eight-rowed. Average product per acre, 40 bushels. Cost of production per bushel, 50 cents, exclusive of rent. A good system of culture, and one which is approved by our best farmers, I will try to state in a few words. The land intended for corn should have been turf the preceding season, and, if clayey or wet, should be ploughed in the autumn. In the spring, 15 ox-loads of well-fermented manure should be spread on the inverted soil and well harrowed in. Mark the ground at right angles for rows, so that the hills may be 3 feet apart each way. Plant, about the middle of May, 4 kernels in each hill, with a moderate handful of ashes. Ten bushels will suffice for an acre, and

they may be applied in the hill, on the hill, or near the young plants, after the first hoeing, with like effect. Cultivate and hoe three times at suitable intervals. The corn should be cut at the ground about the middle of September, or after it has become a little hard, and put up in stacks to dry. In about 4 or 6 weeks it will be ready to draw off and husk. In feeding to hogs, there is, doubtless, a saving of grain in grinding and cooking; but to make pork quick, cooking is needless.

Oats are sown principally with grass-seed, two bushels per acre producing about 30 bushels. All land that is heavy, or that was stiff sward the year previous, should be ploughed in the fall rather than in the spring. Oats are considered very exhausting, and, if possible, had better be dispensed with in a rotation of crops. The quantity of hay cut per acre varies from 1 to 4 tons. Two tons are considered a good crop. When land produces but one ton, it is ploughed for corn, or, if it is low ground, where corn will not flourish, it is ploughed in August, dressed with compost manure, sowed with a peck or half a bushel of timothy, nicely harrowed and rolled. The ploughing is done after haying, and the next year we have a crop greatly improved in quality and quantity. This method is strongly recommended by the Massachusetts Ploughman.

If any of the above remarks may be considered of any worth, they are at your service. I have applied to Prof. Snell, of Amherst College, for answers to the questions relating to the weather, which I hope to enclose in this sheet. A copy of your Report will be gratefully received and highly prized by, Sir, your's truly,

THEOPHILUS P. HUNTINGTON.

Answers to the questions under the head of "Meteorology," as derived from the journal kept at Amherst College, by Prof. E. S. Snell:—

Temperature from observations of twelve years, 1839–1850, *inclusive.*

	Highest above zero.	Lowest below zero.
Range	86° to 94°	6° to 22°
Average	91° 15′	13° 54′

Time.

Range, from June 17 to July 30.	From Dec. 13 to Feb. 24.
Average, July 13th.	January 19th.

Mean Temperature.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	°	°	°	°	°	°	°	°	°	°	°	°	°
	23.49	23.89	33.36	45.90	56.09	65.71	70.75	69.27	59.74	47.20	38.09	27.11	46.72
Highest Mean	29.73	30.50	37.69	51.95	59.47	68.85	72.42	71.54	65.48	50.46	44.08	34.24	48.02
Lowest Mean	18.93	16.48	24.52	41.63	52.71	61.60	68.23	67.10	57.22	42.81	33.49	21.53	44.21

Fall of Rain, from observations of fourteen years, 1837–1850, *inclusive.*
Mean depth, (including melted snow.)

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Inches.												Aggre.
	3.04	2.68	3.21	2.83	3.96	3.39	4.16	4.71	2.94	4.23	3.52	3.95	42.58
Greatest fall	5.80	4.88	5.78	4.82	8.72	5.18	9.56	9.88	6.38	9.45	5.77	6.41	55.59
Least fall	0.99	0.99	1.69	0.57	1.91	1.58	1.95	1.53	0.47	1.78	1.90	0.96	34.92

Sweet Home, Bond County, Illinois, January 1, 1851.

Sir:—Being favored with a circular from your office, soliciting information respecting the agricultural interests of our region, I give the following in reply.

Wheat.—The red chaff, velvet, and golden straw, are the most common varieties here, and have been cultivated ever since the first settlement of the country. These varieties are of course nearly run out, producing only 10 or 15 bushels per acre, and are generally sown among corn at the last time of ploughing, or later, as the case may be. More recently, the May wheat has been introduced with some promise of success. Its advantages are, 1st. It is much earlier than other kinds, say from 1 to 3 weeks. 2d. It has a small growth of straw, but stiff and firm, and on these accounts is less liable to rust or fall. The rust and want of proper tillage are the greatest obstacles in the way of a good crop. With this variety, the former is avoided, and the latter may be learned. As this kind is ready to cut before the rust strikes it, it might, with good management, be made a sure crop. The Hessian-fly rarely troubles us, and the weevil never. Of the last-named wheat, I would further remark, that though the straw is short and the head small, the grain is uncommonly heavy and plump. I raised a few bushels of it last year, which was cut with Hussey's reaper. Several of our most experienced farmers came to witness the operation of the machine, and assisted in taking up the grain, and said it was the heaviest wheat they ever handled for the quantity of straw. I threshed the same with one of Emery's overshot machines, the only one of the kind here, and is generally believed to be the best in use. I sold what I had, for seed. Its weight was 67½ pounds per bushel. Others raised of the same kind, which weighed about the same. As to the number of bushels it will yield per acre, I do not know, but my opinion is, that on the same ground, and with the same culture, it will produce as many bushels and more weight than any other kind. No pains have been taken to introduce other new varieties here. The general practice of farming is to plant and sow the same seed on the same ground, from year to year. If a man puts in a piece of meadow, he will cut the grass for 15 or 20 years without manuring, scarifying, or reseeding. There are farmers here who have planted corn on the same ground ever since they commenced farming, say for 25 years, without changing their seed or ploughing deeper than at the first. Corn, corn, without manure, is their rotation. Corn is their motto from beginning to end, barely splitting the rows. And should any one presume to do differently, he would be denounced as a *book*-farmer, and thought to be incapable of getting a living by farming. Still, there are some who are bold enough to differ from them, and who, after their grounds have become a little worn, venture to let their plough in to the depth of from 6 to 10 inches, and thus, without manure, obtain double the crop of their old-fashioned neighbors. This, and the use of machinery, they look upon as an innovation, while they pursue their old course, and manage to raise corn enough "to do them," and are content. Cost of raising corn is from 5 to 10 cents per bushel, and sells at St. Louis (our principal market) for from 20 to 60 cents per bushel. Wheat brings from 60 cents to $1 per bushel. Our corn is generally fed to stock in a raw state, and unground, with no other crib than the ground for them to eat from. And, when taken into the stomach

of the animal in this hard state, it affords but little nourishment, much impairs their digestive organs, and, of course, must produce disease in many cases. As I omitted to say what I intended to in relation to the best mode of putting in wheat, I would here remark, that I believe a summer-fallow of clover, or fresh-broke prairie, is indispensable to the raising of a good crop. It may do to sow after other crops, if the land is well manured, for the ground must possess the elements of wheat—otherwise, none will grow. In the next place, it should be put in with the wheat. Drill or plough as soon as the 1st September; and, in the spring, it should be well harrowed and rolled. This I consider to be good wheat culture.

Oats are extensively cultivated, and produce from 28 to 40 bushels per acre. They are worth from 25 to 50 cents per bushel.

Rye yields from 10 to 20 bushels per acre, and sells for 37½ to 50 cents. It is a sure crop, though but little raised.

Beans are not extensively raised here, though they do well. They are worth from 50 cents to $1.25 per bushel.

The castor-bean is raised here, and produces from 10 to 25 bushels to the acre. They are worth from $1 to $1.25 per bushel.

Grasses of all kinds do well here, producing from 1½ to 3 tons per acre, according to the land, cultivation, &c. The best fertilizers for meadows are leached ashes, and barn-yard manure, spread on evenly as a top dressing. No land retains manure longer than ours, or gives a more bountiful return for the expenditure. The kinds of grass preferred here are red clover and timothy, mixed. Quantity of seed per acre, ½ a bushel of timothy, and 4 quarts of clover. Hay can be raised, cut and put into the mow or stack, with the aid of Hussey's grass-cutter and a good revolving rake, for $1 to $1.50 per ton. The usual price here, is $4 to $5 in the stack; but, if pressed and taken to St. Louis, (about 50 miles,) it brings from $15 to $30 per ton. The prairies are our pastures, and our cattle come from them to our barns, in the fall, as fat as they well can be, and this, too, without any expense, except for salt. The produce of the dairy from the prairie is equal, if not superior, to the best tame pasture, making richer milk, and as much or more butter and cheese for the year. Our dairies are managed only in connection with stock raising, and with nothing but dry food in winter. The value of butter and cheese per year, for each cow, is from $15 to $20. Treatment of milk and cream, various; also the mode of putting down butter for market. The best plan I have found for large dairies is to set the milk for butter in a cool cellar, of the right temperature, without scalding, and take off the cream, which I churn in a large rocking-churn, and, after the butter comes, which is in from 10 to 20 minutes, draw off the buttermilk, and dash in a bucket of cold water, which, by churning a few minutes, helps to wash out the buttermilk; after which, we work in the salt, and set it away for a few hours; then work it over the second time, adding more salt, with saltpetre and loaf-sugar, and pack away in firkins made of mulberry or ash. This will keep any length of time in any clime. Average price here, 10 cents. At St. Louis, 20 cents. Cheese, from 8 to 10 cents.

Neat cattle cannot be raised till three years old for less than from $6 to $7 each; but, with suitable blue-grass pasture for winter feeding, might be raised for one-half that sum, and would attain a larger size, consequently bring a better price. Average price now from $10 to $15. I can raise a horse or mule to the same age (three years) for less money than I can a hog or a steer; though Durham cattle, possessing every advantage in market, without any additional cost of raising, might do better.

Sheep and Wool.—The raising of sheep is the most profitable branch of husbandry in which the farmer of this region can engage. One hundred per cent. can with certainty be realized in the raising of wool and lambs, on any amount of investment the farmer has a mind to make, with proper care, shelter, and blue-grass pasture for winter feed. I can raise a pound of wool of any description as cheap as any other man can a pound of pork, and I can raise a pound of fine wool as cheap as I can a pound of common, coarse wool. The different breeds here are the Merino, Saxon, Cotswold, Blakewell, and Southdowns, the latter of which, with their crosses, I prefer. All sheep grow larger here than in the old States, and will yield more wool per head with the same care, and will produce a greater number of lambs in proportion to the ewes. Experience has proved this most conclusively; also that the same kind of sheep will produce a finer quality of wool in this or any other mild climate. This is the fact respecting furs; for those coming from warm climates are much finer and richer than those from cold ones, as every fur-dealer knows. The same that causes the fur to grow finer will operate the same on the wool of the sheep. As to mutton, every man knows that a large fat sheep or lamb is better than a small poor one. Sheep will get fat on the prairies in summer, and, if changed to blue grass and timothy in the fall, will remain so all winter, with good shelter. Hemp and tobacco can be raised to any extent here, but are not. The same may be said of roots. Potatoes do well here, both sweet and Irish, when the latter do not fall a prey to the bugs.

Fruit.—In this line we stand No. 1, both as to quality and quantity. Notwithstanding the extent and number of our orchards, new ones are being planted every year. The raising of fruit is the surest source of profit to the farmer in this section. Our market nor crops do not fail more than once in ten years, and the net profit is often above two hundred per cent. So long as our market remains as good as it has been for the last ten or twenty years, we shall not need to make other arrangements to dispose of our fruit; but if this should fail, we should still find it profitable to raise it for stock. Thus far, I have answered as well as I am able, and I believe accurately, although not as fully as I could have wished. Yet, if I have subserved the interests of agriculture, it is most cheerfully submitted, for you to dispose of as you may think proper, while I remain

Your most humble servant,

SAMUEL COLCORD.

Cinnaminson, Burlington Co., New Jersey, 12th mo. 18th, 1850.

Sir:—Having received one of your agricultural circulars, soliciting such information as might be useful in the Annual Report to be issued from the Patent Office, I proceed to give some account of the crops and management of farm-land in this locality. The kind of crop most profitable for cultivation in any section of country must depend, not only on the soil and climate, but the convenience of conveying the same to market. The extensive cultivation of perishable articles is necessarily confined to the vicinity of large cities, and situations having steam communication with them. Our land being a sandy loam, is very favorable for the early ripening of fruits

and vegetables, and, situated within a few miles of Philadelphia, and having railroad communication with New York, fruits and other perishable crops, gathered one evening, may be served out in either market the next morning. As a consequence, the farmers in this section of New Jersey find the raising of fruits and vegetables for the great markets, Philadelphia and New York, to be the most profitable use to which their lands can be applied, and vast quantities of such produce are daily despatched, by cars, steamboats, and sloops, during the market season. Whole fields of asparagus, peas, melons, cucumbers, &c. may be seen during the season of cultivation, resembling vast gardens. Strawberries, raspberries, and grapes are now coming into general cultivation, and bid fair to remunerate the husbandman richly for the labor bestowed thereon. Rotation of crops is not strictly adhered to, yet the system most approved is to turn down a sward or grass lay for corn; if it is old, and likely to be infested with worms and troublesome insects, it should be ploughed early, so that the frosts may kill all vermin that would otherwise prey on the kernels when deposited in the hill. We usually plant about the first of the fifth month, and cultivate the yellow gourd-seed variety, which yields an average of about fifty bushels per acre, costing thirty cents per bushel for cultivating, which cost varies inversely with the yield per acre; a strong argument in favor of plenty of manure and careful treatment. The practice of cutting up corn near the roots before it is quite ripe, while the blades and stalks are full of nutritious matter, is coming generally into favor, thereby saving a large amount of fodder, which is rapidly wasted when unprotected from the bleaching winds of autumn. The stalks from an acre of ground, when properly cured, are considered equivalent to a ton of hay for feeding stock. Grinding the grain, and sometimes crushing the cob with it, is greatly preferred to feeding whole; but little steaming or cooking of corn for stock has been practised. Oats and barley are sometimes sown the next spring after corn, but more frequently the ground is occupied with potatoes, peas, melons, and other garden vegetables for market.

Potatoes.—The failure of this crop in many parts of the country, where the land is clayey and tenacious, thereby holding the heavy rains in immediate contact with the tubers, until the hot sun, coming upon them while thus thoroughly saturated with water, completes their destruction, drying and baking the ground over and around them, so as to exclude the air, that, if they were so near ripe at the time as to retain their form until harvested, they soon give way after being exposed to atmospheric influence. The same cause that has heretofore prevented the cultivation of the more delicate sweet potato on heavy land, now operates against the Mercer or Irish potato, which seems to have degenerated in vigor, and has at length yielded to those adverse influences (which the sweet potato never could withstand) that had been imperceptibly, though no less certainly, impairing its constitution for many years previous. And sandy loam,—open and porous soils, that allow the excess of moisture to pass off freely from the plants, whereby severe storms act like gentle showers, merely to moisten the roots and invigorate the plants, and the genial rays of the sun thereafter meliorate the land, to the great benefit of the growing crop,—being the most certain land in which to grow the potato successfully, has induced our farmers to cultivate them almost to the exclusion of oats and barley; and fifty or sixty acres may be seen growing on single farms. Potatoes are invariably planted in drills, about thirty to thirty-six inches apart, manured with stable manure, or marl, which is abundant, and containing portions of lime, potash, &c., is preferred by many to any other manure, and can be obtained at the pits at 25 cents per ton, the additional cost depending on the distance to which it is carried. Planting is generally done during the fourth and fifth months, using about 10 bushels of seed and 15 horse-loads of manure or marl per acre. The digging commences in the ninth month, and is hurried through, so as to seed the same ground with wheat before cold weather sets in. Average yield per acre, 100 bushels; cost of producing, 30 cents per bushel; current price for last season, 60 cents per bushel. Hauling the crop to market, or to some navigable stream from whence they can be shipped to any of the seaport towns, commences soon after digging, and is continued at intervals through the winter and spring, as they are wanted for transporting to distant markets.

Sweet potatoes are also extensively cultivated, in the lightest and most sandy portions of this district, (stiff, unyielding soil being unfit for them.) The yield per acre, and market value, about the same as the Irish potato; but greater care in cultivating, storing, and preserving them through the winter is necessary, they requiring a temperate and uniform atmosphere, both as to warmth and moisture.

Wheat.—The third year of the rotation is usually devoted to wheat, which had been sown at the close of the second, after the crop of that year, such as potatoes, melons, cucumbers, &c., had been removed. Many varieties have been introduced here, as having some particular merit, which entitled them to preference over others; but of those that have been subjected to the test of several years' cultivation under all circumstances, the "blue stem" has the preference among white, and the "Mediterranean" stands unrivalled among red wheat, being early and less liable to suffer from rust, fly, and other maladies to which the cereal crops are subject. Seeding is mostly done in the tenth month, and harvesting near the first of the seventh month. The seed is generally sown dry, as it comes from the winnowing-mill, though it is sometimes soaked in strong pickle with beneficial results. Average product per acre, 20 bushels; cost per bushel of cultivating, 80 cents; market value, $1 to $1.12 per bushel.

Rye.—This crop is not cultivated to any great extent here. Three pecks are usually sown in the ninth month, and about 12 bushels harvested per acre in the latter part of the sixth month following. Price, 75 cents per bushel. The straw is valuable to farmers. Being long and pliable, it is convenient for many purposes; but this crop has disappeared rapidly from our fields since the introduction of Mediterranean wheat, which succeeds admirably on light sandy soils, yielding 50 per cent. more in quantity than rye, and commanding 33 per cent. more in price.

Grasses.—Clover and timothy are the principal grasses in cultivation, and are usually sown on young wheat or rye, about 1 bushel of each on 8 acres of land. Lime, marl, and plaster are extensively used, and are excellent fertilizers for meadows and pastures. Wood-ashes, guano, and poudrette are sometimes used with beneficial results. There might be a great saving of useless experiments, if farmers, instead of groping in the dark, and waiting years for the results that might be produced by different treatment, could bring to their aid the light of science, to show by mere analysis the constituent properties of their soil, and the kind of application necessary to supply the exhaustion caused by various crops.

Peas and Beans are only cultivated as vegetables, and are picked and sent to market while green.

Hogs.—Several breeds have been introduced and much mingled together; the Berkshire, however, has held a prominent place in the estimation of the people. Hogs are kept principally for the purpose of consuming the slops and offal produce of the farm, which would otherwise be wasted, but may thus be turned to good account, and, by keeping the sties well supplied with litter, muck, &c., large quantities of manure may be obtained: further than that, the price of corn will not warrant the feeding of swine on a large scale.

Root Crops.—Carrots and beets have been cultivated as a field crop to some extent, but, not meeting the expectations of the people, they have been mostly discontinued. Turnips are still largely cultivated, both for market and for feeding stock, yielding about 500 bushels per acre.

Dairy Husbandry.—Milk and butter are the principal articles sold from the dairy. One hundred and fifty pounds of butter to each cow is a fair yield for the year, worth 20 cents per pound. There is a limited demand for milk, which commands 8 cents per quart in the neighbourhood, and 6 cents in Philadelphia market.

Fruit culture is claiming increased attention. Many people have found that a few trees of the best selected fruits, planted around the house and yard, have yielded more profit than as many acres of land cultivated with ordinary crops. If proper care be taken in the transplanting and after-treatment, for a few years, until the trees get established in their new location, it will be fully repaid by the additional quantity and quality of fruit produced. The holes to receive the roots should be excavated larger and deeper than merely sufficient to let the roots in without bending, and rich earth or prepared soil should be filled in, so as to plant the tree as deep as it previously grew in the nursery. All wounded or bruised roots should be pared with a sharp knife; the tree should be held upright, and the roots extended in their natural position, and covered carefully with pulverized soil, which should be brought in contact with every fibre, so as to leave no hollow or cavities among the roots. A little water should be poured on, so as to settle the earth and retain moisture around the roots, after which throw on a little more surface soil, to prevent its baking, and leave a little hollow to hold the rain. Stake each tree and tie it carefully, to prevent the wind from shaking it, which greatly retards the young roots from striking in the ground. Young orchards should be cultivated for several years, and have vegetables grown therein, in preference to grain or grass.

The *Plum* is a valuable fruit, and, being liable to several maladies, particular care should be taken to cut off and burn the large black bunches when they appear on the limbs. One of the best preventives against the depredation of the curculio is to allow swine to have free range among the trees, as the insect is found to avoid places so dangerous to its offspring, which is contained in the fruit that has been attacked on the tree, which falls prematurely to the ground, and is destroyed by the hogs feeding below.

Peaches are of easy culture, but the trees should be examined two or three times during the season, and all worms removed from their roots, which may be readily indicated by the gum oozing from near the surface of the ground.

Quinces succeed best in a rich, mellow, moist soil, and, when thus situated, produce abundant crops of fine, sound fruit. Coming into bearing early, they bid fair to be a very profitable market-crop.

Grapes.—The native varieties are the only ones to be relied upon for open or field culture; and the Catawba, Isabella, and Elsinburgh have proved the most valuable for that purpose. Poles or stakes have heretofore been used for supporting the vines, but what is greatly preferred now, is a cheap and substantial trellis, made by erecting upright posts, eight feet high, and extending wires (No. 11) from one to the other, for the tendrils to cling to, and support the fruit and foliage.

Raspberry.—The cultivation of this fruit is claiming much attention, and many thousands of them are annually planted. Having over six acres devoted to their culture, I have found them to be one of our most profitable crops. There are many highly esteemed varieties, but, so far, the red Prolific, a native kind, has answered better than any of my imported ones. It is a medium-sized berry, great and certain bearer, and very hardy, needing no protection during the severest weather. The Antwerps and Fastolffs bear superior fruit, but the canes are so tender as to require careful protection from the sudden changes in the weather, or they may be so injured as to affect the crop. A moist situation, free from the extreme of drought or surface water, is desirable. The rows should be six feet apart, and the plants three feet apart in the rows, and cut down to within a few inches of the ground, soon after being planted, that the roots may become well established before they are required to supply nourishment for a long top of green foliage; otherwise the exhaustion of sap would be greater than the amount furnished by the roots in their new situation, and many of the plants would wither and die at the approach of dry weather. After the bearing season is over, the stems that have borne fruit should be cut down to the ground, to give strength to the young suckers which are to produce fruit the next year, as those which have once borne will never bear again. All superfluous suckers should also be cut out, and not more than five or six of the strongest stems retained in each hill. Stakes or rails are not necessary in field culture for sustaining the plants, but where they are too slender to bear their own weight, the tops of several may be tied together, whereby they will support each other. The ground should be thoroughly cultivated, and have a coat of manure every fall. A new plantation should be formed every seven or eight years. The fruit is picked in small square boxes containing one pint each, at a cost of one cent per box, mainly by the wives and children of laboring men in the neighborhood, who, instead of being a burthen to be supported by the head of the family, as heretofore, can each of them earn from fifty cents to one dollar per day, being quite as much as the principal himself generally obtains. The extensive use to which the raspberry is now applied in making jams, pies, tarts, sauces and preserves, raspberry cordial, syrup and wine, which "is a good reviving draught in ardent fevers," in addition to the large quantity used as a dessert fruit, creating a great demand, and the supply being limited by the number of pickers in each neighborhood, maintains a price much above the cost of growing them.

Strawberries.—This delicious fruit being so extensively cultivated as a field crop, yielding as many bushels per acre as corn, and commanding six times the price in market, scarcely needs any direction at this time for its culture; but, as some may wish to engage in it, who are not acquainted with the manner of growing fair crops of large berries, I will merely state the mode of cultivation that I most approve, after several years' practice. The ground should be prepared as for other crops; if not already rich, make it so by manuring: mark the rows four feet apart, and set the plants twelve

to fifteen inches distant in the rows. If the plants are of the female variety, put one hermaphrodite to every ten of the others, entirely rejecting the purely male or barren plants, which produce no fruit, but blossom and grow vigorously, and soon overrun and crowd out their more fruitful neighbors; some hermaphrodites bear abundantly themselves, and are amply sufficient for all the purposes of fertilization, by which treatment every plant may bear a perfect berry to each blossom. The beds should be kept mellow and free from weeds the first season, and the runners carefully distributed over the ground, so as to form the beds with regularity, after which but little culture is needed. A new plantation should be formed every four or five years. Plants are less liable to suffer from drought when set in the spring than in the latter part of summer, though either is a suitable time for transplanting.

I have extended this communication beyond my first design, and have no doubt embraced much superfluous matter, which, I hope, thee will curtail, and publish only what may be useful. Believing that the great interest of agriculture will be advanced by collecting and disseminating information on all matters pertaining thereto, I shall be happy at any time to contribute what little lies in my power towards the general good, in part return for the benefits which I have received from the experience of others. With sentiments of the most perfect regard, I subscribe myself,

Very respectfully, thy friend,

WILLIAM PARRY.

West Chester, Pa., December 24th, 1850.

Sir:—In answer to the queries contained in your printed circular, issued the 26th of August last, I beg leave to confine my remarks, at present, principally to the cultivation of the apple.

The apple will, for a long time, continue to occupy a prominent position among the fruits cultivated in Pennsylvania, either for home consumption or exportation. Its adaptation as a table dessert, in connection with its cooking qualities, and the great length of time to which its season of usefulness may be prolonged, will secure it a prominence in the culinary catalogue that no other fruit can easily reach. But a very limited quantity has hitherto been cultivated in this section of country for exportation; the principal markets for the surplus, over the consumption of cultivators, are the inland and river cities and villages. The proportion of arable land in eastern Pennsylvania under apple culture is about 2 per cent.; it might be 10 per cent. with profit to the cultivator. At least, three-fourths of the trees are past the prime of bearing, with a rapid tendency to decay. Most of the old orchards were planted for the purpose of making cider and apple-brandy, and the varieties of fruit selected with special reference to those objects. The association of horticulturists, by holding exhibitions, and awarding premiums, have, within a few years, given an impulse to the growing of such varieties of the apple as are better suited for the table; hence, plantations have been lately made with reference to that object; but a small proportion of which has yet come into bearing. The ball of improvement is, however, in motion, and continues to roll. Experience has demonstrated that certain varieties of the apple cultivated with the greatest success in one section of the United States are very inferior in other locations. This remark holds good in relation to most other fruits. It will hence be seen that it is impracticable to give a list that would be worthy of cultivation in all parts of the country. It is better, therefore, that those who are about to make apple plantations should select such varieties as are known to do well in their own vicinity for the larger part of their orchard: at the same time, plant a smaller proportion of other varieties of standard reputation elsewhere. If any of these should prove to be inferior, the heads can be top-grafted, and the variety changed, with a loss of only two crops. I would here remark to the young orchardist, that the nursery-man, from the nature of his profession, is always the best able to give advice in relation to the varieties most worthy of cultivation in his vicinity. A northern slope is the best for an orchard; any deviation from this should be easterly or westerly; a southern aspect should be avoided, if possible, as the very worst. Although some compositions of soil are better than others, I would say to every landholder, plant on such soil as you have; but avoid, if possible, a low, flat, or wet location, unless you first give it a thorough draining. Most horticultural writers advise the digging of holes, 3 or 4 feet square and 2 feet deep, in which to plant trees; the holes thus dug being first filled with rich earth or well-prepared compost. This preparation will undoubtedly give the trees a rapid growth for a few years, while the roots are confined to the narrow space prepared for them; but when they are compelled to go beyond those narrow limits in search of food, I fear the consequence will be like a spoiled child, fed on "roast-beef and plum-pudding" at home, and then sent out into the cold world to seek a living for himself. I do, however, most earnestly recommend subsoil ploughing. Let the subsoil of the whole field to be planted be loosened and pulverized as deep as possible. Without this preparation, the good results contemplated by digging deep holes are, to my mind, very questionable. I planted an extensive apple-orchard, a few years ago, without even the advantage of subsoil ploughing, which I very much regretted, there being obstacles in the way, which I was unable at the time to overcome. To make amends, as far as possible, for the want of subsoiling, I planted my trees *on the top of the ground.* A boy held the tree upright, while a man, with a shovel, covered the roots with such topsoil as he could collect convenient to the tree, raising a mound about the stem, to the usual depth of planting, extending the slope some 3 or 4 feet from the tree, the ground having first been well ploughed in the usual way. I did not lose one tree to the hundred—they not only lived, but grew; and their growth, so far, is quite satisfactory. There is great difficulty in making a fair estimate of the quantity of apples that may be grown annually on an acre of ground—the age of the trees, the mode of pruning them, the number on an acre, the composition of the soil, its culture, the aspect or slope of the ground, with other contingencies—all have a bearing on the productiveness of the orchard. A good distance to plant apple-trees, is 33 feet apart each way, which will place 40 trees on the acre; this disposition will give the trees sufficient room when they come to full growth; but if the planter wishes to devote his ground principally to the growth of apples, and bring it into profit as soon as possible, he may plant his trees 1 rod apart each way, which will put 160 trees on an acre. When the heads grow so large as to become too close, cut out every other tree in each row—not the trees opposite each other in the adjoining rows; but so as to leave the orchard in the quincunx order. When they again

become too close, cut out one-half of the rows alternately, which will reduce the number to 40 trees to the acre, and give ample room to expand and develop their utmost fruit-bearing qualities. If apple-trees are planted on good ground, and well cultivated, they will commence bearing on the fourth or fifth year, (some varieties sooner than others.) The tenth year, they will yield 3 bushels to the tree, which (if planted 1 rod apart each way) will be 480 bushels to the acre. The fifteenth year, they will yield 5 bushels to the tree, which will be 800 bushels to the acre. This may be considered a fair average crop for 20 years afterwards. If apples are worth 20 cents per bushel on the tree, (which is a very moderate estimate,) then an acre, planted as above advised, will produce $96 the tenth year, and $160 annually after the fifteenth year. All that a farmer gets for his apples on the tree, over 5 cents per bushel, is clear profit. To produce these results, it will not do to merely plant an apple-orchard, and let it take care of itself. The ground must be cultivated and manured, the trees must be annually pruned, caterpillars and other insects destroyed; in short, such a course of culture is needed as will keep the trees in good health, with plenty of nourishing food at their roots. The crops grown between the trees, before they come into bearing, will remunerate all this labor and expense. Indian corn and root crops are the best for orchard culture; cropping with small grain is injurious to fruit-trees. Red clover is the only grass that ought to be permitted to grow in an orchard; and it should be ploughed under, the second or third year.

Pruning.—Minute directions for this operation cannot be clearly given, without occupying too much space. A few hints, in outline, will be sufficient for the purpose. Pruning should commence with the planting of the tree, and should be continued, more or less, every year. The upper surface of the head of the tree should be in the shape of an open umbrella: this will permit the rays of the sun to reach the fruit, without which it would not ripen well. The upright centre branches must be shortened, or "headed back," the outer side-branches be encouraged to take a horizontal position, and the whole head should be so thinned that light and air can have a free circulation. The facilities incident to hand-picking the fruit should also be kept in view when shaping the head of the tree by pruning.

Some pomologists prefer winter, and others summer pruning. My experience is in favor of winter pruning, for the purpose of thinning-out and shaping the head of the tree. Suckers or offshoots may be removed at any time—the sooner the better. When young trees are well cultivated and manured, they sometimes become too growthy, at the expense of fruit-bearing. To remedy this, it is well to go over the trees, in the months of July or August, and, with a sharp knife, cut off about one-third of the present year's growth of each shoot: this will check the growth of the tree, and induce the formation of fruit-buds for the next year's crop. Summer pruning for any other purpose cannot be recommended, as the removing of any part of the foliage has a tendency to check the growth of the tree. By pruning every year, small branches only are cut, which soon heal over, without any deleterious effects from the wound.

There is nothing to be gained by those who wish to plant fruit-trees, to begin by propagating and raising their own trees. It is better to go to the nursery at once and buy those they want, of the proper size for transplanting, which will be five years in advance of trees they would grow themselves. Five years advance in the fruit business is a matter of some importance. If the above remarks are deemed worthy of a place in your Report, and prove to be of any use to the community, the writer will be amply compensated.

Very respectfully, &c.

A. MARSHALL.

Canandaigua, N. Y., December 27th, 1850.

Sir:—In answer to the Agricultural Circular which you were pleased to send me, I beg leave to make the following remarks:—

Wheat.—The varieties most in use are Soules and white-flint, the former is sown to the greatest extent, but the latter has many recommendations. It will make at least an equality of flour, and, being less liable to shell out, there is less loss in harvesting; and, if there should be a scarcity of help, it can stand until quite ripe without any damage. On this last account, I have sown no other for several years. Where much wheat is grown, I think it advantageous to sow both kinds. Since I have grown the flint-wheat, my average has been about 25 bushels per acre. I am not an advocate for early sowing, but from the 10th to the 20th of September, I consider the best time. By sowing late, I think I stand a better chance to escape the ravages of the fly. I formerly limed my seed, but of late have sown without any preparation, and, by being particular in selecting clean and pure seed, have not found it necessary to pursue any other course. Where I fallow, I plough three times; but I put in a great portion of my wheat with one ploughing after clover. My favorite rotation, where the nature of the soil will allow, is, 1st. Corn or roots, on which I apply all my manure; 2d. Barley or oats, at the same time seeding-down with clover; 3d. Clover, mowed or pastured; 4th. Wheat, with one ploughing. Under this system, there is no dead year for fallow; my crops are good and my land is not exhausted. Of course, this system will not apply in all soils, for, on some, fallow seems absolutely necessary; but such I do not consider the most profitable to cultivate. Average price for 1850, at our nearest market, one dollar per bushel.

Corn.—I have tried several varieties, and consider the large eight-rowed yellow the most profitable. My manner of cultivation is as follows, viz.:— As soon as the manure is spread, I plough it under, and, without any harrowing, plant along the furrows made by the plough, taking every fourth furrow, which gives a little over 3 feet between the rows, and I allow the same distance between the hills. I would say that this plan requires good ploughing and favorable soil. As soon as the corn is up, I cultivate between the rows lengthwise, and drop some plaster on each hill. In a short time, I go through again with the cultivator, first cutting down all weeds with the hoe, which grow among the corn, and the next and last time I go through with the plough, throwing up the soil to the plants and covering up all weeds, which will as effectually kill them as cutting them up with a hoe. After this, I go through with a hoe and draw the soil about the plants, and release their leaves when fastened down by ploughing.

Hogs.—I only fatten enough for my own use, and this I do by throwing to them the corn on the cob, which is not, perhaps, the most economical way, but it is the least troublesome. For my horses, cattle, and sheep, I grind corn and cob together.

As to the increase of corn from the application of manure made from corn fed to hogs, I cannot speak; but, having made a small experiment on manure applied to ruta baga, I will here state the result. November 17th, 1842, measured three drills of ruta baga, 30 feet long and 30 inches apart, and weighed the product, with the following result:

From common barn-yard manure,	45 lbs.	of roots,	=	435[illegible]	per acre.
" hen-house	do. 99	do.	=	958[illegible]	"
" rotted hog	do. 108	do.	=	1045[illegible]	"

From this I think it fair to infer that a very material increase of the corn crop might be expected from the use of hog-manure.

Oats.—Average crop per acre, about 50 bushels. Quantity of seed per acre, 4 bushels.

Barley.—Average yield per acre, about 35 bushels. Quantity of seed per acre, 3 bushels.

Peas and *Beans* I consider the least exhausting.

Clover and Grasses.—Average quantity per acre, about 2 tons.

Plaster is undoubtedly the best fertilizer for clover; but I do not think it has an equal effect on other grasses. In laying down meadows, the kind of seed should be suited to the land, for, on low, wet land, red-top is considered to be the best, while, upon higher land, timothy is more suitable. I am now using orchard-grass with clover, on account of its ripening so much earlier than timothy, which is not fit to cut when clover ought to be. I have tried rye-grass, but did not like it.

Sheep and Wool.—My sheep are all Southdowns. They are not profitable merely for wool-raising, but their mutton is very superior, and we are now brought near the Eastern markets by railroads. I consider them the most profitable sheep to keep. I have known them to be sold before 12 months old for slaughtering, in our village, at \$3 per head. I generally rear as many lambs as I keep ewes.

Root Crops.—For many years, I have been a successful cultivator of roots. My greatest crop of mangel wurtzel was 1846 bushels per acre, and of ruta baga, 946. I consider mangel wurtzel, sugar-beets, and carrots to be the most profitable. I do not think there is any decided increase in these crops, nor will it ever be profitable to grow them to a very great extent in this climate, owing to the necessity of having them protected during our long and severe winters. It is very different in England, where the winters are so mild that the greater portion of the crop is consumed upon the ground. I look upon corn as the grand substitute for roots, and as the farmer's main dependence to carry him through our long winters. Having noticed your queries, so far as I have a practical knowledge of the subjects, and being invited not to confine myself strictly to those queries if any other subject bearing on agriculture should suggest itself to me, I take the liberty to call your attention to a subject which I consider of the first importance to agriculture. I allude to a thorough system of draining. The wheat crop in this section of the State of New York is the principal one upon which the farmers depend in order to meet their cash engagements. Any plan by which this crop can be materially and permanently increased must be of great benefit to a large class. Now, I consider the greatest enemy to the wheat crop to be a surplus of surface-water. Nearly every spring we hear farmers complaining that their wheat is winter-killed, and in almost every instance of this kind which has come under my personal observation, I have felt assured that draining would have proved an effectual remedy. I know that upon my own farm, where wheat used invariably to heave out, a thorough underdraining has effected a complete cure. On many parts, which were mere swamps, and too unsound to bear a horse, I now grow my best wheat, and those fields which were formerly so wet as to be the last in a condition to work in the spring are now dry the earliest. To carry off mere surface-water much may be done by judicious ploughing and furrowing. Of so much importance do I consider it that the surface-water should have a free egress, that I am not satisfied merely to draw a plough where it is necessary, but I follow with a spade or shovel and clear out the furrows completely, and, after the first rain, I go to see if there be any lodgment of water, and if so, lower the trench so as to give more fall. As to ploughing, I have suffered so much inconvenience in getting the surface-water from my land, owing to the custom, so prevalent, of deeming it absolutely necessary, if a field had been ploughed north and south, that the next ploughing should be east and west, that I have, for a number of years, given up cross-ploughing. I have my fields ploughed into lands of 30 feet wide, taking care that the furrows run with the natural inclination of the land. By adopting this plan, I obtain a good fall for all the surface-water. After all this attention in carrying off the top water, there will remain lands to a very large extent unfit to bear wheat without underdraining, and a still larger extent which might be greatly benefited by it. It would be difficult to lay down any general rule for draining, as different situations require different treatment as to direction and depth of drains. It is a disputed question, whether deep or shallow drains are best. I advocate the former, never having had to repent of making drains too deep. My drains have varied from two to three feet in depth. In some instances, I have drained every dead furrow, which, according to my plan of laying out my lands, would be 30 feet apart. This is rather an expensive operation, but it has proved very satisfactory, as the nature of the soil, which was before a stiff clay, has undergone a great change for the better; and the field, from being the wettest and most difficult to work, has become the driest on my farm. With regard to the best materials for laying drains, stones, if abundant on the farm, (and, of course, it would be an object to remove them from the surface,) make good and permanent drains. If you have not stones at hand, drain-tiles are the best and cheapest material for that purpose. These are now made of good quality, and at a reasonable price, at Waterloo, Seneca County, N. Y. In this county, draining is comparatively a new operation, but I am convinced it is one which may be very beneficially pursued, and several farmers in this vicinity have entered into it with spirit, and with perfect satisfaction as to results. If, by these imperfect remarks, I shall be the means of calling attention to this most important subject, and of having it introduced into the next Agricultural Circular, when more minute and satisfactory statements may be elicited, my object will be attained.

I am, sir, your ob't serv't,

CHAS. B. MEEK.

Aurora, Cayuga County, N. Y., 12*th mo.* 18*th*, 1850—*lat.* 43°.

Friend:—Thy circular of the 26th 8th month last is before me, and in answer—

Wool-growing is most profitable for persons who are obliged to hire laborers; but for those who work for themselves, a variety of agriculture is more profitable. Cost per lb. for growing fine Saxon Merino wool is about 28 cents per lb., and sells for 38 cents per lb.; average weight of fleece 2½ lbs. Cost of growing Spanish Merino wool, 22 cents per lb.; sells for 31 cents per lb.; average of fleece, 4 lbs. It is not any more, if as much expense, to raise Spanish Merino wool per pound, as to raise common coarse wool. The Saxon Merino is much the finest wool, but not as strong constitution as Merino. The wethers of the latter are worth 50 per cent. more than Saxon; are equal to Southdown for mutton. My flock is very fine Saxon, but I am crossing them with Merino, such as I kept years since. One ton of hay will produce 28 lbs. of Saxon Merino, or 36 lbs. of Spanish Merino wool. One ton of hay is sufficient for 11 Saxon, or 9 Merinos, during our winter-foddering of 17 weeks. Merinos will eat coarser provender than Saxon; the former are rather more profitable than the latter, and 40 per cent. more profitable than such sheep as were common in America previous to the introduction of Merinos. The proportion of lambs annually reared, to the number of ewes, is, of Saxon Merino 40 per cent., of Spanish Merino 60 per cent., if they have lambs at two years of age; but better not have them until three years old; the flock will be stronger, and produce more wool.

The soil of this county is a rich, calcareous loam, producing good crops of wheat, corn, or grass. The above statement is estimating land worth $1 per acre, annually, subject to taxes and repairs, or double that sum, if in grain culture. Laborers, $125 per year, and board.

I have kept a flock, averaging two thousand Spanish or Saxon Merino sheep, during the last twenty-five years. The foot-rot was introduced from Saxony 17 years since, and, after applying for years several caustics to their feet, &c., and other things, as directed in European and American books, with great labor, without success, then commenced giving the sheep about three ounces flour of sulphur, (cost in New York 3½ cents per pound,) in one peck of fine salt, each week during warm weather, which, if I had known years ago, would have saved me some thousands of dollars, for it effected a permanent cure without labor.

Respectfully, HUMPHREY HOWLAND.

Jeffersonville, Fayette County, Ohio, December, 1850.

Sir:—In compliance with a request made in your Agricultural Circular of the 25th August, 1850, I have thought proper to make a few suggestions relative to the culture of the Irish Potato. Having experimented considerably on a limited scale, for some years past, in the above business, I give the result, hoping it may be of advantage to others. By planting in the month of May, say towards the latter part, in ordinarily rich, loose soil, with the addition of a little long manure, prepared by ploughing and harrowing, plant in hills three feet apart each way, with from two to three small potatoes in each hill, and cover four to six inches deep. Till, by ploughing each way, without adding fresh dirt to the plants, but elevate the soil on all sides above that first made, (i. e. above the hill,) and thin to three or six stalks to the hill, just before they bloom. By this process, the yield is 400 bushels per acre. But the same process, in rich sod land, with the same manure, may make a yield of at least 600 bushels per acre. The varieties are the pink-eye and red meshannock.

H. CREAMER.

Westmoreland, December 28th, 1850.

Sir:—Having received a circular from you soliciting information upon the subjects therein named, I will proceed to give my opinion in answer.

Wheat.—There are three kinds in use—the bald, which averages about 25 bushels per acre; Black Sea, average 25 to 30 bushels, and red-chaff, average 20 bushels per acre. Time of sowing, September 20th; harvest, July 20th. Preparation of seed, wet and roll in plaster; quantity per acre, 2 bushels. We plough but once, depth 6 inches. Yield diminishing. Rotation, corn, oats, and wheat. Remedy for the weevil, air-slaked lime sown while the wheat is in the blow. Average price in market, $1.13 per bushel.

Corn.—Varieties, yellow and white; average crop, 50 bushels per acre; cost of production, 40 cents per bushel. The best system of culture is to plough the ground in the fall, and in the spring furrow it and dung in the hill with compost. Best method of feeding corn, have it ground and scalded. The manure of 10 bushels of corn made by hogs, if carefully saved and applied in the hill, will add 5 bushels to the crop.

Oats, average yield per acre,			40 bushels;	quantity of seed,		3	bushels.
Rye,	"	"	" 35	"	"	" 1½	"
Peas,	"	"	" 20	"	"	" 1	"
Beans,	"	"	" 20	"	"	" ½	"

Peas may be considered a renovating crop.

Clover and Grasses.—Average product per acre, 2 tons; best fertiliser, manure; kind preferred, timothy; quantity of seed per acre, ½ bushel; cost per ton to raise, $3.

Dairy.—Average product of butter per cow,	150 pounds,	cost	12½	cents.
" " cheese "	300 "	"	7	"
Average price of butter per pound			14	"
" " cheese			6	"

Neat Cattle.—Cost of rearing till 3 years old, $23; usual price, $25. Value of dairy-cows in the spring, $30, and in the fall, $18. Number of pounds of beef produced from 100 pounds corn, is 19½. A given amount of food will produce more meat in a native than in an imported animal.

Sheep and Wool.—This branch of husbandry is profitable, and on the increase. Cost of coarse wool per pound, 18¾ cents, and that of fine, 31 cents. One ton of hay will produce 15 pounds of wool. Large sheep are more profitable for mutton, and small fine-woolled sheep the best for wool. The proportion of lambs to that of ewes is two-thirds. The best breed of hogs is the Berkshire. The cheapest method of producing pork is to feed scalded meal. One hundred pounds of corn will produce 24 pounds of pork.

Potatoes.—Average yield per acre, 200 bushels; cost of production, 12½ cents per bushel. Varieties, red-field and pink-eyes. Best manure is a compost of muck, lime, and dung.

Fruit culture is receiving increased attention. Apples are a profitable crop, but, when compared with potatoes, are not profitable to feed. The best mode of preserving manure is to keep it under cover till wanted for use, then draw it out and plough it under as soon as possible. The quantity used per acre is about 20 loads.

ROBERT WATERMAN.

Morrissania, Amherst County, Va., December 28th, 1850.

Sir:—I had wished to see the agricultural part of the Patent Office Report before replying to your circular, that I might see what I had written last year, and avoid unnecessary repetitions; but, as I understand it will not be published in time for that purpose, I have concluded to delay an answer no longer.

Wheat.—The varieties cultivated in this county are the white-flint, white blue-stem, the early and late purple-straw, the white-bearded, Mediterranean, and Zimmerman. The May wheat, both white and red, and the red-shuck, which were formerly cultivated here, have been almost entirely superseded by the first-mentioned varieties. The white blue-stem was more productive the past season than any other cultivated by me. This fall, I sowed a part of my crop with early purple-straw and Zimmerman wheat; as these varieties are highly spoken of by those who have tried them. The average produce per acre in this county, the past year, cannot be estimated at more than 10 bushels. We usually sow on high land from 1 to 1½ bushels per acre, and on low lands from 1½ to 2 bushels; and we commence seeding about the 25th of September, and complete this operation about the 10th of November. Fallow ground I usually plough twice, corn and tobacco land only once, and cover with the harrow. The ploughing is usually from 6 to 8 inches deep for wheat. The yield per acre I consider as on the increase, for a much better system of agriculture is practised by our farmers; more attention is paid to manuring the land, and more guano, plaster, and other fertilizers are used than formerly. My system of rotation in crops on high land, is the six-field: 1st, corn or tobacco; 2d, wheat or oats; 3d, clover; 4th, clover, partially grazed; 5th, wheat; and 6th, clover; and on my low grounds, the three-field: 1st, corn or tobacco; 2d, wheat; 3d, clover, taking care to graze the clover, after harvest to closely beat down the weeds and prevent them from destroying the young clover. The best protection against Hessian-flies, is to make the land rich, and sow in the month of October; and that against weevils, is early threshing and grinding. The price of wheat, the present year, in Lynchburg, has been from 90 cents to $1 per bushel.

Corn.—The only variety I have cultivated for many years is what is called the "double-eared," a white grain, between the gourd-seed and the flint. The best system of culture for corn is to make the land rich, plough deep, plant early, and not work the corn after harvest. I usually plough my low land in beds of 21 feet wide, on each of which I make 5 rows, plant the corn 2 feet apart, and leave 2 to 3 stalks in each hill. My low land produces from 5 to 15 barrels (of 10 bushels of ears) to the acre, and my high ground about 5 barrels. The average of the county is not more than 4 barrels per acre. There is certainly great economy in the feeding of stock by having the corn ground, for I am satisfied that from one-fourth to one-third will be saved by this operation. As to cooking food for stock, I am unable to give any information.

Oats.—This grain will yield about double that of wheat to the acre; but as the poorest land is generally selected for oats, the average yield may be put at 15 bushels.

Rye.—The Poland rye, a new variety, is said to be much more productive and hardy than that previously grown; but I do not cultivate this grain, in consequence of the difficulty of keeping it from mixing with my wheat.

Peas and *Beans* are only raised for family use in this vicinity, and barley not at all.

Clover is regularly sown on all my land after the small grain crop, and I save largely of the hay: indeed I consider it necessary for my farming operations. This, and my corn-fodder, are the only kinds I make use of. I suppose the clover yields from 1 to 3 tons per acre.

Dairy husbandry does not receive much attention, as we are satisfied if we have plenty of milk and butter for family use. We make no cheese. It costs us but little to raise our cattle, as we have a sufficiency of straw-fodder and shucks to feed with, and we keep no more than we can feed with advantage. We never feed our sheep except when the ground is covered with snow, which, in our coldest winters, does not exceed a few weeks. Wool-growing, therefore, might be profitable, if it received sufficient attention, as the expense of keeping sheep is inconsiderable; we keep only enough, however, to clothe our families and to furnish us with mutton and lambs.

Hogs are generally raised by keeping in the woods during the winter and spring, and feeding them on corn till about the first of June, when they are turned into the clover-fields, where they remain until the wheat is removed, and they are then suffered to glean the wheat-fields; and about the first of October they are put up in pens, and fed with corn, pumpkins, &c., till December, when they are killed. This we consider the cheapest method of producing pork. I have but one suggestion to offer as to the best method of curing bacon-hams, and that is, to remove the bone from the point of the ham to the hip-bone, and round it off. It is under this bone that the ham usually spoils, and this removal is attended with but little trouble, and the appearance but little changed.

The crops which we grow in rotation to maintain the fertility of the tobacco land, are wheat and clover. It is also desirable, in the three-field system, to put that part which was in tobacco one rotation, in corn the next, so that the land will not be in tobacco but once in six years. This I consider necessary, as the food of the tobacco-plant differs from that required for grain. To prove this, all kinds of products grow well after tobacco; and wheat after it will yield twice the quantity that it will after corn on similar land. The average yield of tobacco per acre, may be estimated at about 700 or 800 pounds on old land, and on new at about 500 pounds. The reason why old lands produce the largest yield is, that they are generally manured. Sometimes, however, much larger crops are made, for I have grown as much as 1200 pounds per acre. Root crops are not on the increase, as we only cultivate them for family use, except a few for market. Fruit culture is receiving increased attention among us, for orchards of apples, peaches, pears, apricots, &c. are being planted, of the best varieties, which produce well, unless nipped by an "untimely frost;" and I have no doubt that apples will be exported from Virginia in a few years, instead of being brought from the North. Grapes are also grown of many varieties, and produce well, both native and foreign; the former, however, succeed the best; and among these are the Norton seedling, a fine bearer, and is a most delicious table grape.

Manure.—My plan for making manure is to place my pens for wintering stock near the land intended to be manured for corn or tobacco. Into these pens I haul all my corn-stalks, and feed with straw, shucks, &c. The cattle eat as much as they want, and trample the remainder under their feet. In the spring, this manure is spread and ploughed under, and the stable manure is used in the same manner. That which is made in spring, summer, and fall is either spread as a top dressing on clover or wheat in the fall and plastered. I have spread lime on my land, but never have been able to discover any benefit from its use. I use plaster freely and with beneficial effects. I spread it weekly over my stable-manure heaps, also over the manure when spread. It is sowed on clover and used with seed-corn. The use of guano has just commenced in this county, and gives general satisfaction.

Respectfully yours,

RICHARD G. MORRISS.

Warsaw Prairie, Kaufman County, Texas, December 26th, 1850.

Sir:—My absence from home for some time past has prevented me from answering the interrogatories propounded in your circular until the present time, and I shall now have to beg you to excuse me for the brief reply which I am compelled to make. From the newly settled state of the country, it is almost impossible to make a correct report of the amount of products now raised in this and the adjoining counties, for it is now only a short time since when "nought else was heard but the yell of the Indian and the tramp of the buffalo." As to the capacity of our soil and climate for the production of cotton, corn, wheat, and other cereal grains, as well as that of many other agricultural products, I think it cannot be excelled; in short, as was stated in the Report of the Trinity Convention, which met at Huntsville a year or two since, and which was composed of delegates from the whole Trinity Valley,—"The rich black prairie country of the Upper Trinity, in an agricultural point of view, must necessarily become the garden of Texas. The immense grassy plains of prairie and woodland, the cane-bottoms, with never-fading verdure, and the immense fields of wild rye, green in midwinter, all show that the constant labour and toil of man are not necessary in order to rear stock of any kind, for they grow and flourish without his care."

Wheat.—Most of that formerly grown here has been of the bald varieties. Very little of any bearded variety has as yet been introduced among us. I regretted exceedingly that we had not sown the "Mediterranean," or some other good variety of bearded wheat, the past season, as the little we had remained unharmed, while whole fields of bald wheat were almost entirely destroyed by myriads of small birds resembling the rice-birds of the south, and which have never before visited us. It is unnecessary for me to say more at this time concerning these birds, as I am apprized of your having noted down my remarks to the Hon. Mr. Kaufman on this subject. Our black prairie land generally produces from 30 to 40 bushels of wheat per acre, and is of a very superior quality, weighing about 70 lbs. to the bushel. Five bushels of our wheat are equal to 6 raised in Ohio, for it contains the nutritious quality called gluten in that proportion, as has been proved by actual experiments. From my experience in seeding, I prefer to sow from the first to the middle of October. Our wheat is ready for harvesting from the first to the middle of May, which gives us the advantage of having our flour in market one or two months earlier than that from any of the Western States. We generally sow about 1 bushel to the acre; but I prefer rather more. It is not common to plough our ground but once, and this at the time of sowing. I usually plant my ground with corn, preceding a wheat crop. I sometimes make a good crop of corn on the same land after taking off a crop of wheat, and then sow with wheat again the next fall. We are not troubled much with weevil, and not at all with the Hessian-fly. The average price of wheat is about $1 per bushel.

Corn.—The average product per acre is from 30 to 40 bushels. The cost of production is about 20 cents per bushel. I do not know that I can point out the best system of culture, for, having too much land to cultivate for my force, I am sometimes obliged to do many things different from what a scientific farmer would recommend. I suppose it is unnecessary for me to state the process of putting in a sod-crop. If any of your readers want any information on this subject, I would refer them to the letter of the Hon. H. L. Ellsworth, published in the Patent Office Reports for 1845. After this first crop, if not sown with wheat in the fall, I usually let the land remain without any further ploughing till I am ready to plant again in the spring, when I lay off my corn-rows only one way, and 3½ feet apart, with a plough. I drop my corn in the furrow, 1 grain in a place, about every 2 feet, and cover by turning a furrow from each side on the corn. When it comes up, I go through with a harrow, which levels the ridge and leaves the ground loose and in good order for giving the corn a good start. I usually give my corn one or two more ploughings after breaking out the middle, and then lay it by.

Oats.—The average yield on my land is about 40 bushels per acre. The quantity of seed per acre is 1½ bushels. Barley, rye, peas, and beans are also cultivated with good success. Peas are the best for renovating the soil, though as yet we have no need to cultivate them for that purpose. The cost of rearing neat cattle here is comparatively nothing, and the value of a heifer at that age, with her increase, is usually from $12 to $15. They usually commence breeding at two years old, and continue every year after until a very advanced age. We have no occasion to fatten beeves on any thing else than what our prairies and bottoms afford. Many of our citizens complain that the beeves are too fat, though the flavor is very fine. Some yearlings of the common breed have been killed in this neighborhood, which weighed about 400 pounds. Beef is worth $2 per hundred. Our high undulating prairies are peculiarly adapted to wool-growing, though no great attention has been paid to this business among our farmers; but from the experiments made, there is no doubt of its being a profitable branch of husbandry, for we have no trouble in feeding at any season. The raising of horses and mules is also profitable with us, and for the same reason. The large cotton and sugar plantations of Louisiana, as well as some portions

of our own State, always afford a ready market and good prices for all we can send them. If there is any one kind of stock that succeeds better than another, I would say that hogs have always exceeded any thing I have ever seen in any country, if we except the past year, for we have always before had an abundance of mast. This failure, together with the unprecedentedly long drought of the summer and fall, has proved very detrimental to our pork interests, for we have never before been obliged to feed our hogs on corn in order to make them fat, the mast (acorns) always being sufficient for that purpose. I think the meat thus fattened is better flavored than that fed upon corn, though the lard is not so hard: still, I believe it to be as good for all culinary purposes.

Cotton is one of the great staples of the Upper Trinity country, though, for the want of navigation on this part of the Trinity, it has not been cultivated so extensively as it would otherwise have been; yet we have tested this branch of agriculture sufficiently to prove that the quality of our cotton is equal to that of any other country, and, for the shipments we have made to Galveston and New Orleans, the highest prices have been paid which those markets afforded. I suppose a bale of 500 pounds would be a fair average produce to the acre. I have not heard any complaints of the rust or the bollworm. My system of culture is to throw up my land into beds, by ploughing four furrows (two on each side) together, leaving the middle unbroken. When ready to plant, I open a furrow with a small plough, and drill the seed sufficiently thick to secure a good stand, which I cover with a harrow, though a simple contrivance made of wood, which packs the earth close to the seed, I think, is better. As soon as the cotton is up, I thin it out to one plant for every two feet, the rows being four feet apart. The after-culture is very simple, the main object being to destroy the grass and keep it clean. Deep ploughing is not necessary. Should our land require renovating or improving, I should pursue a somewhat different course, which would be to bed up my land as early in the winter as possible, by first opening a deep furrow in the middle of the old rows, which is called the water furrow, into which I would put the stalks of one row, and whatever litter might be on the ground, and then bed immediately over it. This should be done early, in order that the ground may have time to settle close over the stalks beneath. A great many more hints might be given on this subject, but time will not permit. I have already extended my remarks on this topic to a greater length than I should otherwise have done, did I not believe the time had now arrived when the citizens of the Upper Trinity will engage with spirit in the cultivation of this great staple. The obstructions to the navigation of the river having been removed, there is now no difficulty in navigating it with steamboats. I do not know that the sugar-cane has yet been tried in our prairie country, though I am induced to believe it would succeed quite as well as it does in Harrison county, which is in about the same latitude as this, and where I have seen cane that had ripened well to the tenth or twelfth joint. The first year I moved here, I brought some sugar-cane with me, for the purpose of testing whether it would grow here. I planted it, and it came up and grew vigorously till the rabbits, which were then very numerous, began to eat it, and finally destroyed the whole. I have procured more, and shall try it again the next year.

Rice, as yet, is but little cultivated, though, from experiments which I have made, I am satisfied it might be a profitable crop.

Tobacco is also cultivated here by most of our farmers, on a small scale, merely for domestic use; yet those who have raised it in Missouri and other Western States, say that it succeeds equally well here.

Root crops, such as beets, turnips, carrots, &c., are easily produced, but are not cultivated as a field crop.

Irish and *Sweet Potatoes* are also cultivated with good success.

Fruit culture is receiving increased attention among our farmers, many of them having now considerable orchards of peach and apple-trees; also many other kinds of fruit.

Not having kept a meteorological table since I came here, I cannot answer the questions propounded under this head, but think there is very little difference in the temperature here from that of Louisiana and Mississippi, in the same latitude. I think the aggregate fall of rain, during the year, to be about the same also. I have thus, sir, glanced over most of the items named in your circular, in a very hasty manner, and, should any thing I have said, have a tendency to benefit the agricultural interests, it will be a source of gratification to me to think that I have been of any service to your department, which I look upon as being one of the first importance.

I am, sir, with high esteem,

Your obedient servant,

S. G. PARSONS.

Philips, Franklin County, Maine, December 25th, 1850.

Sir:—Having received a circular from the Patent Office, soliciting information upon agricultural subjects, I would, in reply, make a few observations relative to some of the crops cultivated in this vicinity. Of all the products of the soil in this State, that of grass is the most important. From this source arise at least three-fourths of all the profits of the agriculturist. Maine exports, annually, vast numbers of neat cattle, horses, sheep, the products of the dairy, wool, &c.; consequently, it is all-important to produce the greatest possible amount of grass, both for hay and pasture. The pastures of this State will compare favorably with those of any other in the Union, especially for sheep, as they are generally elevated. The common method of seeding ground for hay is to sow the seed with grain, in the month of May. The grain is wet, and sometimes soaked in blue-vitriol water, 2 oz. of vitriol to the bushel, in order to prevent smut in wheat; the grass-seed is mixed with the grain in this wet state, to which it readily adheres, and thus it is sown evenly over the ground. The quantity sown is about 10 pounds of clover and 8 quarts of herd-grass (timothy) to the acre. These are the principal kinds of seed sown, though some add 1 or 2 qts. of red-top seed. The quantity of hay per acre varies from 1 to 3 tons. When it falls short of 1 ton per acre, the land is ploughed, and treated in the following manner:—We plough after the hay crop is taken off, or early in the spring, and sow with oats, which will yield a crop of from 30 to 40 bushels per acre; and immediately after this crop is harvested, the ground is manured and ploughed; and in the spring it is ploughed again, and planted with corn or potatoes, and sometimes sown with wheat, and seeded down to grass, but more frequently planted as above stated: the next spring it is ploughed, and sown with grain, and seeded to grass. The hay crop, for the past season, was rather above the average and secured in good condition. Our wheat crop was of an excellent quality and a fair yield for late years. For the last ten or twelve years, the yield has materially diminished. The variety most in use in this vicinity is the red-bearded, which is much less subject to rust than any other variety that we have tried. An average yield per acre, is about 12 bushels. The time of seeding is in May, and of harvest in September. We generally sow 1½ bushels per acre. Good wheat is worth $1 per bushel.

The corn crop was very good the past season both as to quality and quantity. The yellow eight-rowed variety is most esteemed, the cob is small, and kernel larger than any other kind among us. Average product, 40 bushels per acre.

The last autumn was unusually mild: no frost to injure any thing till all the products of the farm were secured, except in some low situations.

Very respectfully,

Your obedient servant,

B. F. EASTMAN.

Waterloo, Granville, North Carolina.

Sir:—In reply to your circular, soliciting information on the different branches of agriculture, I will state such facts as have come to my own knowledge.

Our wheat crop, which, in this State, is generally small, was this year an unusually short one, having been attacked, a few days before harvest, with the rust, which cut it short in quantity at least one-third, and rendered it, in most cases, almost unfit for use. The state of the weather, at the time our wheat was attacked by the rust, has most sorely perplexed all the theorists who have attempted to account for the cause. The most generally received opinion of the cause of rust is, that it is induced by the superabundance of sap in the stalk, which, not being taken up and assimilated by the grain as fast as formed, exudes through the ruptured skin of the stalk, there drying and forming the rusty brown blotches or spots from which it takes its name. The weather heretofore considered most favorable to the formation of the rust is warm and damp, when vegetation generally flourishes best. The rust attacked our wheat this year, during an unusually cool and dry season, with cold dews at night. The wheat generally raised in this section is golden-chaff, a red wheat. The white varieties, of which there were some grown here, though the stalk was nearly as badly rusted as the red-head grain, were of far superior quality. Early sown, and the early varieties, seem generally to be less injured by the rust. Though the white bearded, (the only name by which it is known here,) a very late wheat, was the best in quantity and quality. Why the white varieties should escape the rust, I have not seen or heard satisfactorily accounted for. This crop has increased annually in this part of North Carolina, for the last ten years, with great benefit to the farmers, and manifest improvement to the farms. The average product per acre will not exceed 10 bushels, though, in some cases, I have known from 20 to 25 made on the acre. The time of seeding is from the 1st of October to the middle of November. Harvest, from the 15th of June to the 1st of July. The wheat is generally sown on land after tobacco, and turned in with the single-horse-plough: when sown after cane, and the land is foul, harrowed in on a deep furrow.

The best preventive of Hessian-fly is to wait for a hard frost before seeding. This was the advice of the late Judge Buel. I have followed it for the last 20 years, and never had my wheat injured by Hessian-fly. Salt, sprinkled thinly over a bulk of wheat, prevents its being injured by weevil, or covering it with sassafras or alder bushes. The average price of wheat at our market, Petersburg, Va., is about $1 per bushel.

Corn.—The variety of corn preferred by myself is a mixture of the gourd-seed and rare-ripe. It is early and very sound, generally. Great advantage may be derived by selecting seed-corn from the largest and most prolific stalks. The average product per acre is from 10 to 20 bushels. The most important part of the cultivation of the corn crop is the preparation of the land before planting. It is my opinion that all land should be first furrowed deep, and then harrowed before planting with corn. The early cultivation should always be deep, and shallower as the crop increases in size. Our corn crop this year is quite small, owing to the long dry spell of weather, from May to November. It is now selling higher than for 10 years past, 80 cents per bushel. Peas are considered the best renovator now in use in this section of the State; are more generally used for this purpose, and for fattening hogs, than any other crop; but are seldom raised here for market. But little attention is here paid to the grasses, although they are coming more generally into cultivation. Our all-absorbing crop is tobacco, which takes precedence of all others. The average yield per acre is from 800 to 1000 lbs. It is generally considered the most profitable crop when the soil and climate suit; and particularly in places far from market. I believe the crop made in this State stands as high as that made in any part of the United States for manufacturing into chewing tobacco. The method of curing has undergone a great change within the last five years. It is now cured mostly by the sun and air. After it is housed, very small fires, made with seasoned oak, hickory, sweet gum, or sassafras with the bark taken off, are preferred to dry it in damp weather, when the tobacco is soft, or, as we say, in high order. The wood should be split in small pieces about two feet long, and not larger than a man's arm. The object is merely to dry the tobacco, not to smoke it. Our crop was cut short this year, three-fourths, by the long-continued drought, freshets, and frost. The quality this season is generally very inferior; the price in market higher than for several years past; so that it is believed that the income from the tobacco crop, this year, will be as great as usual.

Much more attention is now paid to wool-growing than formerly. The number of sheep in this neighbourhood has doubled during the last five years. Wool is now becoming an article of export; most of our winter clothing is manufactured at home; and in our dwellings you may see some carpets as nice as can be found anywhere. Where lands are so cheap as they are in most counties in this State, I think wool-growing might be made very profitable. Sheep here cost nothing but attention in summer, and not than 10 cents per head during the winter, as they never require feeding here except in unusually bad weather.

As to hogs and cattle, we only raise enough for home consumption. Fruit is now more attended to than formerly, and, instead of being gathered for distillation into brandy, is now grown for the purpose of feeding and fattening hogs. As to manures, we may truly be called Rip Van Winkles; for I am sure no people could pay less attention to raising it than most of us do. For information on this subject we must be your debtors.

Yours, very respectfully,

F. R. GREGORY.

Burlington, Vermont, January, 1851.

Sir:—The culture of fruit has been for many years much neglected in Vermont, though apple-orchards were planted on almost every farm on its first settlement. At present the culture of fruit, particularly of apples, is exciting much attention. Old orchards are receiving more culture, and great numbers of young trees are yearly planted. Some portions of the State, particularly the valley of Lake Champlain, produce apples equal to any part of the United States, which are found to be one of the most profitable crops a farmer can raise for exportation. There has not been a failure of a fair amount of apples any season since I have been a resident of this valley, (twenty-five years.)

No other article grown pays *one-half* the profit to the farmer as good varieties of apples; and, even for feeding to his stock, an acre produces more value than any other crop, and with less labor. Of the comparative value of apples and potatoes for feeding stock, I cannot speak from accurate experiments. I have, for the last two years, fed apples, both raw and boiled, with and without meal, to hogs from the middle of August to December, and am satisfied they are equal to potatoes fed in like manner. I have also often conversed with farmers, who fed large quantities both to hogs and cattle, and find their general opinion to be that apples and potatoes are of about equal value for feeding.

Vermont, like other States, has many favorite seedling apples, both for autumn and winter. In the northern part of the State, the Fameuse for autumn, and the Pomo-Gris for winter, both from Canada, are much cultivated, and are great favorites. The Early Harvest, Bough, Red Astrachan, Porter, and Gravestein are among the best summer and autumn fruit; and the Greening and Roxbury Russet are among the best for winter use and exportation. The Esopus Spitzenberg is much cultivated; but neither this nor the Newtown Pippin, which is also common, is so well adapted to our climate as the Baldwin and Roxbury Russet.

Pears grow in most parts of our State in great perfection. One of our best is the old white Doyenne. (St. Michael's, of Boston; Virgalieu, of New York; and Butler pear, of Philadelphia.) This grows in great perfection, while it fails near the Atlantic coast.

Plums are abundant: in many parts of the State, found growing wild.

Peaches are but little cultivated, though not uncommon. As to disease, the blight on apple and pear trees, black knots and yellows on peaches, are so rarely seen, that no attention has been given to them.

The *grapes* mostly cultivated are native varieties of New England, which, including seedlings, are very numerous. The Isabella, Miller's Burgunda, white Sweetwater, and many others ripen, but require slight protection.

Spring planting in this cold climate has many decided advantages over fall planting, and should be adopted for all fruit-trees, vines, and shrubs.

As to planting and cultivating fruit-trees, the best advice that can be given is to study vegetable physiology, so as to have a slight knowledge of plants and trees, with the chemical properties of the different kinds; then manure accordingly, with thorough cultivation, and drainage when necessary.

But little wine is made in the State from grapes, though many families make small quantities. Wine is also made from currants. I have had from 50 to 100 gallons made yearly in my family, from red and white Dutch and black Naples currants, from the following receipt:

To make currant wine.—The fruit should be gathered when fully ripe. The juice may be expressed by washing the currants in the house, and straining through a common strainer. A man or a strong woman, accustomed to washing, will easily prepare the juice for a barrel of wine in a day. Have a clean cask, of the size you want to fill; let it stand on one end, and have a hole 2 inches in diameter in the other, to allow the scum to pass off. For every gallon your cask will hold, put in 1 quart and 1 gill of currant-juice, 3½ pounds of clean light-brown sugar; fill with water, and thoroughly mix. Shake the cask daily for 2 weeks while fermenting, filling the cask with diluted currant-juice as the scum passes off; then stop tight, and let it stand in the cellar until December, when it may be drawn off and bottled. It may be kept any length of time without the addition of alcohol; but 2 or 3 per cent. of pure brandy is added when bottled. It may be kept in the cask, though bottling is commonly thought best. For white currants, white loaf-sugar is used, making a clear white wine. We have also 50 gallons in a season from the berries of the common white elder, which resembles a rough port wine. This is made like the currant wine, except that 1 gill more of the juice of the berry is used for every gallon. This and the currant wine improve by age.

C. GOODRICH.

Hon. Thomas Ewbank.

Rock Haven Point-Office Farm, January 15th, 1851.

Sir:—Some time since, I received a circular from the Patent Office, requesting information respecting my experience in agriculture. My farm is situated on the bank of the Ohio River, on the Indiana side, about 30 miles below Louisville; and consists of 300 acres of cleared land, all of which is under cultivation, and 140 acres woodland, which is in pasture, making 440 acres under fence. My staple crop for a number of years has been hay, of which I raise about 200 tons annually, which I bale for the New Orleans market. I raise from 1 and 1½ to 2 tons per acre. As yet I have used but little fertilizing matter, the soil being very productive without; but barn-yard manure or straw, ploughed in, has, so far as I have tried it, doubled the crop on a stiff soil. The pure timothy-seed, unmixed with any other grass, is preferred for hay intended for the market; but, for my own use, I prefer a mixture of clover and timothy. Two gallons of timothy-seed is the amount sown on an acre of ground, when sown separate; and, when a mixture of clover is wanted, I would sow with the two gallons of timothy one gallon of clover. I have succeeded best in the fall and winter sowing, the ground being prepared for wheat in the month of September. I prefer to sow my seed, giving it one harrowing; then, to sow the grass-seed, harrowing again, so that the grass-seed gets one harrowing. I prefer this process to that of leaving the seed on the surface, wholly dependent on the heavy rains to imbed it in the surface. If, however, I fail by this process to get a sufficient quantity of young timothy in the fall, I resow during the winter, on the snow; and, between the two, I have never, as yet, failed to get a sufficient stand of timothy-grass, for a swath of hay, the season following the crop of wheat. If, however, grass is wanted without the wheat, the grass-seed may be sown alone, on the ground prepared as for wheat, and can be mowed the following season; but, usually, the first crop will be lighter than when sown with wheat and suffered to stand a year longer before it is mowed. Spring sowing is hazardous, unless sown in February, and then not so safe as fall or winter sowing. As to the cost of raising hay, I consider that, when sown with wheat, the cost of setting an acre of grass will consist of the following items, viz.: Two gallons of seed at 50 cents per gallon, $1, and the sowing of the same, at a cost of 25 cents, make the sum of $1.25 per acre, without rolling, which should be done in the month of February or March preceding the mowing; for, if the roller were passed over the ground when the sowing was done, it would assist the vegetation of the grass-seed very much, by compressing the soil, thereby retaining the moisture. The cost of rolling, per acre, would be, for driver 75 cents per day, and team $1.25, making $2 per day. Eight acres would be a fair day's work, making the cost 25 cents per acre. Harvesting the hay is estimated at $2 per ton, and baling $1. Thus, one acre of grass, producing two tons of hay, would cost as follows:—

Seed	$1 00
Sowing	0 25
Rolling	0 25
Harvesting	4 00
Baling	2 00
	$7 50

The average price of baled hay, at the river, is $10 per ton, amounting to $20 per acre, deducting expenses, $7.50, leaves $12.50 as the net proceeds of an acre of grass. I consider my grass crop worth to me, on an average, $10 per acre. The best baling fixture in our county is called the Mormon press, consisting of a beater to beat in the hay as the screw is receding, and an iron screw; the cost of the same, aside from the building in which it operates, is $175, and the building will cost $100, making $275 outlay for baling fixtures. It will also require an outlay of $500 to build suitable housing for 200 tons of hay. My screw has been in use 6 years, and looks as if it might last 6 or 10 years, or, it may be, 15 years longer. I put up the bales, about 4 feet long and 2 feet square in thickness, weighing, on the average, 250 pounds. This kind of screw will make it much lighter; but the above-named way is tight enough to be saleable and convenient. My press puts up 40 bales per day, in long days, working three hands and a boy to drive. Three hands prepare the poles, bale the hay, and stack it in the house, from which the loose hay is taken.

I have also on my farm some 1500 bearing apple-trees; but, for the last 10 years, the fruit has been nearly unfit for market, on account of the bitter rot, but, during the last year or two, the disease seems to be subsiding. The crop this year has rotted considerably on the tree, as heretofore, but the rotten part of the apple has not been bitter, as formerly. Before this disease attacked our fruit, I sold, in one season, from 500 trees, $1000 worth of fruit, besides what was used in the family. Since that period, my sales rarely exceed $100 per season, notwithstanding the enlarged size of my orchard. I have tried the application of lime to the surface of the ground about the roots of the trees, at the rate of 1 to 5 barrels per acre; but without any apparent success. I have also scrubbed the bark with a solution of potash, and inserted various drugs into the tree, by tapping and plugging; but without success. This has been a prevailing disease in all locations in this county; but it seems to be subsiding. I also had 100 pear-trees, bearing fruit, which, a few years since, died of fire-blight. I now have about a dozen, which seem free from disease, and have been bearing abundantly for three years. The fire-blight in pear-trees, after having prevailed here for the last 20 years, seems to have run out. My grain-raising has been without any system up to this time; but I now have a crop on hand, of which, another year, I expect to give a better account.

Yours respectfully,

JACOB L. KINTNER.

Henry County, Farmille, Virginia, January 24th.

Sir:—Your request would have been noticed sooner, but the Agricultural Circular was only received a few days ago. On only a few subjects will I submit a few remarks, leaving to others, of more leisure and superior knowledge, a full discussion of the important inquiries you make. In relation to ploughing, by far the most important work on the farm, I will observe, that every year's experience has convinced me more and more of the great advantage of ploughing *deep*, while I would by no means depreciate the utility of the various manures or other means of fertilizing the soil; yet, for this purpose alone, "deep ploughing" is invaluable. Not only by this means are larger quantities of the soil exposed to the fertilizing action of the atmosphere, rains, dews, or frost, but, by imbibing the rains that fall, the soil that is ploughed *deep* retains not only what it already possesses, but whatever it may gain through the decomposition of vegetables, &c. It will be admitted, that if a dam were thrown across a ravine, so as to catch and retain the soil that is washed off by the rains from a certain area above, in a few years' time, the accumulation would be sufficient to enrich the entire land from which it came; yet the land from which it was washed might remain as productive as before. In this case, the restorative processes of nature would repair the injury as fast as it was produced. Now, suppose any method could be adopted by which both the regular supplies of nature and the original soil could be retained, it is obvious that the land would be doubled in fertility. The hill-side ditches, however well graded, cannot answer this purpose; for whilst they may prevent the formation of galleys, they still allow the rain-water, impregnated or charged with the lighter, richer, and more soluble particles of the soil, to pass off. The "solid," or unploughed space, left between the rows of the growing crop, to prevent the "crushing of the land," will not answer, for a similar reason. As far as I know, there can be no remedy for this evil but deep ploughing; ploughing to a depth sufficient to allow the imbibition of all the rain-water that falls. This may appear impracticable to those who have not tried it; yet, it is well known to those who have, that if the soil be well broken to the depth of 15 or 20 inches, with a large turning plough, and subsoil plough, none, except the most hasty rains, if any at all, will run. Within the last winter, I have seen, on my own farm, this fact fully illustrated. A rain, unparalleled in this country, by which the water-courses were raised higher than they had been known for many years, fell on a piece of land that had been recently ploughed to the depth of 12 or 14 inches, yet not a drop escaped, and consequently no part of the soil was borne off. Another advantage of deep ploughing is, that when the surface has been exhausted to some extent by continued cultivation, many "earthy matters" that existed some 15 or 20 inches below are brought up and combined with the surface, so that a new soil is formed. One of the most productive fields I have, was made so by this means, after having been greatly exhausted. Another great advantage of deep ploughing is, that, to a great extent, it corrects the destructive effect of extremes in the seasons on the growing crop. Had we command of the clouds, so that we could stay their torrents when in excess, or provoke their genial showers in times of drought, there would be but little difficulty in making abundant crops, even on lands of common fertility. This power the great God of nature will never transfer to his ungrateful creatures; yet, he has permitted us, to a very great extent, to escape the effects of those apparent extremes, with which, for some wise purpose, he is ever visiting the earth. Through land that is deeply and well ploughed, water readily percolates. If it fall in excess, by means of a greater evaporation from a loose soil, but especially by its rapid percolation downwards, it soon disappears: a crop escapes all injury. If, on the other hand, there should be a deficiency of rain, the moisture from the subjacent clay more readily rises; the roots descend deeper to meet this moisture, and thus a crop, that might otherwise suffer from the want of rain, maintains its luxuriance and health throughout the driest seasons. One other advantage I will mention. By this means, a larger quantity of soil is rendered capable of producing, and consequently the crop may be grown much thicker than it otherwise could. We suppose a soil 6 inches in depth. A plough that runs 8 inches in depth, will certainly cultivate and prepare double as much soil in the aggregate as one that only cuts 4 inches, and thus, while the extent of surface may be the same, double as much soil is prepared and exposed to the action of roots of the growing crop in the one case as in the other, since the crop may be almost in the same ratio planted thicker. There is yet one other advantage, which I will mention. It is known that many soils abound in the roots of briers, sassafras, and other shrubs. These are more effectually exterminated by deep ploughing than by perhaps any other method. And, instead of their growing and taking from the crops much of the nutriment of the soil, they are killed, and, by their gradual decomposition, converted into valuable manure.

I will now add a very few remarks on the culture, &c. of the tobacco crop, confining myself only to those parts of the process that are less generally understood, and in which most planters are greatly deficient. It is well known that there is no part of this whole process more important than the raising of plants. The success of the crop depends, in a great measure, on the supply of early plants. The season here is short, and if, from any cause, the crop should be planted late, the plants are not only more difficult to live, but there is not, unless the seasons are more propitious than usual, full time for the crop to mature. The tobacco crop here is usually large and important, and is perhaps surpassed by none in its quality for manufacturing purposes, and the best methods of raising plants are as well understood here as in any other part of the country. Last spring, notwithstanding the general failure, and the very unfavorable character of the season, and the great depredations of the fly, we had an abundance of early plants.

A suitable place having been selected, (of which every good planter is a judge,) it should be burnt thoroughly. The surface should be exposed to the action of a hot log-fire, for two and a half or three hours at least. Then the ashes should be removed, and the bed deeply hoed, dug without being turned, to the depth of 8 or 10 inches. It should then be well manured with fresh stable manure, clear of seeds of all kinds, (that made from wheat chaff is perhaps the best,) and afterwards sowed. The bed should then be covered well with brush. Should the seasons be dry, the covering should be very thick, and, on the other hand, should the seasons be wet and warm, less covering will answer. Should, however, the plant be endangered by frost or the fly—two common sources of injury, if not entire destruction—a thick covering of pine brush, together with a second covering of manure, will be found most effectual remedies. There being nothing peculiar or worthy of remark either in the planting or culture of the crop, I proceed at once to the best method of curing. On this subject there is a great diversity of opinion, yet I think the method I am now about to propose will always insure a superior article, especially for manufacturing purposes. The plant should be allowed to become thoroughly ripe before it is cut. Tobacco, unless it become thoroughly ripe, can never be made of good quality, whatever may be its color. When cut, it should be hung on the scaffold, with its tails very near the ground, surrounded or covered on its sides with brush, so as to exclude the air, until it acquires a yellow color. It then should be removed to the house, (taking care not to hang too thick,) and immediately exposed to the fire. If common wood should be used instead of coal, thoroughly dry, yet sound, wood should always be taken. Small fires of this wood or coal should be made over the floor of the house, sufficient to raise the temperature to 90° of Fahrenheit's thermometer, or that of the sun of a moderate summer's heat. This should be continued 4, 5, or 6 days, until the leaf is thoroughly dried, then the fires should be suddenly increased so as to cure the stems in 12 or 16 hours. This process will insure a beautiful yellow or nutmeg tobacco, without the least color of green, or that "green taste," which is so peculiarly offensive, and which, by no process in its subsequent management, can be remedied. Should the flue be used—a peculiar method of curing here—the same rules as it regards color and temperature, &c. should be observed.

Respectfully, ANDERSON WADE,
Henry County, Virginia.

North Anson, Somerset County, Maine, December 7th, 1850.

Sir:—Being situated as we are, in the valley of the Kennebec, near the operations of the *lumbermen*, our efforts in agriculture are, as a matter of profit, chiefly directed to supply the market afforded by that branch of business; therefore, in past years, experimental farming has been practised

only so much as would tend to furnish *bread* and *pork* for the men, and hay and provender for the oxen employed in obtaining lumber. Lately, however, since the failure of spring wheat and potatoes, the agriculturists have been making experimental trials, in order to remedy, as much as possible, the loss of those important crops. Purely scientific farming is not known in this region. A hard flinty slate-ledge, the strata running north-easterly and south-westerly, underlie this section of country. The intervals or meadows which lie quite extensively along the river and large brooks, are fertile alluvial deposits. The upland is diluvial, and in many places considerably covered with boulders, the larger of which are granite.

The following analysis, made by Dr. C. Jackson, state geologist, in 1838, of soil taken from a plain elevated some 60 feet above the river, shows a large proportion of carbonate of lime. As there is no lime-rock to be found in the vicinity, it must have been brought hither by a diluvial current, from *limebeds* lying some distance to the north of us. Indubitable evidences of there having been such a current running south, 10° or 15° east, are found in many places.

Analysis of 100 *grains of the fine soil was found to contain—*

Water	7.6
Vegetable matter	5.6
Peroxide of iron	6.1
Carbonate of lime	4.6
Insoluble	75.0
	98.9
Loss	1.1
	100.0

We have, however, all the varieties of soil to be found in a broken country, from the fertile intervale to the barren mountain-tops.

I will now reply to your schedule of questions, rather by approximation than otherwise, regretting that our practice and results cannot be more definitely stated. The crops of *spring* wheat, the only kind formerly cultivated here, have been greatly diminished by the ravages of the weevil, which commenced its destruction eleven years ago; since that time, the average quantity raised per acre is not over 10 bushels, and that of an inferior quality. We know of no *remedy* for the pests, except to sow no grain for them to destroy, though late sowing, as late as the 1st of June, will avoid the weevil; then there is great risk of its being cut off by rusting: the last evil, is, perhaps, the lesser one, and more grain may be raised by sowing late than early. The varieties most in use are the tea, and Black Sea, or red-chaff wheat: two bushels are sown upon an acre, on the older cultivated ground, and five pecks on the newly cleared, usually sown dry, but sometimes wet and rolled in lime or ashes, from April 10th to 10th of May. Price in market, $1.84. A railroad to Waterville, 27 miles from us, has a tendency to keep the price proportionate to that of imported flour. Since the weevils commenced their depredations, attention has been turned to the cultivation of winter wheat, and, for a few years past, the Kloss Blue-stem, or, as it is popularly called here, "Banner wheat," has succeeded remarkably well, producing generally 25 bushels per acre. This variety, as I understand, was first received in this State from the United States Patent

Office, and cultivated by Mr. Drew, editor of the Gospel Banner, Augusta. A great quantity of this variety has been sown this season, and, should it succeed as well as it promises, we will soon return the flour-barrels, which are so plenty around us, filled for the sustenance of those who are unable to raise their own wheat, as we have been. It should be sown the last of August, or first of September. We can raise *wheat straw* in abundance, and, were it not for the accidents to which the berry is liable, a proportionate amount of the grain also.

Corn is now considered to be one of our surest crops, not having failed for a number of years. The 8 and 12 rowed yellow corn are usually preferred; other kinds, as the Brown, Dutton, &c., are planted by some. The former varieties are the ones adapted to the climate, having been cultivated in this vicinity by the Norridgewock Indians, a long time previous to the settlement of the Europeans upon the river. To succeed here, it must ripen before the 20th of September, as we generally have frosts about that time. The average product is 40 bushels of shelled corn from an acre, (100 have been raised,) costing 56 cents per bushel for raising. The best method of cultivation for it, is to spread 12 ox-cart loads of well-rotted manure upon an acre after it is ploughed, and work it in with a cultivator or harrow, then put as much more into the hills; plant, covering it just enough to prevent the seed from becoming dry, and hoe it twice: then you may safely trust in Providence for a remunerating harvest. An acre of corn planted upon hog manure will yield twice as much as when put upon manure from the barn-yard. It should be ground and cooked in order to be fed most profitably. *Pumpkins*, such as *pumpkin-pies* are made of down East, are raised among the corn. Hogs are seldom fed exclusively on corn, other grains and roots being used for that purpose.

Oats are an exhausting crop. The only *safe* method for their cultivation without manure, is to plough up grass-land and take off but one harvest, seeding down again to grass at the time the oats are sown, thus having one set of roots decaying whilst there is another forming on the top. Three bushels of seed are sown upon an acre, which will generally produce 30.

Peas yield 30 bushels per acre—never cultivated here as a renovating crop; but are often sown with oats, seeded half-and-half for feed for hogs and cattle. Spring and winter rye are sown with varied success, producing, one year with another, about 12 bushels per acre. Sometimes it yields exceedingly well, but is too much of a chance crop to be firmly relied on. Price, $1 per bushel.

Barley flourishes well, producing 30 bushels from an acre.

Buckwheat is cultivated quite generally, especially the rough variety, usually called Indian wheat here. Fritters made of it are thought to be "good enough for company." Besides, it makes good pork when fed to a "porker:" 40 bushels may be raised from an acre.

Beans are most frequently planted with the corn; but it is called better to plant them separately in drills. Land made as rich as for corn, will produce 30 or 40 bushels. They are sold here for $1 a bushel, and sometimes more.

Maine is decidedly a good State for grazing and hay, one of its most valuable products; and, without much difficulty, it may be raised in great quantities. One ton is near the average product per acre from all the lands producing grass; but two or more may be easily raised in cultivated fields. The land is not exhausted when it fails to produce English grass, but only needs turning over and new seeding, with *eight* pounds of clover and a *peck* of herds-grass seed, taking off a crop of oats, in the time, to pay for the labor. Or, what may be called a better renovator and fertilizer for *pastures* and *meadows*, spread upon them, in the fall, a *compost* made of equal parts of swamp-muck and barn-yard manure. Hay costs $4.50 per ton, when in the barn, unless the season be a very good one: then it would cost less. A drought in June lessens the quantity of grass.

Land is considered as "put through" a regular rotation of crops when the sward is broken up, and sown in the spring for oats; the next spring manured and planted with corn or potatoes; and, the following spring, sown to wheat, and seed down to grass again.

Corn and potatoes are planted, and wheat sown successfully on sward land-ploughing. Corn is more apt to be injured by the *cutworm* when thus planted, than when upon stubble-land.

But few have paid particular attention to *dairy husbandry*. Almost every family makes butter and cheese enough for their own consumption, and often a surplus for market besides. The average price of butter is 14 cents, and of cheese, 8 cents. Those who have made it their business, however, find it profitable.

There has been, of late, considerable care and commendable rivalry in the management and rearing of neat cattle for market—the result has been a great improvement upon the old breed, and, consequently, an increase in their value. The *rule* for cost of rearing cattle is, $4 for keeping a calf from spring until fall, and $4 a year thereafter until 3 years old, making a cost, at that age, of $16, which is the price of an ordinary one here. Our surplus stock is readily bought up by drovers, and driven out of the State, chiefly to the Brighton market. Oxen command a good price, if they are fit for service in the woods, bringing $100 a yoke. Good dairy-cows valued at $15 in the fall, and $30 in the spring.

The advantages of wool-growing to the agriculturist are not fully appreciated by a majority of the tillers of the soil; because sheep are peculiarly adapted, by their habits, to render important services as pioneers to the plough, reducing, in a few seasons, lands that have been mortgaged to weeds and briers to arable fields, and, while doing it, thrive so that their sides will stick out with fatness; or will scale the rough hill-sides, and glean food where the implements of husbandry are useless. They invariably leave a pasture for having been kept in it: an old sheep-pasture that can be ploughed may be looked upon as but one step from a well-filled granary.

When the desideratum is to obtain mutton, the large coarse-woolled breed should be selected; but, if the raising of wool is made paramount, the Merino is superior to all others introduced among us. They will *grow* more wool from the same weight of sheep, will eat a greater variety of vegetables, are more peaceable,—therefore requiring less watching to keep them within enclosure; and, taking all the items of expense and care into consideration, will *produce wool as cheap* per pound as any of the coarser breeds. Any pedigree of fine-blooded sheep requires more tending through our five months winter than the coarser native, but the compensation for the extra care is more than made up by the less amount of food consumed, by the finer, in producing the same quantity of wool.

Our flocks, young and old together, average $3\frac{1}{2}$ pounds per head—instances of shearing 8 or 10 pounds from a sheep are not uncommon; the more Merino-blooded the sheep are, the more is the proportionate weight increased. Among us, there is difficulty of obtaining a fair proportionate price for the different grades of wool. Our wool-merchants seldom make more than 8 or 10 cents difference between the finer and coarser staple; a difference which does not compare favorably with other sections of the United States: a *fact* which our wool-growers should take cognisance of, since we can and do raise the finer qualities, having obtained the stock from the best Merino flocks of Vermont, and other places where it was obtainable. A ton of hay will winter sheep enough for a clip of 17 pounds. The yearning time for our northern latitude is the last of April and the first of May, about the time vegetation commences. The lambs raised are, in proportion, two-thirds the number of ewes. After an experience of 30 years with a flock of fine bloods, and observation, during the time, upon the efforts of others in wool-growing, I am fully convinced of there being more profit in raising fine wool-producing sheep. Capital invested in them is available twice a year; in the fall, lambs and mutton are readily turned to cash, and, when spring comes, they tender their fleeces for all arrearages.

It is truly said that "a sheep may die indebted to its *purchaser*, but *never* to *him* who raised it."

As for the *breed of hogs*, we have had a great many different kinds, and they have been mixed and crossed until their *given names* "are used up," and no other left but *hog*, after all. They are important assistants in making a good cornfield. Three hogs, properly supplied with chip-manure, swamp-muck, or horse-stable manure, will make dressing enough to raise 80 bushels of shelled corn from an acre of land. The *cheapest* method of obtaining pork is to feed well from the pig upwards. Weight, when dressed, from *three* to *five* hundred. *Price*, average for round hog, 6 cents per lb.

Roots.—Since the rotting of potatoes, the root crops have been advantageously cultivated, *turnips* and *carrots* being chiefly sown. One farmer in this vicinity has raised, the present year, *carrots* at the rate of 1000 bushels upon an acre, by spreading a quantity of manure upon grass land, ploughing it, and sowing the seed in the seam between the sods.

Irish Potatoes.—Here, again, we can use "the language of complaint;" for we once thought that potatoes would never fail us; but the rot came and taught us the uncertainty of raising potatoes "in particular." It pays but little respect to kind. Some years, one variety will succeed better than others; but in the result, they are about equally affected. Early planting on dry soil does best, by spreading the manure on the top of the ploughed land, harrowing it in, and planting the seed in hills on the surface. The yield is now about 50 bushels per acre where it used to be 200. All the tubers that grow late in the season are liable to rot, and the vines die early.

Attention has lately been given to fruit culture. Many young orchards of choice fruits have been recently set, and older ones improved by grafting.

Apples are considered to be a profitable crop, and are an important item in the luxuries of a living. It is thought that hogs thrive as much by being fed upon an equal weight of *sweet* apples as upon potatoes.

Manures of a vegetable origin are chiefly used; but *plaster* and *lime* are considerably used. They produce beneficial results when applied to light sandy or gravelly soils, but are inert when used upon clayey lands.

Strawberries, raspberries, blackberries, and blueberries are indigenous here, and, in some seasons, may be gathered in great abundance. Should it be desirable, they could very easily be cultivated in gardens or yards.

We are located pretty well north, besides being "a long way down

east." The parallel of 44° 47′ 40″ crosses the village in this town. For this latitude we have the long range upon the thermometer of 110° F. Some of our hottest days raise the mercury to 102° F.

With due respect,

Your obedient servant,

WILLIAM R. FLINT.

Hon. Thomas Ewbank, *Commissioner*.

Chester District, South Carolina, 1850.

Answers to questions sent me by the Hon. Thomas Ewbank, Commissioner of Patents:—

Wheat.—The varieties in use in this locality are, yellow Lammas, blue straw, Virginia white May wheat, and a few others with local names. The average product is about 7 bushels per acre. My neighbors talk of a higher figure, but I give you my experience and belief as to what we make now; and no wonder it is not more, as you will readily perceive when I come to state our system of cultivating it. The first two varieties require being sown early, say in September, or they will be likely to ripen late and be struck with rust in the spring, whilst the white May wheat is not usually sown before some time in November; for, although not always free from rust, yet, if sown too early, it is still more liable to injury from late frosts in the spring, from prematurely shooting out the ear. We harvest the early white May wheat, which alone is what I sow, from the end of May to the middle of June; the others, from the middle of June to the beginning of July. We prepare our seed by soaking it in a solution of bluestone (sulphate of copper) for 12 hours, as a preventive of smut, and, if well done, it is very effectual. We make the solution at the rate of 3 oz. of bluestone to the bushel in the first water used. The water left when the wheat is taken out to be sown is preserved and the wheat thrown into the same vessel, with 2 oz. more of bluestone to the bushel, and additional water put in, so as to cover the wheat, and which is well stirred in it. The wheat, previous to being sown, is rubbed in as much good ashes as will adhere to it, and is then sown broadcast, at the rate of 1 bushel to the acre. We do not usually plough for wheat, but our system is to scratch it in hurriedly with a grab or gopher plough after corn, without manure, not as a crop, but to get what we can; and well may we be thankful when we get any in return: 'tis truly a godsend. Our rotation, when regularly conducted, is cotton, corn, wheat, and rest, perhaps, for 2 years, though that rest is too often converted into pasture, eaten bare, and the yield per acre certainly averages less than what it used to do. We are not often troubled with the Hessian-fly, and know of no remedy; neither are we much annoyed with the brown flour-weevil, but are very much incommoded and seriously injured by the little miller-fly weevil, which deposits its egg in the seed whilst in the field, is hatched out in July and August, and, eating its way through, leaves the grain a mere shell. Our only remedy is to thresh early, grind early, and sun for 2 or 3 days what we reserve for seed and spring family use. Our hot sun destroys the embryo in the berry. Our usual average price is $1 per bushel. This year (1850) it sells for $1.50. Our crops were eaten up by rust. I must be allowed to say one thing, though, in favour of us poor Southern farmers, on the subject of growing wheat. Our lot is cast in a cotton region, and no man can be a successful wheat cultivator and cotton planter at the same time; they interfere materially with each other, from beginning to end. Wheat is not cultivated for a crop, but a little is put in for family use; and cotton, cotton, cotton won't give us time to do that little well.

Corn.—Our seed is so generally mixed, that it is hard to give it any known name; the old gourd-seed kind is gone very much out of use, and that which I commonly use now is a Tuscarora—a mixture between the old gourd-seed and the low country flint-corn. I have now, for upwards of 30 years, been selecting every year my seed-corn in the field, from stalks not bearing less than two ears to the stalk; and it is now more difficult to find in my field a stalk with less than two good ears on it, than it was at first to find them with two ears—the average product about 25 bushels. We break up our lands as early as cotton will allow us; of course, it ought to be deep; but I believe I am the only man in this neighbourhood who uses the subsoil plough, and I have been doing so now for many years, with great benefit. Others say cotton will not give them time. Last year, when my neighbor, one of our best farmers, too, made 20 bushels of corn to the acre, I made 70, chiefly from the use of the subsoil plough. I lay off my land in furrows, at 4 feet apart, with a large, long shovel-plough, deep as I can get it done, and in the same furrow run my subsoil-plough with two horses, from 8 to 10 inches deep; in this furrow, where I have manure enough, I strew my manure, and then back up upon it with a two-horse Ruggles plough, running a furrow from 5 to 7 inches deep, and this is again followed by the subsoil plough in the same furrow: the whole bout is finished in the same manner. I then check off at 4 × by 2½ or ¾, and leave but one stalk in a check. In these checks is usually deposited my manure, and, where that is cotton seed, it is always deposited in the check before planting. I keep my land level, use coulters and cultivators, and lay by with the cotton-sweep, leaving a good water-furrow in the middle: my land is a stiff clay, and my greatest enemy is drought. I never cook any of my grain, except for my milch-cows, and sows and pigs, and find it to be highly beneficial to them; but the most of my corn used is crushed on the cob, in one of Hussey's corn and cob crushers, a good machine, but the plates, which are the crushers or grinders, are not very durable, and are difficult to be got, far as I am in the interior. It now makes slow work; I have used up one or two sets of plates, and would freely pay the price of new ones, could I readily obtain them.

Oats, &c.—Average yield of oats per acre is about 20 bushels; barley, 15 to 20; rye, 6 to 10. Peas, by themselves, in beds 3 feet apart, and in chops on the beds, 18 inches apart, about 10 bushels; where among corn, 4 to 5: this I know will be considered a very low estimate by many; but, perhaps they never measured the peas after they were thrashed on the land. Beans are not cultivated here. Peas are decidedly the least exhausting to the land—indeed, rather benefit it. I have never known them cultivated here as a renovating crop to be ploughed in. Cotton hardly gives us time to gather our seed.

Clover and Grasses.—We have a little rough meadow, in strips, along our spring branches, which give 1 or 2 tons of a coarse meadow-grass hay per acre. I have but little of that, and no bottom land, and have never been able to succeed with any of the cultivated grasses upon our uplands, though I have been trying them for upwards of 30 years. I have had as fine clover in the spring as I ever saw anywhere, but it could not stand our

July droughts and hot September suns: it may probably succeed better on our rich, deep, mellow bottom lands.

Dairy Husbandry.—We have nothing under this head, having no meadows or grasses; and cotton having cut up our ranges, we scarcely make more than butter enough for family use; and home-made cream-cheeses are only to be remembered, and talked about by the old grandmothers of the district, as the occurrences of the good, abundant, happy old times, before cotton came in to be a crop.

Neat Cattle.—We really raise them with so little care, that it would be a shame to charge any thing for their keep up to 3 years old, when they will sell for about $5; a cow and calf in the spring, are worth $10 or $12; in the fall, from $15 to $25; to the rest I can give no answers; we have no improved stock here; no grass to raise and fatten them on; no market here to encourage one to exertions for improving stock, and come too high to feed for a distant market; when the railroad comes, it will perhaps be better.

Sheep and Wool.—Sheep might certainly be raised with profit, both for mutton and wool, but again we have no market for either. My neighbors generally will not eat mutton, and as there are as yet but few manufactories that use wool, scarcely more is produced than what is required for domestic use. I have made all of my negro winter clothes and blankets for 30 years. I long kept a little flock of grade Merinos for mutton and wool for family use, and have raised full-blood quite as fine as my original Escurial stock; but found the full-blood too fine for our farmers' use; they cannot card it. I now keep from 80 to 100. I raise my sheep at little expense, but have never made any estimate of the cost. I have shelter for them in winter, and give them hay in sheep-rack, or rather open frames, and sometimes a little oats, and have usually a green pasture of rye or barley for the ewes and lambs to run on: the price we get for our wool is just the same, whether fine or coarse—about 25 cents per pound. I do not doubt that the time is at hand when wool will be more, much more attended to—more discrimination be made in the quality and price; a market for it is rising up in the manufactories, that are rapidly growing in the Southern States; and it will, ere long, become an important and profitable branch of Southern husbandry. For 20 years, I raised as fine wool as Spanish stock, or any samples I could obtain from the North; it was highly approved by the Messrs. Dupont, of Delaware, and sold in Philadelphia at 50 and 60 cents; and the railroads will soon open to us a way of reasonable transportation.

Hogs.—The breed we find to suit us best is a cross between the black Siamese or China, and the Berkshire; they thrive upon less feed: but I should say that the Suffolk, Sussex, and other late imported English breeds are unknown here. We raise our hogs by allowing them to range in our woods, where they get fat in the autumn on acorns, and call them up at nights, giving them a little corn to keep them tame, and to help them on when the acorns are consumed. In November, they are usually put in pens to fatten, where they have water and as much corn thrown to them on the ear as they will eat. I also see that they are well supplied with charcoal, rotten wood, and ashes, all of which they consume with great avidity and benefit—no doubt as absorbants and correctors of acidity. I have never known of any experiment made of the quantity of meat made by a given amount of corn. I cure my flitches in the usual way of dry salting; my hams I rub the first day with salt, to draw off the blood; the next day, they are packed loosely in casks, and cover them with Pocock's pickle, viz. 6 lbs. salt, 2 oz. saltpetre, 1 to 2 lbs. brown sugar or molasses, and 4 gallons of water, boiled together and well skimmed, in sufficient quantity to cover the hams well, pour it on them cold, and let them remain in it from 3 to 6 weeks, according to their size, and then hang them up and smoke them for a fortnight; and I will warrant, if you have one that has been well kept till this time, it will fill your dish with essence. As soon as you are done smoking, and which ought to be by the middle of February, bag them in a loose bag, but which has been previously soaked in a strong size made with wheat bran and water, and hang them up in a dry place with the string tied tight around, with the hock side down, and then keep free from bug or skipper, and remain juicy to the end. My smoke-house is 16 feet high, divided into two stories; the bottom one has an earthen floor, on which the fire is made; the second story, in which the meat is hung, is divided from the bottom one by a plank floor, which protects the meat from being heated by the fire, while the smoke is allowed to pass freely up to the meat through a double range of six-inch holes in the floor the whole length of the house, and which I think conduces very much to preserve the hams from becoming rusty.

Cotton.—The average yield here is from 150 to 200 lbs. of clean cotton per acre. I am no cotton-planter, and plant it only as a matter of necessity, to make a little money: it is with me a scourging, starvation crop, to land and every thing else. I leave you, for information about its culture, to those who like better, have better lands, and cultivate it better than I can. Drs. Cloud and Phillips will, no doubt, ably supply my deficiency.

Sugar-cane, rice, tobacco, hemp, are not cultivated here.

Root crops are not cultivated here as field crops. Turnips are merely sowed for domestic use on cow-penned patches, and are a very uncertain crop; our droughts in the end of August and throughout September burn them, even when they do come up. I have to depend on my spring sowing, even in my garden, for my supply of beets, carrots, parsnips, and salsify, and they are therefore frequently woody. Mine is a stiff clay soil, and I have to haul into my garden a good deal of sand to procure a due supply of them; but even in the most favorable soil here, they are never cultivated as field crops.

Potatoes, Irish.—Irish potatoes are only cultivated in our gardens and in patches, and, under good management, yield well, good, large, mealy potatoes; but I have not known any estimate made of what they would yield to the acre; we have no market to induce us to raise more than enough for our own immediate family use; for those raised from our spring planting in February, and which we usually begin to use out of the beds in May, and dig in in June, won't keep. By the end of July or middle of August, they shrivel up, sprout, and rot. Almost every year I make a second planting of them about the middle or end of July. If the season is favorable, I make good potatoes, which keep well all through the winter; but they most frequently fail to grow from the drought: those which I planted this year, never came up until in October, and but few of them then.

Sweet Potatoes.—The sweet potatoes do better, much better on sandy soil, and though not to be compared in quantity and quality with the low-country sweet potatoes, yet yield a fair crop: I have heard of 200 bushels to the acre being made; but they are never planted up here in any quantity, whereas, in the low country, where the climate suits them much better, they are cultivated extensively, being depended upon largely for provisions for

the negroes, and for fattening hogs; and I have even used them, when in great abundance, and with great benefit, in feeding my working mules, horses, and oxen:—big crop of potatoes, and every thing fat. Up here, we have to depend upon the root potatoes grown by planting the small potatoes, and which are called the seed; the product of these, called root potatoes, are much more difficult to keep through the winter, than such as are produced in the low country, as their principal crop, from what they term slips, which are cuttings, not of the potato itself, but of the vines. In the low country, they plant only a few acres of roots to raise vines for their principal crop; these vines are cut off throughout June and July, and stretched out in handfuls, lengthwise, on the tops of large beds prepared for them, and partially covered by hoefuls of earth thrown at intervals upon them; if rain follows, they take root, shoot them down into the beds, and produce there abundant crops of fine potatoes, superior in sugariness, and keep through the winter much better. I have known 600 bushels made to the acre; but I have travelled out of my province, or at least out of my district. You will probably ask why we do not do here as they do in the low country: the answer is simply, the climate will not allow it; the season up here in June and July, the time for setting out *slips*, is usually too dry to allow them to strike roots, which they won't do without rain, and allow them to grow in time to produce tubers of any size larger than merely for seed for another year, and oftentimes not even that, that few persons risk their labor even for that. The ground ought to be broken up well, deep, and early, and plentifully manured with straw, pine trash, or leaves, or any other vegetable matter, but ought not to receive stable or other stimulating manure, which will cause them to run too much into vine, and only produce fibrous roots instead of tubers. Cotton seed is a good manure, when it can be spared in sufficient quantities from the more important crop of corn. The best mode to preserve them for use is, after gathering them carefully in dry weather, soon after the vines are killed by frost, and their growth is consequently stopped—to pick out all decayed, cut, and bruised roots, pile them up in conical heaps, where they will be free from frost, and let them remain so to sweat for a few days—then pour over them well-dried sand till it covers them two or three inches deep. Preserved in this way in the basement story of my house, I have kept them sound and good, and unsprouted, until fresh potatoes came in again.

Fruit Culture.—The culture of fruit is certainly receiving much more attention than formerly. When I first came to spend only my summers up here, there were no orchards except of peaches for the still, nearly 40 years ago—there were but few apple-trees, and pears were quite a rarity—now every farmer has a small apple and peach orchard, though pears are still rare. One good thing cotton has done for the country, to make some amends for the destruction of our lands, has been to drive the stills out of the country; it does not leave the people time enough hardly to raise a sufficiency of corn for their own consumption, and without raising their meat, and, therefore, none for the still, and no time to carry peaches to the still, even in good and abundant seasons. I could write much upon this subject, but know you will have much of this kind of trash to wade through, and endeavor to condense as much as possible, and to answer your queries intelligibly. I have imported fruit trees from the North, largely and at different times, and grafted, too, wherever I could procure scions of good repute; the peaches and plums have done well, but pears badly; and apples from the

North have not succeeded with me at all. Both of these trees are short-lived with us when so obtained, and none of the apples from Prince's nursery, Newtown pippins, Rhode Island cooper, russet, &c., have ever perfected their fruit, though grafted and regrafted. I am still trying, however, some of the more modern kinds. Yet I have a few good summer and autumn apples, got from North Carolina, under various local names, but no really good winter-keeping apple. The farmers are just becoming aware of the importance of apples to their stock, but their orchards are quite too small yet, to draw any comparison between the use of apples and corn for stock; none are raised for exportation—freight has been too high; but I do hope that the completion of the South Carolina and Charlotte Railroad will bring with it a reduction of freight, and all the benefits attending such improvements, and so enable us to obtain a market for the various little articles we could raise, and an additional incitement to improve our orchards. I have paid a good deal of attention to the pear-tree, and have now 85 different kinds on my list, that I have either imported or grafted, but they are now a short-lived tree. I say now, because there are some very old, old-times pear-trees in this settlement. The imported tree will grow and bear well for a few years, and then die, most commonly with the real fireblight; suddenly —the whole tree blasted at once—some in full bearing, and some before they had ever fruited; and within a few years past, that disease, which commences with the dying of the limbs at their extremities, has done me great injury. I have lost upwards of 50 trees, of all ages, from a foot in diameter to a two-year old graft, and have had many others seriously injured by it; have tried all prescribed remedies and preventives in vain, without even benefiting by a change of location. Others have suffered nearly as badly, probably quite as much so, proportionably. I have not as yet had sufficient experience with the later varieties to test their durabilities, but the age of the variety does not seem to have much effect, for the old St. Germain does as well with us as any, while the Jargonelle (English) suffers severely. Our peach-trees are not liable to the yellows, but are dreadfully injured by the worm in the root, the best remedy for which, that I have experienced, is spent tanner's bark, piled up around the tree at the root; best when done in June and July, say a peck to a tree.

I have cultivated the grape for nearly 40 years, with very variable success. My soil is most unfavorable, and the drought and sun bake my stiff clay so hard that the leaves drop, and the berries wither up before the time for their maturity, though I cover their roots with leaves, and train them conically, that each vine might shade its own roots. I prune severely, and find the best manure is surface-mould from the wood, and ashes. Barn-yard manure makes them run too much to wood. I cultivate with the plough and prong-hoe, and, in good seasons, make tolerably good crops, but not to compare with Mr. Longworth, Weller, &c. The foreign grapes do not succeed with me any better than elsewhere. I have several varieties, but the Lenoir, Herbemot, and Bland Madeira do best with me, and it is chiefly from the last I have been making my wine for 30 years, and a very good wine it is. The birds and negroes are so destructive to my grapes, that it is difficult to keep those the drought spares me until they come near to maturity. I am obliged to gather them early in September, whilst those which hang around my piazza, and are preserved to the middle of October, are quite another thing. My juice strikes from 7° to 11° of Beaume's saccharometer; at 9°, one pound of good dry St. Croix sugar added, per gallon, gives me a pleasant, dry wine, within 2° as strong as Madeira, and which has kept and improved to 10 years old, and would have kept much longer, had there been enough of it.

Manures.—I have but little to say on making and preserving manures; it is a subject but little attended to but by a few, and it is much wasted, our mild climate not obliging us to house our cattle. We have no cellars to throw our manures into, and but few have even sheds around their cattle-yards. The breadth of land we cultivate, and the few cattle we are able proportionably to keep, seems to paralyze efforts. My yard is scooped out in the centre about 2 feet lower than the external borders, have cattle-sheds 12 and 16 feet wide, furnished with mangers to feed in, and the whole is well littered with cornstalks, straw, leaves, weeds, and whatever roughage I can procure; and this way, and from my stables and mule-pens, I make about 200 wagon-loads of manure a year, and which, with the help of my cotton-seed, enables me to help a portion of my farm every year. It is quite too little for the need of my farm, and far less than I see others write of making, but it is more than any one makes about here, even with a larger stock and larger force. Lime, plaster, and guano have been but sparingly tried: the enormous price we have as yet to pay for carriage, renders them quite too expensive. I cannot get lime delivered to me under 65 and 75 cents per bushel; and plaster, which could be had in Charleston at $5 the ton, would cost $20 more to bring it up here: we could buy three acres of fresh land for what it would cost to lime one.

Meteorology.—The thermometer ranges highest in July. The hottest day this year was the 20th of July, with the thermometer at 78°, 88°, and 82°, at 8 o'clock A. M., 3 P. M., and 10 at night. I have known the thermometer to rise as high as 92° here, though very seldom. The thermometer ranges lowest in January and February; the coldest day this year was the 5th of February, when the thermometer stood at 18° at 8 A. M., at 34° at 3 P. M., and at 28° at 10 P. M. On the 8th of January, 1847, it fell as low as 8° in the morning, and I once, since I have been living up here, have known it down to 4°! No register has been kept of the mean temperature, or of the quantity of rain that falls.

I shall be very glad to receive a copy of your Reports, and have the back volumes up to 1848. They contain a mass of valuable and instructive matter; and I shall be happy if I shall in any way assist you in accumulating materials for your heavy labors.

Respectfully,
WILMOT S. GIBBS,
Chestnut Grove P. O., Chester District, South Carolina.

December 16*th*, 1850.

WINE-MAKING NEAR CINCINNATI, WITH PLANS OF A WINE-HOUSE AND MACHINERY.

[From the Western Horticultural Review.]

Our frontispiece for this month is a view of the wine-house of Messrs. Corneau & Son, located on their place, at Latonia, in Kentucky, about four miles from this city; it is probably one of the most complete establishments of the kind in the country. The great and increasing interest that is felt, not only here, but in all parts of the United States, in reference to the culture of the grape and the manufacture of wine, induces us to devote some space to this subject, particularly as the vintage season is about over, and our vignerons are now able to determine the result of their labors and skill. Improvements upon the methods and practice pursued during the earlier periods of the manufacture of wine from the Catawba grape, are being made every year, and the result is, that a very superior wine is now obtained from this grape, and one that bids fair to rival the most celebrated brands of the old country. The wines manufactured by the Messrs. Corneau, as well as by Messrs. Yeatman, Longworth, Buchanan, and others, will not suffer in comparison with those which are imported in large quantities from the Rhine countries; but, on the contrary, are frequently preferred by those who have been most accustomed to the use of the Rhenish wines. Its perfect purity and mild tonic properties render it an important addition to our materia medica; and its use as a gentle and nourishing stimulant is prescribed by some of the most distinguished of our medical faculty.

One important improvement which has been successfully introduced by the Messrs. Corneau, is the stemming of the grape, by a very simple and rapid process, and which also increases the peculiar aroma, or bouquet of the wine.

Many attempts have been made to accomplish this result heretofore, but they have either failed entirely, or have been found impracticable for large crops. The method of the Messrs. Corneau is remarkable for its rapidity; two men being able to stem, mash, and place in the press, near 80 bushels of grapes in about 8 hours. We understand that they intend introducing some further improvements during the next season, which will facilitate their operations to a greater extent than those which they now possess.

A sketch of the details of wine-making, as pursued at this establishment, may not be uninteresting to our readers, and which will be readily understood by a reference to the accompanying cuts of the plan and arrangement of the wine-house.

A. Door, opening to the vineyard, by which the grapes are brought into the wine-house.

B. Back-door of wine-house.

C. Front-door of wine-house.

D. Opening through which the stones are thrown from the machine.

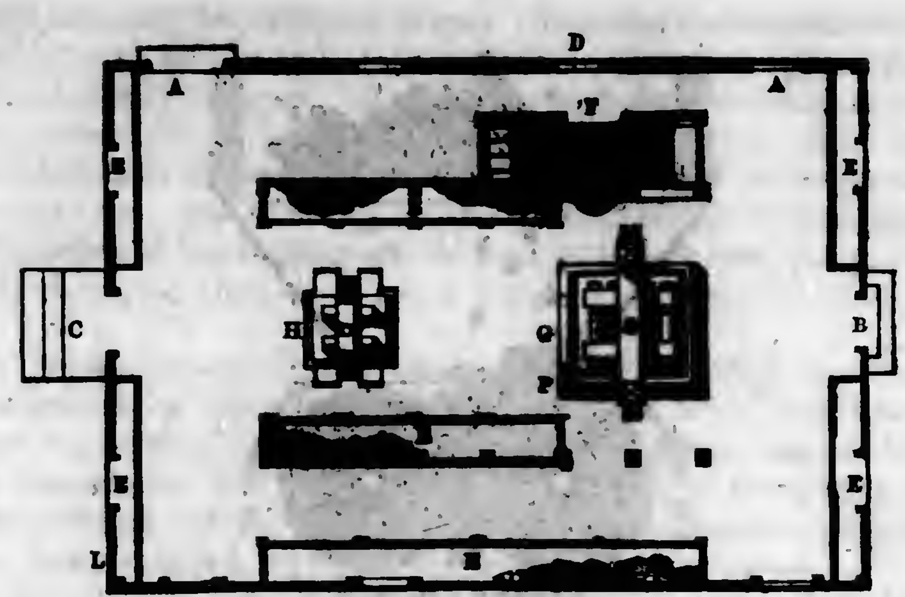
E. Tables for picking over and assorting the fruit previous to being stemmed.

F. Stemming and crushing apparatus.

G. Large press—capacity of 100 bushels.

H. Small press—capacity of 40 bushels.

L. Door opening into the basement.



Plan of a Wine-house.

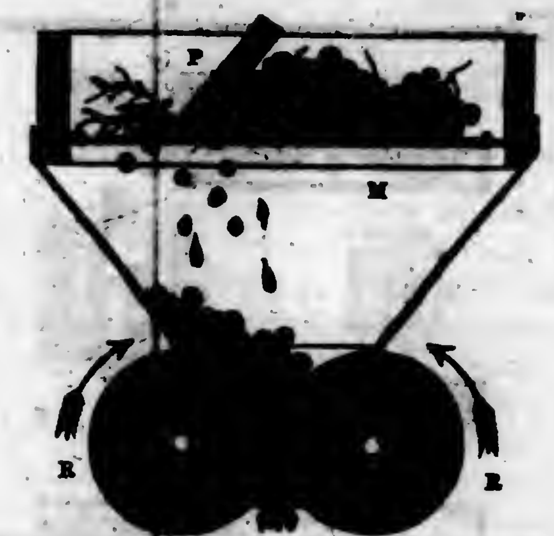
The following are the various operations of the manufacturing process, from the gathering of the grape to the bottling of the wine:

1. *Gathering.*—The grapes, when fully ripe, are gathered in baskets containing about a bushel, as well as in a sort of "pannier" of wood, made very light and strong, and which is supported by straps or thongs of willow, on the back of the picker, as represented in the frontispiece; they are brought from the vineyard in this manner and thrown upon the picking tables, where they are carefully assorted.

2. *Picking.*—This consists in removing by hand all green, shrivelled, or decayed grapes, which are thrown into tubs or barrels and pressed separately, to make a common wine or vinegar. The finest grapes are carried thence to the stemming apparatus, where they undergo another operation.

3. *Stemming.*—Beside the improvement in the quality of the wine which this process imparts, there is another material advantage derived from it, which consists in the diminution of the bulk or volume of any given quantity of grapes in bunches—the large press of the Messrs. Corneau being capable of containing upwards of 100 bushels after the stems are removed; from which about four hundred gallons of wine may be obtained. "Stemming" consists in separating the berries from the stem; it is done in F, (of the ground-plan,) by means of the apparatus, of which a wood-cut is appended.

The grapes are thrown on the wire sieve, M, which is open enough to allow the berries to pass, but retains the stems; a little plank, P, is held in an inclined position, to which a backward and forward movement is given by the operator, as shown in the next cut, so as to force the berries through the sieve, and to remove out of the way all the stems as they are stript: with the aid of this apparatus, two men can, in the course of 8 hours, if regularly supplied with grapes, stem from 70 to 80 bushels. Improvements might be made, by which the manual labor would be diminished; but this simple and cheap apparatus, which Mr. Corneau has introduced, is generally used by the wine-manufacturers of France.



Stemming Apparatus.

4. *Mashing.*—After passing through the stemming process, the grapes fall into a wooden mill, consisting of two rollers ridged obliquely, to one of which is attached a set of screws, by which the distance from each other may be graduated to the proper degree; it being desirable that every grape should be crushed, but that the seed should not be broken.

The rollers are turned by hand: the above wood-cut exhibits, in R R, a section of these rollers, and that which follows shows two men, one stemming, the other mashing the grapes.

Stemming and Mashing.

From the rollers, the grape (being entirely separated from the stem and thoroughly mashed) passes into the press, where the final operation of separating the juice is performed. The wine passes from the bed of the press, by means of a conductor, into the basement, from whence it is conveyed into casks containing 260 gallons each; these, though by no means of so large a size as those used by some of our wine-manufacturers, are of a very

convenient capacity for ordinary crops. The first fermentation takes place immediately, and, at the end of 6 or 8 weeks, the wine becomes clear—or, what is technically termed "fine;" a second fermentation takes place in the spring, about the period of the blooming of the grape. The wine should not be bottled until it is at least one year old, though it is frequently bottled for immediate use, just previous to the second fermentation: this may be done with safety if the bottles can be kept in a very cool place. There are many who think the Catawba wine is better at this period than ever afterwards.

Mr. R. Buchanan, of Clifton, whose beautiful vineyard has been so universally admired by all visitors, and whose wine is so excellent, has also introduced an apparatus for separating the stems from the mashed grapes, which is remarkable for its simplicity, being a large sieve, with meshes of about three-fourths of an inch aperture. The grapes are passed through this after being mashed, and thus separated from the stems.

Mr. Yeatman also uses the sieve to separate the stems from the mashed grapes, before he puts the pulp in the press.

WINE-MAKING IN CLERMONT COUNTY.

Mr. George Weir, of this neighborhood, has made, this season, 4800 gallons Catawba wine, from 8 acres of land—over 600 gallons to the acre. Judges say it is a superb article.

Thomas Williamson, we are told, has made over 1800 gallons; the precise amount we have not learned.

William Carnes made nearly 70 gallons on 2½ acres, first year's bearing.

Charles Burkheart made 150 gallons, on a little over an acre of ground, first year's bearing.

Michael Male made 240 gallons on 2 acres, first year.

Benjamin Light, about 1700 gallons on 8 acres.

Peter Light, about 1400 gallons on 3 acres.

This makes in all, 12,960 gallons, including Mr. John Williamson's. This, at the lowest price offered, will make $6480.—*New Richmond (O.) Age.*

Quincy, December 4th, 1850.

Sir:—Enclosed I hand you answers to some of the questions contained in the Agricultural Circular, dated August 26th, 1850.

The replies given are confined to such matters as come frequently under my observation; and I have been careful to reject any thing in reference to the subjects about which the opinion of practical farmers was not obtained. The profession of agriculture is, in this region, sensibly and steadily approximating towards its proper consequence and dignity, though, as yet, there is a great number of its members deficient in intelligence and enterprise. Our section of country is new—the average settlement of our farms will not reach 12 years: no part of the Union has a population more diversified, either in homebred or imported stock of the genus homo. It will be, therefore, unreasonable to expect much of us until we have attained more homogeneity in habits, peculiarities, and even in tongue. There are, however, indisputable evidences of awakened spirit and emulation among us.

General improvement, the most valuable, is seen in the roads, fences, farm-buildings, and better, neater, and more thorough cultivation of the country.

Agricultural statistics command greater attention than formerly. Experimental farming, with a view to test the extreme point of production the lands are capable of, will be entered into. Experiments are in contemplation, designed to ascertain whether the importation of seed of the staple grains from different latitudes will be productive of advantage, either in quality or time of ripening. Rotation of crops begins to receive some attention, through the example of some who have met with eminent success through its practice. (This is a most important improvement.) Crops are, in general, tolerably well saved, though vast quantities of straw, tops, fodder, and manure are still entirely wasted, in consequence of the short-sighted opinion that the land does not require its use. Many are unprovided with suitable accommodations for stock during our severe winters; yet, in this respect, a gratifying improvement is perceptible. Little disposition exists to introduce new crops, such as flax, hemp, barley, hops, &c., though it is believed many may be grown to advantage. Considerable machinery is used in the field; I think fully seven-eighths of the small grain is cut and threshed thereby: there are some mowing-machines also in use. Much interest is manifested in all sorts of improved implements and machines. The drill is not yet introduced, but will answer admirably, in my judgment.

Horses are almost universally used in the field—very few mules are seen—oxen are not numerous.

The average intelligence is worthy of particular notice, being inferior to no section I have seen in the Union.

Moral character is highly appreciated. Good-fellowship among neighbors, and general interest in country affairs, are marked strongly in our society. Neatness about the homestead is receiving gratifying attention, evinced by the cultivation of shade-trees, shrubbery, flowers, and garden-fruits, such as berries, &c. The means, however, of a great number are insufficient yet to enable them to erect such dwellings as are desirable. Economy, too, is a Sucker virtue. Labor is, in the main, fairly employed, and the laborers treated with deserving consideration: average wages, about $8 a month, with boarding and washing.

The German (chiefly Hanoverian and Prussian) population are generally excellent farmers, and, with the help of their wonderful frugality and industry, almost invariably succeed rapidly. Though not enterprising, they rank among our best farmers for clean fence-rows and well-tilled fields. Much of the field-labor is supplied by them. A desire to educate their children is characteristic with most of them.

The American population is composed of persons from every State in the Union, the mass losing nothing by the mixture, whatever. The country is indifferently supplied with schools, though they are increasing. Teachers' pay is too small entirely, and their responsible vocation not sufficiently appreciated. A disposition prevails to establish societies for the advancement of agriculture, and it is much hoped and desired that the national government will regard, with continued and increasing interest, this department of national industry.

Very respectfully, yours,

JOHN C. COX,
Quincy, Adams County, Illinois.

THOMAS EWBANK, Esq.
Commissioner of Patents.

FRUIT CULTURE.—BY MR. J. C. COX.

"Is the culture of fruit receiving increased attention?" Yes, very much, particularly the culture of apples. "Cannot apples enough be grown on an acre to render the crop a very profitable one to the farmer?" Yes, undoubtedly.

"What varieties are best to keep for winter use and exportation?" They are numerous. I prefer the annexed list:—Newtown Pippin, Golden Pippin, Rhode Island Greening, Jeanetten, Winter Pearmain, Baldwin, Roxbury Russet, Wine-sap, and Jonathan.

There are several excellent varieties of seedlings produced here, not yet named or classed by orchardists.

Apples generally are good. Some varieties are improved much upon the original stock; with reasonable care and attention, their cultivation amply repays the labor invested. In appearance, size, fragrance, and excellence, we can equal any farming locality I know of.

I have observed that some varieties change their colour when transplanted from abroad. The Kentucky Jeanetten and Pearmain, though retaining the original shape and flavor, assume a different shade of color, becoming much darker, and entirely losing the white and yellow.

"Do you know any preventive or remedy for the 'blight' on pear and apple trees, &c.?" No, I wish I did. Have tried close pruning, washing the tree with weak ley; topping, that is, taking off all the branches, stimulating with ashes and other manure, repeated digging at the roots, girdling the diseased limb, slitting the bark—but without avail.

I have observed that orchards in cold, dry, elevated situations are not nearly so much injured as those in more sheltered places. Have a young orchard on a very bleak spot untouched. My neighbors within a quarter of a mile, on a ridge less exposed, very greatly injured. The yellows in peach-trees is not very common here. I have no information on the subject.

Apples.—Best method of transplanting:—For this locality, move the tree before its diameter reaches 2 inches; take as many of the roots as possible; mark the tree, so as to set it in the same position as to north and south; take off a small portion of the stem or upper branches, handling very carefully. Plant a little deeper than the tree stood before, taking care to loosen the earth at the bottom of the hole in which you place it. Shake the earth well down upon the roots, avoiding the injury of the smaller ones as much as possible.

Let your ground be dry, clean, and cultivate in corn, with as much manure as you please. Avoid trimming, as much as you can, and let your trees grow without posts to help them. Weak ley is an excellent wash for the bark of fruit-trees. Forty feet apart is an excellent distance for the trees: less than 2 rods is too close. Plant in the spring, the sooner after the frost is out of the ground the better. Use leached wood-ashes for manuring the trees.

Peaches are abundant and of excellent quality, requiring little care in culture.

Pears.—A considerable number are planted; but, being of slow growth, very few have bearing trees. They have suffered more from blight than any other fruit.

Plums.—Not much attention paid to their culture, in consequence of the attacks of the curculio. The tree grows well.

Cherries.—We have abundance of the common red pie-cherry. The finer sorts are introduced, but few bearing trees. The tree thrives excellently.

Apricots, nectarines, quinces grow well and yield finely. Grapes are only cultivated as fruit. The Isabella stands our climate best.

Currants, gooseberries, strawberries, raspberries thrive very well and are plentiful.

Would any communication resulting from observation of forest-trees, shrubs, &c., together with natural fruits, grasses, &c., be of any value, confined, of course, to this locality?

Wheat.—Varieties in use: Red Chaff, smooth ear, much used.
White " "
Red " bearded, much used.
White " " summer, not much used.
Mediterranean Red, not much in favor.
White bearded Tennessee, (so called,) lately imported.

Average product per acre for 1850, about 19 bushels, of good quality. (Note.—I do not think this average would be correct for any previous year during the last six years.) Largest known yield, 36 bushels per acre.

"Seeding time," best from the 20th of September until the 25th of October for winter wheat.

"Preparation of seed" is much neglected. It is usual to select the seed from that part of the field where grow the most vigorous plants, or to take the seed from the pile having the heaviest and plumpest grains after cleaning.

"Quantity used per acre?" One bushel and a peck. If late, 1¼ bushels.

"How many times do you plough?" Twice if possible. Wheat, covered with the plough, stands our winter better, branches more, and is less liable to injury from falling before it ripens than when covered with the harrow. Depth of ploughing: flush the ground about 4 inches, and plough for seeding about 8 inches.

"Is the yield per acre increasing or diminishing?" I am of the opinion that it is increasing, decidedly, owing to improved farming, and increasing inducement in value, as well as the subdivision of large tracts into smaller farms.

Rotation in Crops.—The most approved system is to follow a crop of wheat with clover and timothy grasses; follow the grass with a corn crop the first year, and wheat the next, or other small grain. The custom is, for the most part, to break the prairie, then put in corn or wheat for ten years successively, reckless of injury to the soil.

Diseases and Insects.—I have heard no complaint of any in this county

this year. There was less cheat than usual at our last harvest. Thorough tillage and winter-fallowing are recommended for the destruction of the Hessian-fly.

Loss of crops sometimes happens from freezing out, from rust, and cheat; the first and last from indifferent farming, generally, however.

Wheat is considered a good crop as to certainty of remuneration.

Corn.—"The most esteemed varieties?" A species obtained by mixing the large yellow corn of Kentucky with the yellow flint, called here smooth yellow; it is prolific, full, smooth grain, covers the end of the cob, hard, sweet—cob brittle. The gourd-seed corn is most planted, both white and yellow. Very little care is taken in selecting seed, particularly as to variety, most farmers merely preferring the color.

"Average product per acre?" Fifty bushels; (have grown more than 100, which is not uncommon.)

Cost of production will vary with the crop. I think corn cannot be properly cultivated for less than $5.25 per acre, estimating labor at $8 per month. A fair average would be not less than 12½ cents for dry corn per bushel.

"Best system of culture?" Land should be ploughed deep during the fall, if possible; this secures the following advantages: 1st. It destroys a great number of weeds, and, at the same time, turns under the surface a considerable amount of fertilizing matter, in the shape of decaying vegetation, which would otherwise be lost. It destroys many insects which live upon the crop; it renders the soil more easy of cultivation at seed-time, and, by exposing more or less new soil, recuperates that already taxed for one crop. It should be again deep ploughed in the spring, after the frost is fairly out of the ground, and planted in rows, about 4 feet apart. Two plants are enough to stand in one hill—three may do well—more than this is too many. Plough till there are no weeds visible after the plants appear, throwing the earth against the plants, and then plough again, to be sure. Corn can't be ploughed too much in this climate. Planting depends much on the season, of course, as to time. I prefer late planting, in order to avoid the frost and the stunted character of the plant when its development is checked by unfavorable weather, such as cold, wet spells, &c. When the plants are quite small, use a cultivator instead of the plough, and when too large to use the plough, use the hoe. In thinning the plants, regard the color and thickness of stalk more than the height. Should the land be lumpy after spring ploughing, smooth with a harrow.

Oats.—Average yield, (5 farms, in fair season,) 36 bushels. Quantity of seed used, 2 bushels and 1 peck. Is an uncertain crop.

Rye.—Scarcely any raised in this county.

Barley.—None cultivated for a crop.

Peas.—None cultivated for a crop—are not cultivated as a renovating crop.

Beans.—Very small quantity raised—are very prolific. Oats are considered the most exhausting crop.

Clover and Grasses.—Quantity of seed used, about 14 pounds to the acre.

"Quantity of hay cut per acre?" With reasonable farming 2 tons; I have known 2½; average, 1½ tons. Cost of production $3 per ton.

"Best fertilizers for meadows?" Stable manure is the only one in use here, and answers every purpose. Will increase the yield surprisingly, even upon first-rate land.

"Grass seeds preferred for laying meadows?" Timothy, clean, is first. Timothy, with very little red clover, second. It is supposed that a meadow will thrive better with mixed grass, as the clover shades the young growth of the timothy during excessive heat, and preserves it thereby. Kentucky blue-grass is our best pasture grass. White clover grows spontaneously upon close-pastured land, in timber and prairie, most luxuriantly at this time. I am credibly informed that in the early settlement of the country it was unknown.

Dairy husbandry is much neglected; very little cheese produced.

Root Crops.—Some turnips are raised as a field crop, and are the only one of the list that are so cultivated. No disposition is manifested to engage in their culture as a crop. All of those named thrive excellently as garden vegetables.

Potatoes, (Irish.)—Average yield, 70 bushels. Most prolific variety, Neshanac—most profitable, pinkeye—most edible, Mercer. Cost about the same as corn; say 22½ cents average. Some experiments are being made in their culture: if any improvement be elicited, will report it.

Jefferson Township, Fayette County, Pennsylvania, December 5th, 1850.

Sir:—I have been at some pains to get what information I could from my brother farmers, and I herewith send you the result of my inquiries.

I live in a section of country every way adapted to the raising of wheat, corn, oats, and clover; the soil is a limestone clay, susceptible of the highest degree of cultivation.

Wheat.—Our average product per acre is from 20 to 25 bushels, and, in some instances, 30. Our varieties are the Mediterranean, the Cape, the red smooth, the red bearded, and latterly the Zimmerman; our mode of culture is varied; we sow on a fallow with two ploughings, which mode invariably insures us good crops. Sometimes we cut off our corn and sow wheat of a late variety, but our principal crop is sown on oats stubble, with lime or manure on the top; our time of seeding is from the 15th to the last of September; the yield of our land is steadily increasing; the land which, 15 years ago, produced from 12 to 15 bushels of wheat, will now, with lime and manure, produce 20 to 25, and could still be made to produce a greater quantity. Our rotation is, first, corn on a clover lay; second, oats, with manure; third, wheat with lime; fourth, clover sown on the wheat in the spring. Our nearest markets are Brownsville and Pittsburgh; prices range this season from 70 to 75 cents per 60 pounds. *Corn.*—Our most esteemed variety is a large, rough gourd-seed, with from 12 to 16 rows, a white cob and long grains. Our average yield is from 40 to 50 bushels per acre. We generally plant on a clover lay, with long manure, ploughed in early in the spring. We then commence about the middle of April to haul on lime, coal-ashes, and any other fine manure we may have, harrow fine, and mark out in squares of four feet each way, and plant from the 25th to the last of April, 3 grains in the hill; our after-culture is to work four or five times with cultivator and double-shovel plough. We keep our corn clear of weeds and grass till harvest. The National Road affords a good market for corn and oats, so that we feed but little to stock; the price this fall is 40 cents per bushel.

Corn can be raised at the rate of from 8 to 10 cents per bushel, exclusive of interest and taxes on the land. Oats we mostly sow after corn, once ploughing; we raise 40 to 50 bushels per acre, and sow 1½ to 2 bushels per acre. We consider oats an exhausting crop, and always lime or manure after oats, to insure a crop of wheat. Barley, rye, peas, and beans are not cultivated with us as field crops; neither are roots for feeding stock. Clover is considered as indispensable to good husbandry. We sow from 10 to 12 pounds of good seed, per acre, on our wheat; we sow in March, and always try to sow on frozen ground, or on snow. We raise from 2 to 2½ tons of hay per acre; cut in June, and reserve the second crop for seed; we cut two crops in succession, and then plough for corn. We sow timothy for permanent meadow on bottom land; hay is now selling for $10 per ton. Cattle and sheep are not raised to a great extent; if we feed cattle or sheep for market, we purchase from a distance, feed during winter, and dispose of them in the spring, when fat. Potatoes are raised in limited quantities, farmers have been deterred by the rot from planting them. *Manures.*—Our farmers are only just beginning to turn their attention to making and preserving their manures. We have, for several years, used lime as a manure, to which we owe the increase in the production of our land. Lime, in quantities of from 50 to 100 bushels per acre, sown immediately before we sow the wheat, increases the wheat crop, and insures us a crop of clover, which we consider the best renovating crop we can sow.

I have given you short answers to some of the questions proposed in your circular: if they will be of the smallest use to you in making out your Report, I shall be highly gratified; if not, you can lay them aside, and give no offence.

Yours, respectfully, JOHN H. FARR.

Rivesville, Marion County, Virginia, December 10th, 1850.

Sir:—I had the honor of receiving, through the politeness of the Hon. Thos. S. Haymond, your agricultural circular for the present year, (1850.) With the expectation of getting the necessary information from the marshal's books, I have delayed completing my report for more than two months, and, for want of their returns, shall be able to give you nothing more than a mere historical sketch of the improvements that are at this time progressing within our county. Our soils are naturally fertile, and highly adapted to the production of the various kinds of grain, as well as grasses. We have hitherto given but little attention to the improvement of our lands, either by any regular rotation of crops or otherwise; and while it yielded an ample supply for home consumption, we were satisfied with the present state of things. The principal market for the sale of our wheat and other produce heretofore has been Pittsburgh, Pennsylvania, the prices being barely sufficient to defray expenses of transportation and other incidental charges, the distance being over a hundred miles. The Monongahela river affords the necessary facilities for transportation, at least in the spring season of the year, by which the surplus of produce is conveyed to the above market. Lumbering, or supplying timber for steamboat building, has, for many years, engaged the attention of many of the citizens of Harrison, Marion, and Monongalia, and been a source of considerable revenue to those counties.

But I may say, with much propriety, the rearing of live stock, horses, cattle, sheep, and hogs have formed the staple of Western Virginia, and been the principal source of the wealth and prosperity of this section of our State.

The surface of the country is undulating and healthy, but its insulated position has heretofore proven unfavorable to the introduction of experienced and practical farmers locating among us. But a new era in the history of our county has at length opened. The time was, when it would have been thought impracticable for a wagon and team to cross the barriers that lay in the way on every side. But behold the change that has been effected within the last six months! The mountains are made to tremble from their very base, by the constant and tremendous explosions in blasting rocks, whose deafening reports arouse the sleeping echoes from their placid retreat, and send back a wild response in tones of thunder. The great railroad from Baltimore to Wheeling is now under a rapid state of being made through the centre of our county, and an active interest in all the departments of industry are favorably conspicuous among the people, especially the agricultural portion of its population. The wheat crop of '49 was extremely light, owing to the rust striking it a few days previous to harvesting. Nothing discouraged, the farmers, in anticipation of the public works that were all centering through Fairmont, our county seat, employed themselves with renewed energy, and perhaps no former year ever witnessed so large an amount of soil turned, or so much grain sown. The result was a favorable experiment, and an abundant yield of small grain of superior quality was our reward.

Corn was never better; oats not so good as '49; but potatoes were better, both in quality and quantity, than they have been for the last 5 years. They were not the present year injured by the disease termed the rot, though the yield was less abundant than before the disease was known in western Virginia. The red-chaff bearded, until a few years past, has been, with few exceptions, the only wheat cultivated in this section of country. The Mediterranean, though of recent introduction, promises a fair yield; being thought less liable to the ravages of the fly and other casualties. Besides raising an amount of produce sufficient for home consumption, there will be more than enough, it is thought, to supply the great number of hands at this time employed on the public works.

I am, dear sir, yours respectfullly,

HENRY MERRILL.

Hon. Thomas Ewbank, *Commissioner.*

Bloomfield, Somerset County, Maine, December 5th, 1850.

Dear Sir:—In answer to questions propounded in your circular, handed to me by the postmaster, W. S. Parks, of Skowhegun, I would say: 1st. The variety of wheat sown now is principally the Black Sea wheat, the red-bearded wheat, and the bald white, for spring sowing; and the average product per acre (unhurt by rust or weevil) is, or rather has been, about 8 or 10 bushels. The past season has been better. The time of seeding varies from the 25th of April, or as early as it can be sown, to the 10th of June; although, in general, farmers prefer sowing as early as it can be done, or to the 10th of May, or defer it to the last of May. Harvesting is done from the 1st of September, onward—done before the 20th. Seed is pretty generally washed clear, and lime or wood-ashes added till dry enough to sow, and allowed to stand 12 hours. It is now customary for most farmers to sow 2 bushels to the acre, some even more, on land planted with corn previously and manured, ploughed once or twice from 4 to 6 inches deep. The system of raising wheat has been changed somewhat of late, and considerable has been sown on "broken up" pasturage, which has succeeded well, using no manure: the plaster or gypsum is good. This, with rather better seasons, gives an increasing yield. The system of rotating has never been carried to much extent, as the country is not old, and land plenty, and two or three crops are all we get before seeding down, say one of corn and potatoes, one of wheat and grass, or one of oats or oats and peas, one of corn, and then wheat. No particular remedy for the fly, except having the wheat ripen in the season which is too early or too late for their accommodation. Market at home, and average price from $1.25 to $1.50—1850, $1.50—governed by imported flour. We have succeeded this year in raising a long neglected crop of winter wheat; none having been sown but what has yielded well, some as high as from 35 to 40 bushels to the acre; all that has been sown looks well. This crop succeeded well 30 years ago, but having failed several successive years, it was abandoned. We have for the last 20 years labored under great disadvantages in raising wheat, which began with the fly, then the weevil, and then "blue-neck," blight and rot. Forty years ago, wheat was a sure crop, and the quantity sown to the acre was just 1 bushel, the same as is now sown in the fall; and the yield was uniformly from 20 to 30 bushels, and it may be a question now whether 2 bushels to the acre is not too much: a farmer of my acquaintance began with Black Sea wheat, at the rate of 2 bushels to the acre, and found his crop pinched; he reduced to one and a half, and it was better; and then to one and a quarter, and found it right. Several experiments have been put in operation to test the quantity of seed-wheat in this State, which have elicited what may be valuable information on this important subject. It has been suspected for a long time that our seed was in fault, at least for a part of the deplorable deficiency in the crop, and if, "as you sow, so shall you reap," and every seed shall bring forth its kind, then it follows, if we sow defective seed, we should expect defective crops. I could not see why a flour-mill cleanser should not be the best thing to prepare wheat for sowing, till an experienced miller told me it would kill one-half of it. Reflecting on this fact, I was led to see what effect the common threshing-mill would have, when many kernels are broken in the operation. These suggestions have been experimented upon, and it is found, on repeated trials of samples sown in common saucers and broadcast in the ground, that one-fourth or more of the largest kernels are killed, and never germinate, and some will produce a shoot, but no root—the root-sprout being killed by the machine. This accounts in some measure for our wheat coming up thick enough, but shortly becoming thin. Many kernels, from native strength, shoot up, but, having no strength, die. In our flour-mills may be seen the caps of the root-sprout, blown out by the blower or fan, under the hopper, by quarts at a time, besides that which is blown out above. One farmer told me he had tried the experiment, by accidentally having a barrel of wheat threshed by hand and sown with another barrel threshed with the machine; and the difference was at least one-quarter. Thus it is seen that one-quarter of the seed is killed by the machine for threshing, and then the whole is run through an ordinary winnowing-mill, all together, and sown from the mass; we raise our wheat, year after year, from about three-quarters of the seed sown, and that of the poorest quality; the best and fullest being killed. Now, to my mind, this is enough to account for the diminution of the wheat crop, from 20 to 30 down to from 5 to 12 bushels. No seed on earth could stand such a test. Formerly, the wheat was threshed with flails, and winnowed in the north-west wind, and then the seed taken carefully from the north-west end of the pile, so that very little was sown but the first order of kernels. What a contrast! Some even went so far as to select heads of the largest and best growth, by pulling them from the sheaves. A gentleman, now on the Supreme Bench of this State, informs me that his uncle followed that course, and had no occasion to change his seed for 40 years in succession. A gentleman of this town informs me that he tried the experiment by selecting a few heads, enough to give a quart of wheat, which was carefully kept and sowed on a corner of the field, and he assures me that he could see the difference in the grain 40 or 50 rods, the plants being a darker green, broader leaf, and taller growth.

A question has been raised whether smut is raised from smut in the seed: and I am informed, by a friend, that he sowed some wheat in a bed in his garden in rows; two rows of good seed produced all good wheat; next two rows, of middling wheat, produced a poor quality, with some smut; next two rows, of the poorest wheat, which was mostly smutty; next, the very smut itself, a small part of which came up, but was all smut. This proves the necessity of improving the quality of seed-wheat, in this climate at least, if we would raise fair remunerating crops. A recapitulation might be well; but I will only say, let every farmer who sows wheat have a sufficient quantity threshed by hand, at least, for seed, and winnowed in a good strong north-wester, if he would have good crops of good wheat.

As for smutty wheat, I would say, with Capt. H——, there is no more need of raising it than of wearing a dirty shirt. In my younger days, when agriculture was not studied, but "*went on itself*," I was on a farm where, for years, smutty wheat had been successively raised, till my ambition rose above it, and, though at the time quite young, I bought 2 bushels of clean seed-wheat, and prepared it, by washing, liming, &c., for sowing; the consequence of which was that I got a crop several shades lighter than usual. Some of this crop I saved for seed, prepared carefully again, and sowed it, from which I got a very tolerable article; and, after the third year, I had no trouble in raising good white wheat and enjoying good white bread—a blessing which I wish every man to enjoy.

Corn.—There are several kinds of corn raised in this vicinity, from the old Indian blacksmith kind to the Massachusetts large eight-rowed, including the Brighton, the Dutton, the sparkled, and threaded. The Brighton is a kind got up by the legislature of Massachusetts, before the State of Maine was set off, and given to the members, by which it became pretty generally disseminated. It is considerably planted, grows large, and produces well; but has a moist cob, so as not to be very easily dried. The Dutton is much like it, ears a little shorter, from 8 to 14 rows, grows well, and is productive. The sparkled is a good variety, much like the old eight-rowed, and produces well. The blood-red is a soft, damp kind, not worth putting in competition with others. There is another kind, called here Piscalaquin corn, eight rows, good ears, small kernels, cob very small, ripens early, and is *the* kind for a bad season. But such are the changes in corn, that a description is

not worth much. I planted the Brighton kind on a light, sandy, alluvial soil, and the second year I had nearly all eight rows, small variety; and the same, put on a clay soil pretty rich, went back again; and the same stalk will produce eight, ten, and twelve-rowed ears. The old Indian corn remains nearest to its pristine state, tall and straight, two ears to the stock, half bluish and half yellow. An average crop per acre may be measured or estimated variously. An average of all the corn, from the drunken blacksmith to the accomplished farmer, would give an idea of the country and manners, but not of the agricultural capacity. An average crop of well-cultivated land may be reckoned not far from 40 bushels per acre, running from 20 to 100 bushels, but may be more under 40 than over. The cost per bushel, on the same estimation, may be put at about 42 cents per bushel. The mode of culture has been materially changed, and much corn is now raised by spreading manure and lime on grass-land worn out and "bush-furrowed," the seed put where the furrows join, by which little labor is required in hoeing. Pasturage and mowing, broken in the early fall, and manured with long manure, and then go over it, before planting, with the cultivator, gives good crop, and the old mode of planting on the stubble-ploughing. In the last case, a mixture of two parts ashes and one part lime, with one-half to a pint in each hill, covered one inch in dirt, especially on light land, gives a good crop at a fair paying rate. Cooked vegetables are generally best; but, in regard to corn, it may be questioned whether it will pay the expense: I think it will. Grind and cook corn, formerly planted 4 feet apart, in rows by three in hills, but recently 3, by crop a doubtful expediency—one ear for two to the stalk.

Oats yield very small, on account of threshing-mills, same as wheat; seed 2 to 5 bushels; naturally exhausting; 5 years kill the land; formerly 20 to 50 per acre, now 6 to 25.

Barley.—Rather uncertain; well sown, will produce from 12 to 30 bushels per acre; not very exhausting; a good article for pork, &c.

Rye.—Mostly sown in fall, and yield all the way per 10 to 30 bushels per acre.

Beans.—Seldom raised alone to any amount; planted with corn; raised per 50 cents; generally sold at $1.

Peas do not exhaust land, rather improve; not sown for the benefit of land; from 10 to 40 bushels per acre.

Butter and Cheese.—Very much neglected; average to the cow, 100 pounds cheese and 100 of butter; many cows kept for stock-raising, and nothing else.

Neat stock.—For 3 years old, prices vary greatly; from 15 to 50 in market; giving 15 for raising, the large ones cost more. Cows worth in the fall from $12 to $20; in the spring from $16 to $30; extra, $50 to $100. The kinds of cattle are not kept apart, but much attention is given to stock, and successfully; all fine yoke oxen must be 7 feet in girth, and many come to that standard.

Sheep.—Wool is considered worth raising as a business when worth 25 cents the pound. Coarse wool, on the same kind of sheep, is not so good as a paying business; but the coarse-wool sheep need a little less attention, and are as good mutton.

The large Dishley sheep produce good mutton and great fleeces—very hardy; but the Merino sheep are generally kept for profit. The difference in price is about equal with the cost—say from 24 to 34 cents from the sheep.

The subject of raising is badly understood and badly attended to, on account of the fluctuations in the prices produced by partisan legislation. Well might Mr. Hamilton say to Mr. Calhoun that a certain eight years had cost the nation $500,000,000. Sheep are too often kept for the purpose of killing the bushes in the pasture—consequently poor, the lambs are allowed to run with the dam till they wean themselves, the best sold off, and the flock kept good from the remainder: allowing for death and accident, no small amount. In this way, flocks soon run down, and well they may, and must be changed. Instead of this, if sheep could be kept well in winter, and bring their lambs by April, and let the lambs be taken off by the 1st of September, the sheep would all get fleshy by fall, and go into winter capable of standing the rigor of climate. The lamb would not be seen gazing at hay and provender, not knowing what to do, but go right to eating and winter vastly better; and by this means the ram is kept from them, if you please, so they do not yean the first year. The old sheep are in good case, and very little feeding will fit them for market.

The proportion of lambs to the ewes is, probably, about two-thirds, and, with the above rules observed, might be raised to seven-eighths. Sods of turf should be piled where sheep can get them in long snowy winters. Soot and salt, with a quantity of meal, are very good. Hogs are of all varieties and mixtures. We can't compete with the West in this article.

Cotton we wear out, but raise none.

Sugar-cane the same.

Rice the same.

Tobacco.—Everybody uses it, but produces none to count. It used to be raised considerably here, and is raised in Canada now.

Hemp.—This article has been tried, but did not succeed very well. Rather exhausting as a crop. It may come up again when we get railroads and have less lumber.

Potatoes.—Irish potatoes were one of the staple articles of the farm till the general blight, and numerous starch-mills were erected, which promised a lucrative business; but our hopes are blown to the moon for the present. The best kind of potatoes, every thing considered, is the old Spanish or English white, or the pinkeye, nearly alike. Most other kinds have objections: the Chenango rots more, the red is not good for the table, the Christri wants very rich soil, and so on of Butnene lady. The best method in raising them is to plough pasture land in the spring. Harrow and plant all good-sized, either cut or whole; put on gypsum or plaster of Paris. A thousand conjectures have come to light as to what constitutes the disease; but facts seem to baffle every one. No two fields, no two hills, no two positions of the same seed or location, high or low, dry or wet, produce the same results, but right contrary. My own opinion is, that the same disease attacks potatoes that does wheat, and they both came suddenly and may go as suddenly. I observed that something ailed potato-vines several years before the rot commenced; the tops rusted and died where they used to keep green till frost came. I had pens of potatoes near my stercorary, (hog-pen,) on which the vines grew large; and, wishing to dispose of them, I put them into the low wet ground in the yard, on which I piled a quantity of pamplain vines, making a cart-load. In November, I pitched the whole over, to give them some chance for rotting, and in the mass I found attached to the stalks of the potatoes thousands of maggots, resembling, in shape, color, and size, the weevil. It would seem that the fermentation had produced the requisite

amount of heat to hatch them out. They were in rows on the stalks, and appeared to have been deposited along the little raffle on the stalk. What would seem to corroborate the hypothesis is that, where corn and potatoes have been planted one year, and wheat sown on the whole ground the next year, that part where the potatoes were planted will be doubly injured to that of the corn.

Sweet potatoes are not cultivated nearer than about Boston, to my knowledge, and there they assimilate to the Chenango, so that little or no preference can be given. I think that they are the Irish potatoes varied by climate, little else.

We have a native ground, not exactly resembling the sweet potato in vine-leaf and blossom. I think that might be mistaken.

Fruit culture is new business and in infancy. Much is going on in the line, and will give ample results in a few years. Orchard lands have been too prevalent. When I was a boy, I have heard the remark, that we could raise apples to eat and some cider, but could not have cider like Massachusetts. Every one set out trees to try it; now, were the trees in good condition, and not killed by ploughing, we could expect a million bushels of apples in a year. I am entirely against cutting off the top roots with the plough share. Enrich the ground with coarse any thing, and cut out the middle of the top, so as to let the sun in.

Manures.—We are beginning to use lime considerably for manure, and salt and alkali, on Baumer's plan. Every farmer uses all his manure, and spreads it on all his cultivated land, probably one-eighth of what should be used. Good farmers put on all the way from 20 to 60 loads per acre.

Thus I have hastily gone over with most all the questions propounded, very imperfectly; and, if you find any thing worth notice, you are free to use it. The remarks on wheat are very strongly set in my mind, and, I think, worth perusing in the Northern States and the older Southern. In the virgin West any thing will grow. The remarks on sheep, too, are applicable to the North and Middle States, but not to where no winter is.

Very respectfully and with much esteem,

Yours truly,

EUSEBIUS WESTON.

WOOL AND WOOL-GROWING.

Nashville, Tennessee, October 21*st*, 1850.

Sir:—Your favor was duly received, and I cheerfully make a communication for your Annual Report, on the subject of wool-culture and sheep husbandry in the low latitudes of the United States. Observation and many years' experience have brought me to different conclusions from all others who have written on this subject, upon the effects and influence of warm climates on wool-growing, and especially upon the finest Saxony wools.

In a letter addressed to the Commissioner of the Patent Office, and published in the Report for 1848, page 627, I expressed the opinion "that the United States are a better wool-growing country than any portion of Europe; that the *low latitudes* have an advantage over the high, and will produce finer wool; and also, that as fine wool is now grown in the United States as can be found in the world."

I stated further that I had studied this subject with diligence and devotion for 35 years, and thought I had come to correct conclusions; but the Commissioner, Hon. E. Burke, decided that I "was wrong, and most decidedly mistaken in the whole matter," and that Mr. Fleischman's views, who had said that we must go to Germany for sheep, if we hoped to succeed, were no doubt correct. Still confident that my long study and experience had not misled me, when the Commissioner published his Report and remarks, I addressed him a letter, which may be found in the "Plough, Loom, and Anvil," page 366, December No., 1849, offering to exhibit selections from my own flock, in latitude 36°, against any sheep which could be found in all Silesia, or any high latitude in Europe, and especially above 50° north latitude. This offer has not been accepted, and I have no fears of the result, if it ever should be.

It is gratifying now to refer to the impartial evidence of science in favor of the positions then taken. I was certain the facts existed, but I did not know that the researches and inventions of our countryman, P. A. Browne, Esq., of Pennsylvania, would so soon present the testimony in so satisfactory and tangible a shape. Mr. Browne practised law for more than 30 years in the city of Philadelphia; retired from practice, he has devoted years to the study of hair and wool, aided by the lights of others and his own inventions. I consider his examinations, therefore, entitled to full faith and credit.

From two letters addressed to the Hon. R. R. Reed, of Pennsylvania, and myself, published in the May No. of the "Plough, Loom, and Anvil," 1850, I beg leave to make a few extracts, which show important results to the United States, because it places her at the head of the list of all countries for fine wools.

Mr. Browne examined 65 samples, or collections of samples, from all parts of the world, and especially the 18 samples brought over by Mr. Fleischman, from the most renowned flocks of Europe, and distributed, through your office, to the several States, as the standards of excellence, and worthy of imitation.

The quality is expressed by the number of fibres which will cover an inch; or, the diameter of one fibre is that fraction of an inch. The low figures indicate the coarser wools, and the high figures the finer.

		To an inch.
No. 4.	Common American wool	500
" "	The wool of Leicester (England)	500
" "	The Irish long wool	560
" 17.	Wool of Odessa	750
" 31.	Three-quarter American Saxony	1041
" 32.	Wool from the herd of Dambran, improved by buck from Prince Lichnowsky, by C. L. Fleischman	1098
" 34.	Lamb from the Duke of Leitchenan, in the possession of Hon. R. R. Reed, Pennsylvania	1098
" 37.	Wool from buck "Napoleon," valued at $1500, owned by M. Heller, of Chrezelitz, whose flock is considered the only rival to that of Prince Lichnowsky, collected by Mr. Fleischman	1200
No. 38.	Wool from a buck of the herd of Reti, from Hungary, by Mr. Fleischman	1200
" 39.	Ewe of Prince Lichnowsky, Kuchelna	1250
" 40.	Buck of Roggon, in Mecklenburg, collected by Mr. Fleischman	1250
" 42.	Ewe from the Duke of Leitchenan, dam of the ram of Hon. R. R. Reed	1250
" 45.	Another ewe of Prince Lichnowsky, by Mr. Fleischman	1562
" 46.	Buck, near Moscow, Russia, by same	1572
" 47.	Buck of Prince Esterhazy, by same	1572
" 50.	Ewe of the herd of Guettsnandorf, celebrated for its thorough blood, by same	1580
" 51.	Buck of the herd of the Viceroy of Hungary	1600
" 54.	Buck of Gross Herlitz, Silesia	1875
" 61.	Specimen from a wool-merchant, Dresden	2186
" 57.	Ewe of Colonel Randall, New York	1875
" "	Specimens from 5 ewes and 5 bucks of Mr. S. Patterson, Pennsylvania	2186
" "	Specimen of Colonel Lee's flock, Pennsylvania	1875
" "	Flock of Mr. Robert Allen, Virginia	1875
" 65.	Five specimens from the flock of Mr. Mark R. Cockrill, Tennessee, as follows:—	
" 1.		1572
" 2.		1875
" 3.	This is a beautiful even wool	1875
" 4.	This is a clean even wool of the extreme fineness of	2186
" 5.	Not uniform	2186
" 5.	Some strands in this specimen	2500"

The above is the evidence of scientific instruments in the hands of a gentleman devoted to the investigation of this subject, and fully sustains my position, that the United States are growing as fine wool as Saxony, Silesia, or any other part of the world.

Mr. Fleischman recommended, in his report, that wool-growers should go to Chrezelitz and give Mr. Heller $1500 for such bucks as "Napoleon," for the purpose of improving the *quality* of our wool. Compare the sample from Napoleon with the samples in Mr. Brown's cabinet, from New York, Pennsylvania, Virginia, and Tennessee:

United States samples	·1875, ·2186, and ·2500
Napoleon—rival flock to Prince Lichnowsky	·1200

Was I mistaken, then, when I said that as fine bucks could be purchased in the United States for $50, as those in Germany which are valued and sold at $1500? What improvement in *quality* of wool would such a buck as Napoleon be to the flocks of New York, Pennsylvania, Virginia, and Tennessee, which grow the samples in the above collection, running from 1500 to 2500, whilst he wears a coat, grown in the snows of Northern Europe, of only 1200 to the inch?

The sample from the flock of Prince Esterhazy, of Hungary, is 1572. This Hungarian prince, it is said, owns a flock of 3,000,000 sheep, and 4,480,000 acres of land. We have a right to suppose that he has done every thing that wealth and leisure could accomplish in *that latitude*, to improve his flock. Yet, would a buck with a fleece of 1572 be an improvement upon our ewes in the low latitudes of 36°, which bear now the "beautiful even fleece of 2186?" The same remarks apply with equal force to the flock of Prince Lichnowsky, of Kuchelna, whose samples are 1250 and 1562.

I cannot omit a notice of a remark of Mr. Fleischman, at page 306. He says: "It has been found that the highly improved sheep do not last well in America, and that the wool grown in America by the German sheep does not at all compare with that grown in Germany."

I can excuse Mr. Fleischman's partiality for his "fatherland," but I should do injustice to our own country not to challenge a test of such statements. I hold directly the reverse of both these propositions, and, on the subject of wool, refer to the testimony of Mr. Browne, who deserves from our wool-growers a service of plate and a suit of clothes from the "beautiful fleece of 2186," for his investigations in this important product.

There is a traditional belief entertained by the greater portion of the world, that sheep by nature belong to a *cold country;* and that when they are removed from a cold to a warm climate, the wool will grow coarser. My observations and reflections on this point have convinced me that, when the latitude is not below 30° N., the reverse of this tradition is true. I believe that the improved Saxony sheep, brought from the snows of Russia to Texas, in the United States, will produce a finer, evener, and fuller fleece than while in Russia. I think the evidence is pretty conclusive that the Merino sheep are natives of the orange groves, and are fitted by nature for the warm climates generally. Climate is a law of nature, and her laws are in harmony. The animals fitted for warm climates are most healthful and vigorous under the action and influence of these laws. The elephant, lion, and camel are organized to bear with healthful influences the long-continued heat of Africa, and the white bear grows fat on the ice of the Arctic seas. I can with confidence say to all husbandmen in the cotton districts of the United States, that, for growing fine wool, they have nothing to fear from climate.

I consider Texas an admirable location for wool-growing, as there is a scarcity of timber, and it is not so well adapted to other agricultural pursuits. The prairies are productive of grass without the labor of man. The winters are mild, open, and warm, furnishing green food, with a regularly growing fleece throughout the year. Population sparse, and lands cheap, requiring but a small capital to engage profitably in the business. Our population is rapidly increasing, and must continue to do so; and last year we imported nearly 20,000,000 pounds of raw wool, besides the woollen goods which we annually take from foreign countries. These are strong facts in favor of a continued demand for wool.

Though cotton, the happy gift of heaven to that class of men blessed with the fewest comforts of life, is steadily in competition with all other materials for coarse goods, yet there are appropriate uses for wool which nothing else can supply. The cotton district, embracing 10 States, and about 500,000 square miles, presents a wide field for the growth of wool. The resources of the South are but partially developed, and I am happy to see Southern opinion awakening on this subject. The spindles and looms are coming to the cotton fields, and when they are up, the cotton crop alone will yield $150,000,000 per annum. The wool crop, at 20 sheep to the square mile, will yield 30,000,000 pounds, besides rice and sugar. We have spread over our cotton territory, and the great enterprise of opening new cotton States is nearly closed. We have about $750,000,000 invested in the growth of cotton, an enterprise of comparatively but a few years, and the addition now of the spindles and looms in the cotton fields will double the product of this great growing capital, and insure consumption by furnishing coarse goods for the laborers of all the world, at cheaper rates than they ever have been or ever can be furnished elsewhere.

The cotton district of the United States is to become, in a few years, the dispenser of a great public charity, by furnishing the laborers of many portions of the world with the cheapest clothing made in Europe or America. The wool crop may be grown in the cotton district, without diminishing the latter, and thus add to the resources of the South. All the cotton region is adapted to wool and sheep.

In my estimation, the South is not dependent and not weak; but rich in natural advantages, and now ready to say she will turn to account the gifts of nature, and show the strength of her position. No power at home or abroad has any just right to interfere with our domestic relations, and thereby disturb our quiet, and arrest the full development of our resources.

I have said that the low latitudes of the United States will grow the finest Saxony wool, finer than Silesia, the boasted province of Europe. I am also satisfied that the intellect of the Caucasian race, under the genial influences of our southern sun, and the effects of our domestic relations, is more rapid, more polished, and more brilliant than it is in the higher latitudes of our own country. Mind is power; and the South may add this to its other natural advantages; and these powers, when developed and understood, and associated in harmony, point to a prosperous destiny.

I am, very respectfully, yours,

MARK R. COCKRILL.

HON. THOMAS EWBANK,
Commissioner of Patents.

Spring Cottage, Marion County, Mississippi, Nov. 6th, 1850.

In reply to a circular of the United States Patent Office, forwarded to me by the Hon. A. G. Browne, I take pleasure in answering such questions as apply to the production, manner of cultivation, &c., of this section of country.

Cotton.—The average yield, on the bottom lands, (no worm,) 400 pounds clean cotton, on uplands, 150 to 300 pounds; cost of production per pound, 6 to 7 cents. Corn yields best after cotton, and, to keep up or improve the fertility of land, sow down between rows of corn from 3 pecks to a bushel of peas to the acre; plough them in lightly, or harrow them over. The next season, sow the same land down in rye or oats, which may be fed off, first by horses or cattle, and then by hogs, so as to tread the straw down. About the 1st of July, sow the land down with peas again, pick or feed them off, and the land is again in good condition for cotton. The oat or rye stubble and straw and pea-vines decompose in less time, perhaps, than any other vegetable matter, and lighten and improve the soil. In regard to subsoil ploughing in the cultivation of cotton, so far as my experience extends, and from observation, I am satisfied that subsoil ploughing will prove beneficial only in strong clay and prairie lands, and upon light and sandy soils will prove injurious.

My mode of cultivating cotton is to bed up with turning-ploughs, in January or February, 3 or 4 inches deep, 5 feet rows on bottom land, and 4 feet on upland. At planting-time, 10th to last of March, sweep the top of the bed with a broad sweep; follow the sweep with a heavy harrow on the bed; then open the bed with a small, light scooter-plough; sow the seed moderately thin; cover the seed with a light harrow. In the first ploughing of the young cotton, commence in the centre or middle of the row with a turning-plough, and turn to the centre, forming a bed between the drills, until the young cotton is scraped; second ploughing with the turning-plough, commence near the drill, raising the bed as much as the cotton will permit; third ploughing, run one furrow on each side of the drill, still raising the bed, and finish the row with shovels; then harrow and sweep the residue of the season alternately, as may be necessary.

The object of bedding up the land in January or February is, that it may settle down by planting-time to an ordinary firmness, so that chilling winds, cold dews, and the rays of the sun will not penetrate so deep about the roots of the plants and kill them, as is frequently the case, when the earth is light and fresh at the time of planting.

Cotton should not be ploughed after the 20th June, if it can be avoided, as it shoots out many small fibrous roots; and to plough deep and cut its roots after it commences forming and maturing, will cause it to drop its forms, check its growth, and seriously damage the plant.

Boll and Army Worms.—Some experiments have been made, and several things recommended as preventives against the army and boll worms; but none has as yet proved effectual. From observation, I have discovered that the army-worm makes its appearance about the farm first, in the shape of the *grass-worm*, as it is called, and generally at particular points on the lowest basins, hollows, or levels; from that it spreads over the farm, maturing usually two generations, by which time they will generally consume the grass. They next appear on the cotton, at particular points, as on the grass, if the season is favorable for their production; but if it be dry or showery, and a change occurs about the time of their coming to maturity, from wet to dry, or from dry to wet, it destroys them. If, however, they so mature as to commence on the cotton, no change of weather will then affect them until they consume it entirely; the cotton protecting them effectually against all changes of weather.

The worm is deposited on the cotton-leaf, by a small bug, or light brown-fly, (resembling the ordinary candle-fly,) at twilight, in the evening, and morning, a live, kicking mote of a worm, and commences its ravages immediately, attains its growth in 10 or 12 days, furls itself up in the leaf, and forms a chrysalis, from which a fly hatches out in 9 or 10 days, and commences depositing the little eggs again.

I this season, having noted the points in my farm where the worm usually first assails the cotton, had torch-fires raised on stumps and other places, elevated a little above the cotton, in a circle or line about these points, to burn from twilight to full dark at night. I noticed that great numbers were singed down by the torches, while the grass-worm was consuming the grass. My cotton has not been touched by the army-worm, and very slightly by the boll-worm, this season: but I would here remark, that plantations around mine, where no fires were raised, have also escaped the ra-

vages of the army-worm this season, though more injured by the boll-worm, than mine. The antidote this year has been, I conclude, in the dry season, commencing about the time the worm usually quits the grass and assails the cotton. I am, however, still of opinion that the use of torch-lights about the points and at the time designated will prove beneficial to farms, not only against the boll-worms, but many other insects that damage the crops to a great extent. There is scarcely any kind of insect injurious to plants, grain, or any other crop, that is not in the form of a fly or bug, between the 20th June and 1st of August. All are attracted by fire-light at that season of the year, and will hop or fly into the fire when near it, and thus be singed down and destroyed. In support of the position here assumed, I will cite two or three small experiments upon insects that have proved effectual preventives, to wit: the carrying of a pan of fire or large torch, at parallel lines near the surface, slowly through a garden or turnip-field at night, while the plants are small and being devoured by a small black bug that most persons are familiar with, will so consume the bugs by their hopping into the fire, as to relieve the young plants entirely.

I this year tried the torch in my smoke-house, by passing it at night, once a week, between my ranges of bacon as it was hanging, and succeeded beyond my expectation, in clearing it of skipper-flies, and bugs, and their effects—*it should be commenced early in the spring.*

I have also exterminated the fleas about my barn-yard, by having a number of small fires made on the ground about the yard, into which they hop at night. These uses of fire should be attended, or superintended, with due care. I shall continue the experiment about my cotton fields until I am satisfied of the effect. This I conclude will be but a partial and limited preventive, until a general and simultaneous effort is made throughout the whole cotton-growing region; as I well recollect how rapidly the worm spread when it first made its appearance.

Corn.—The most esteemed variety in this section of the country is the white, long-grained gourd-seed, as it is called. Average production of upland 15 to 20 bushels per acre; bottom land, 25 to 30 bushels. Cost of production per bushel, 50 cents.

Manure.—Little is done or attempted in this country in the way of manuring. The principal reason is, that the grants of lands, as made by the French, British, Spanish, and first land sales here by the American government, were of large tracts. The holding of large bodies of land encouraged the planters to plant extensive crops of cotton, making heavy crops of which gives the planter no time to manure. As his land becomes exhausted by cultivation, he clears more, rather than manure. Holding large tracts, as most planters do, the only efforts made to renovate the lands reduced by cultivation are to change the cultivation occasionally from cotton to corn, and to rest portions. Cotton-seed is used as a manure, but is frequently poorly managed, and with but ordinary success; it is an excellent fertilizer, if properly applied and well managed. The proper method of using cotton-seed as a manure, is to sow it down on the land in January, 20 to 30 bushels to the acre, and plough it under: thus the seed will be sufficiently decomposed to give support to the crop as soon as the grain gets up; thus the support is gradually attained by the expansion of the roots of the plant, until it is matured, and the crop is not injured by too great heat in the decomposition of the manure or seed. Cotton-seed, when applied on the hill, as many do, if the season proves drier than usual, either fails to decompose, or produces so much heat as rather to injure the crop than benefit it. On the hill, it only gives a good crop in very fine and uniform seasons.

Plaster and Lime.—I have used plaster two seasons, by dropping an ordinary spoonful on the hill of corn when two or three blades high. I believe it paid me about 25 per cent. above what the land would otherwise have produced. I also, with a view to a preventive against worms in the ground, soaked my seed-corn in strong copperas-water, 1½ to 2 pounds to the bushel, 18 to 24 hours immediately before planting; I then rolled the grain in lime. As the result of this experiment, I will say that I never saw corn come up better, or look better; and I think this an effectual preventive against all insects, such as ants, woodlice, worms, &c., that assail the seed in the ground.

Sweet Potatoes.—Average yield per acre, 150 bushels; cost of production per bushel, 20 cents. The *red* are most prolific and profitable to feed to stock; the *yam* and *Spanish* are best to keep, and for family use.

The best mode of manuring and culture for sweet potatoes, upon old land, is to rake up trash, straw, and leaves, in the forest bordering upon the farm, haul them in carts or wagons, and spead them in lots intended for potatoes 3 or 4 inches deep. Keep and feed cattle on them in the early part of the winter, until the straw and leaves are trod to small particles; then take the cattle off, plough the matter under, and let it lie until spring. Plant in April, run the ground off at 3½ feet, turn it up into beds with turning-ploughs, draw up one side of the bed with hoes, make chops with the corner of the hoe on the bed, at about 8 inches apart, drop two cuts of the potato in each chop, draw up the opposite side of the bed with hoes, and cover the potato. When they require working, plough the bed down, turning the earth off to about 6 inches, that is, leaving 6 inches of the line as the potatoes stand, and scrape the grass off with the hoes. In 10 or 15 days after plough the earth up to the bed again, and draw the earth with the hoes up to the bunch, barely leaving the bud or top clear. They will then require no more working until ready to dig. The last-mentioned mode of manuring is preferable, in this climate, for all root crops and all varieties of vines.

Cattle.—Upon the pine region of south-east Mississippi, covering about eight counties of Mississippi, two parishes in Louisiana, and two counties of Alabama bordering upon Mississippi, forming a square of about 200 miles, there have been raised, I suppose, for 20 years past, one million head of cattle yearly. The beef is sold, at 3 to 4 years old, from $10 to $12 per head. There has been considerable falling off in numbers for a few years past, and some degeneracy in the stock, by reason of the winter range being overstocked, and, to some extent, exhausted.

Sheep and Wool.—Throughout the pine region, as before referred to, sheep are as healthy and prolific as in any other climate, and the various breeds yield wool as well. They require no feed, summer or winter; the winter herbage and evergreen shrubbery are as abundant in winter as in summer. With all these advantages, there are but small flocks of sheep kept, barely for domestic or family use. The Merino and Saxony are preferred for wool, and the Southdown for mutton. No effort is made here, as yet, to improve the breeds, or to grow wool for market. The business will, I think, soon be commenced, and be pursued with energy and profit. The pine region is a high, dry, open country, thickly coated with grass, herbage, and interspersed with spots and strips of shrubbery; it is very sparsely settled, and abundantly watered by springs, branches, and small rivers of the best water, perhaps, in the world; all that can be desired for wool-growing extensively. I know of no reason why this scope of country should not grow two millions of sheep, as well as one million and a half of cattle.

You will perceive that little improvement is made at the South in agricultural pursuits generally; some reasons for which I have referred to. A much greater variety of crops may be profitably produced than now is, as I have seen fair experiments made in rice, flax, tobacco, (Havana cigar,) indigo, &c. But cotton and sugar are the all-engrossing articles that supersede almost every thing else.

Supposing that it is as much the object of your inquiries to ascertain the prospective resources of the country to some extent, and the manner of culture and present production, I have written, on some points, at greater length than on others. I would here further remark, that there is a great want of facilities for markets to encourage the development of the resources and productions of this part of the country.

Very respectfully, your ob't serv't,

EBEN'R FORD.

HON. THOS. EWBANK,

Commissioner of Patents.

Edwards County, Mississippi, September 6th, 1850.

Sir:—In compliance with your request, I will endeavor to give you as faithful an account as lies in my power, of the agricultural interest of this State.

I will take your queries *seriatim;* and, passing by those to which I can give no satisfactory reply, will give the results of my own observation, or of my friends and correspondents. And I would here remark, that I may be thought to give preference to some things when not deserving, and to detract from others their just due. I confess myself liable to err; but, as I write for myself, I must freely give my own convictions.

Oats.—I have used the *ruffled, black,* and *Egyptian* varieties. The last I prefer, on account of being able to sow in the fall, and even without the land being ploughed. These oats give a good feed to hogs and milk-cows during the winter, without injury to the crop, if not stocked too close, nor stock permitted to feed during wet weather to cut up the land. If oats be cut high, so as to give but little straw, cut when barely turning, and then passed through the cutting-box, they make an excellent food for stock; but I am not so much pleased with them as formerly, thinking work-horses suffer from the distension of the stomach, thus encroaching upon capacity of chest. I have never used oats alone, nor are we, in this country, in the habit of noticing the yield. Not so much sown this year as usual.

Indian Corn.—I have planted many varieties; but prefer a kind between the flint and gourd-seed for feeding, and for yield of nutrition; for I think the same measure and, perhaps, even weight of gourd-seed possesses most of the covering of the grain, which is not nutritious. The shuck is better food for work-horses than the blade, weight for weight. This is merely conjecture, however, and I act upon it by cutting up my shucks with the blades. We are too negligent, in this country, to make accurate experiments about these matters. I prefer grinding and cooking grain for hogs when fattening, having practised it for years. I rate the saving at one-third.

The corn crop will be larger this year than last, yet there are portions where it will not be an average one. The scarcity of the crop of 1849 has caused 9 planters out of 10 in Middle Mississippi to go to the corn-fields in August. This will cause a demand for corn in 1851.

Hay.—The planters of Mississippi use the blades of corn, called in the South *corn-fodder*, in lieu of hay. There has been a larger quantity saved this year than usual. I have saved over 700 bundles per hand, with a good load of forage per hand, consisting of native grass, millet grass, and corn cut up when a little past the roasting ear. I save more provender than an average. Estimating my fodder at 1¼ pounds per bundle, which, when I have sold, I have found it to average, and a load of forage equal to a load of fodder, and I have saved nearly 2500 pounds per hand. This, say 1¼ tons per hand, would give to Mississippi, counting only negroes as laborers, at 100,000 field hands, 125,000 tons. In 1848, taxes were paid on 271,052 slaves. No returns have ever done justice to the *hay* crop of Mississippi.

Cotton.—This is our reliable crop: but, for several years, the seasons and the army and ball worms have become so unfavorable, that it has become very uncertain how to calculate. In 1846–48, and '49, my crops averaged about 6 bales, in 1847, 9 bales per hand—over a bale per acre. This year I do not expect over 1000 pounds per acre—about 6 bales per hand. I think the crop of Mississippi for 1850 will fall short of the last, and, instead of making 500 or 600 thousand bales, I cannot place the crop over 450 thousand, and it is very probable it will not exceed 350 to 400 thousand. Much of the crop looks well, and, to the inexperienced or the hopeful, there appears the prospect of a fair crop.

Last year, I expressed the opinion that the whole crop of the United States would be 2,000,000 of bales, not to exceed 2,200,000, nor to fall under 1,800,000. The result has well sustained that opinion. Again, I venture my opinion for 1850; yet saying the information is so contradictory between private letters and newspapers, that I am less sanguine than usual. Were I wholly ignorant of the peculiarities of the plant and of planters, I should incline to place this crop one with that of 1849. But I know of much cotton planted over in April, May, and even in June. I know the season was worse here than in 1849; I know there was more replanted (seed planted, where the stand was too good to plough up, and not a full stand either,) than I ever knew before; and I know, from my own fields, that replant cotton, and that in May and June, looks so well that it will deceive. And, besides, the very late fall last year gave a great advantage to the short crop of 1849: for there was no killing frost until 3d December; whereas I have known a severe frost 5th of October. Taking all these things into view, I place the crop of 1850 at 200,000 bales less than that of last year. The improved seed now planted will add materially to the grand total; and, owing to that, I may be mistaken in my estimate. For instance: I have about 40 acres planted with Mexican seed; if all my crop had been so planted, and all yield equal to this, I should not count over 800 pounds per acre, and really think 700 would be nearer the mark. My crop is always open to inspection; I procure the best seed of each variety, and am willing to send "for persons and papers," and submit the case to a jury of all the cotton-planters. Of the many who have seen my crops for 4 years, there is not one, I think, who doubts that upon best land my select seed yields 200 pounds more, and upon poor land nearly 300 pounds; and this year the difference is greater. I do not confine myself to any one variety, nor to that as it turns out from the field. I select yearly, so as to keep up purity, and, when a better seed is sold, I buy a few and try them: if good enough, I adopt.

This brings me to varieties:—1. I name *Sugar-loaf* as the best. I have tested it, grown upon rich and fresh land. Its good qualities are production, early ripening, and easiest of all others to gather. Seed sent to me by Mr. Farmer, Last Chance, Miss. I have grown five crops and selected seed from the field four years, and shall do so this year. I have always grown it upon rich land, and was so much pleased with the first year, that I resolved to improve on it, and, if it held its own, to adopt it as the main crop for this place. I think it has improved, as is shown by general resemblance.

2. The next in value for production is the *Banana*. Seed procured from David Gibson, Vicksburg, Mississippi. Maturing and picking qualities yet to be tested, as this is my first year.

3. The *Brown* stands next, and, upon rich and fresh land, it should stand second. This variety is the only one that has been placed equal, or superior to *Sugar-loaf*, by many of my friends living in the east part of Hinds County. I have tried the *Brown* cotton three years, and am sure any person would give it here, at this time, a good character, but not an equal or a superior to my pet, side by side, as it now stands.

The resemblance between Nos. 1 and 3 is close, but the *Sugar-loaf* has less leaf, smaller, rounder, and thinner-hulled bolls, and matures earlier.

4. *Vick's 100-seed.*—I have this variety 4 or 5 years, and up to this period it has stood next to No. 1, and give it richer land, a year or two more age, and it will equal it. This year, upon the same plat of land as the above three varieties, it has fallen back, making too much wood. This may be caused by all my seed being fresh from Deer Creek, where Colonel H. W. Vick, the spirited selecter of this variety, plants. I sold out all my own seed, with the view of getting a fresh stock, which was a damage to my general crop: fresh seed never has here given so good a crop.

I have the Hagner seed planted here; it has been selected two years. It was originally procured from W. H. Prout, of Tuscumbia, Alabama, who sells it under the name of *Cluster*. The *Cluster* procured by myself from Prout is nothing better, if as good as the above.

I have learned from Mr. Prout, that he procured his first seed from Georgia, Hancock County, I think, but this matters not; he has introduced seed extensively as Cluster. William Hagner, of Warren County, Mississippi, his brother-in-law, got his seed from W. H. Prout, of Tuscumbia, Alabama, and having quit planting it,—so his neighbor, Mr. Corwin tells me,—I will try and drop the name of *Hagner* cotton.

I now say that the *Cluster*, *Multiflora*, *Moneybush*, and *Royal Cluster*, were all originally from Prout. The *Banana*, I believe, is a better article, but not as above, as I know from his letters from the gentlemen in Georgia, where he had the first start; but yet it is the Cluster. The *Pomegranate*, General Mitchell avers to me, is not of the above, and that he has produced it by crossing. I say, after examining 50 acres or more, it is the same as the above, only improved very much by selection. I would prefer the character of a careful, patient planter, who improves, to that of the producer of new seed; but every man to his liking. The *Pomegranate* is more defined as a variety than the *Banana*, *Royal Cluster*, or *Multiflora* is here. How it would do on this soil, I know not, which is the only way to truly ascertain the difference; because General M.'s land, like most of Warren County, is peculiar to growing all cotton with short joints, much the reverse of this place, in the swamp of Big Black. The *Multiflora* is more free from the green seed than any I have yet ginned. The *Banana* is here for the first time.

I feel assured that your readers in the cotton region will not complain at the length of this, as I am known to be more devoted to experimenting with seed than almost any other person. I therefore make no apology.

Peas.—In my anxiety to get to cotton, I overlooked this article of Southern culture. Peas are mostly cultivated for stock-feed, and many think them equal to an ordinary crop of corn. They will fatten all stock as quickly as corn. I only use them as an improver of the soil, though I will fatten my *pork* hogs in my pea-field; no other stock will be allowed free access. The pea-vine, when well cured, makes a superior feed to fodder, but how much, pound for pound, I know not.

Peas seldom sell at less than $1 per bushel. Last year, they sold at that price, I think. We plant, most generally, the *Tory* pea. It being more hardy, and less liable to rot, it will lie on the earth all the year and vegetate. I am now trying a new variety, that is, new to me, the *Shinney* pea. Thus far I am pleased with it, as it is now bearing, whereas the *Tory* pea, though planted a month and a half earlier, and making double the vine, has scarcely bloomed. But with me the crop of peas is secondary, and I prefer the vine, if I only get enough peas to be able to gather seed without too much labor.

Root crops.—We only plant the many articles embraced under the head of root crops, for table use,—therefore in small quantities. The Irish and sweet potatoes being the only exceptions. The Irish potato was better and larger this year, generally, than I ever saw it before. The sweet potato, I think, is not as good as usual; in my own case, and in my neighborhood, it is a poor crop, though I have more planted than usual. We grow usually about 200 bushels per acre, though some planters claim 500 bushels. I have never seen an instance of 500 bushels being produced on an acre.

Our season for the year was one of extremes—very cool in April, so much so that I planted no cotton until the middle of that month. Then, heavy rains, with occasional very dry weather of short duration. June and July, very wet: rainy days, about 20 in each month. Thermometer ranging higher in August than I ever saw before. I have kept a thermometer over 20 years, standing where it now does 10 years, and I never saw it there above 93° until August last, when it rose as high as 98°, and was frequently above 94°.

In consequence of the unfavorable spring, the *fruit* crop was nearly a failure. I have not seen a grown peach on my trees, and I have over 2000. The apple crop is very light, many of them rotting before ripe.

Hoping that such items as I am able to give may prove acceptable to you and your readers, and that thus I may do some little service to the agricultural interest of the country,

I am, with respect, yours, &c.

M. W. PHILIPS.

Woodford County, Kentucky, November 1st, 1850.

Sir:—Viewing the production of sweet potatoes of great importance in the South and West, and believing that they can be produced in many of the Northern States, I have this subject at the head of my report, in order that public attention may be more immediately directed to it. I think that sweet potatoes can be grown wherever the late varieties of Indian corn have have time to mature; at any rate, the experiment is worth the trying on a small scale, and, if successful, they will be a valuable acquisition to Northern agriculturists.

We plant from the 15th May to 15th June, and harvest when the vines are killed by frost—about the middle of September—giving the potatoes from 3 to 4 months to mature in. I have planted the latter part of June with good results. When we commenced cultivating sweet potatoes, it was for some time a hopeless effort, they producing nothing but small, stringy roots, not worth the trouble of raising. At length, when slack-water navigation was opened on the Kentucky River, we received a small supply of *yams* from the South, a potato so far superior to any before seen here, that renewed and successful attempts were made with this variety. Our previous failures had been attributed to soil and climate, as uncongenial to the sweet potato; and it may have been so with the kinds tried before; but with the yam we have been eminently successful, and challenge to produce larger and better potatoes. As a specimen, I will take my crop the present year. I planted only one-fifth of an acre, which produced 28 bushels—at the rate of 140 bushels per acre. The yield would have been greater but for the drought in the spring, in consequence of which at least one-sixth of the plants perished. Six of the largest potatoes weighed 24½ pounds; six next in size, 23 pounds; six next, 21 pounds. The largest potato weighed 5 pounds; and the average, after taking out the seed-potatoes, was about 1½ pounds. There are several varieties of yams: the long red, the long white Spanish, the turnip-shaped, and the largest and best of all, which has a pale yellow skin, and a deep yellow color when cooked.

The soil for sweet potatoes should be light and rich, and the best system of culture, after the ground has been put in good order, is as follows:—In the first place, a broad deep furrow is made by twice running a large plough; the earth is then thrown back in the furrow, by running the plough first on one side and then on the other, until a ridge is formed, say 18 or 20 inches wide at the base; then, with the hoe, it is ridged up to edge. Another row is now commenced, in the same direction as the first. The rows should be 5 feet apart, measuring from the top of the ridges, which should be about 15 inches high. About the 1st of April, the seed-potatoes are put in the hot-bed to sprout. It is the general practice, when the sprouts are say 8 inches long, to draw them from the bed and plant out; but this practice I have abandoned, and adopted another far better, which is, to take the potatoes carefully from the hot-bed, breaking as few roots as possible; then with a knife cut out the sprout with a small piece of the potato attached to it—if it is no larger than a pea, it will be of great importance in keeping the plant from perishing, and will rapidly increase its growth. The sprouts, as they are taken from the parent stock, are carefully laid in a basket, and sprinkled with water, if the weather is warm and dry. In planting, make a hole with the hand on the top of the ridge, about 4 inches deep, insert the plant, and press the earth to the root. Never wait for a season; but plant when all things are ready, and, if the weather is dry, pour on each plant a pint of water, and repeat the same the next day, if necessary—that is, keep the roots moist until it rains. The common method is to plant 12 inches apart, but I find by experience that, at 18 inches, larger potatoes are produced. After taking off the sprouts that are ready to plant, the potatoes may be put back in the bed, and, if the weather is warm, the sprouts will soon be ready for another planting. As soon as the grass comes up on the ridges it should be scraped off with the hoe, and the loose dirt drawn up to the plants. Before weeding, a small plough should be run between the ridges, taking a part of the base of the ridge, say 3 inches on each side. Afterwards they will require another weeding and dressing, and the tillage is complete.

Irish Potatoes.—Every farmer is so wedded to his own manner of doing things, that it is difficult to divorce him from it. Hence it is that we have no regular system of culture; the principal object is to raise as many potatoes as will serve for family use, and the fertility of our soil always secures us an abundant supply, we having no rot to contend with. We put 6 or 8 bushels of potatoes in a heap, and cover them over, first with straw, and then with 10 or 12 inches of earth, for winter-keeping. On taking them up in the spring, we always find among them young potatoes, from the size of a bullet to that of grape-shot. Observing this led me to *deep planting*, which, during eight years practice, has been attended with success, the size being more uniform and larger than when planted in the ordinary way. Another important matter is, to avoid having too many sprouts in the hill; four sprouts are enough; if more come up, they should be thinned out. I cut my potatoes into small pieces, and, in planting, make furrows 8 or 9 inches and 4 feet apart, put 3 pieces of potato in a place, at 18 inches distance, and cover up deep. They make slow progress in coming up, owing to the exclusion of heat and the distance the sprouts have to grow before reaching the surface; yet they are germinating and forming new potatoes before they come to the light. Chip manure and rotted straw, put in the drills before planting, are the best manure I have yet tried for potatoes.

Cattle and Hogs.—For the want of a market, we are compelled to feed our grain to horses, mules, cattle, and hogs, and thus we realize about 20 cents per bushel for corn, which is a profit of about 100 per cent. on the cost. Our grasses and clover yield about the same profit in live-stock. I think the best method of feeding neat cattle, taking into account the saving in labor, is to feed on the ground with stock corn, that is, corn-fodder and husk, as it is cut and shocked in the field, allowing two hogs to each head of cattle, to feed on the waste, &c. In this way, the expense of houses and sheds, and time in husbanding and hauling manure, is saved. The hogs to be fattened are put in a field of corn, and when it is consumed, they are either put into a fresh field, or corn is husked and carted to them. The field, after the hogs are taken off, is ploughed, and the fertility of the soil by this mode of feeding very much increased. The cost of raising cattle until 3 years old is about $18 per head; the usual price at that age, $24. A good dairy-cow is worth from $24 to $30. A Durham will yield more meat from a given amount of food than the native animal.

Sixty bushels of corn will produce, on an average, 200 lbs. of beef, and 2 hogs (which are allowed to each bullock to feed on the waste) will give 200 lbs. of pork. Supposing 2 bushels of corn to weigh 100 lbs., then 100 lbs. of corn will produce $6\frac{2}{3}$ lbs. of beef, and $6\frac{2}{3}$ lbs. of pork; or, if 1 lb. of beef is equal to 2 lbs. of pork, 2 bushels of corn will produce 10 lbs. of beef, or 20 lbs. of pork.

The use of hay is so limited that but little attention is paid to meadows. Corn-fodder and oats are a general substitute for hay. Clover is a *sine qua non*; blue grass is next in importance. Without clover we could not raise hogs to advantage, it being as profitable a crop as corn, and, at the same time, fertilizing our exhausted lands so effectually, as in three years not only to double the product of grain, but to fit them for the production of hemp.

Corn.—The yield varies from 35 to 100 bushels per acre; the premium crop of 10 acres, awarded at the late Lexington fair, was 185 bushels per acre: 50 bushels is about the general average. The most esteemed variety is the *large white*, between gourd-seed and flint. The cost of production is estimated as follows:

Interest on 20 acres of land, $50 per acre...........................	$60
Cost of cultivation throughout..	80
	140
20 acres, at 50 bushels per acre, 1000 bushels at 14 cents........	$140

or 10 cents per bushel, allowing $2 per acre for stock fodder.

We have no regular system of rotation in crops, but usually cultivate hemp land 4 to 6 years, until it will no longer produce the article; then follows a crop of wheat, then clover, until the land is again fit for hemp. We endeavor to manage so as not to grow the same crop two years in succession on the same field.

Curing Bacon and Hams.—It is all-important that hams and shoulders be well pickled, otherwise the bacon cannot be made good by any process of curing. Before hanging, it should have a sufficient quantity of salt to preserve it, and no more; for if made too salt, all the juiciness, high flavor, and relish are destroyed. Salting in bulk does very well if the weather is favorable, neither too warm nor too cold. If very cold, it will take from 4 to 5 weeks to receive sufficient salt; if warm and damp, 2 to 3 weeks will be long enough. After remaining in bulk 1 or 2 weeks, the meat should be taken up, the old salt taken off, and resalted and bulked again. In thus changing the position, the salt is more uniformly diffused. An indication when the meat is sufficiently salt is, that it loses its rigidity, and will yield to a light pressure of the thumb, the hock becoming pliant and wrinkled. To corn hams in brine is the surest method, especially when the climate is very cold. The saltpetre may be put on before salting, or when it is hung up for smoking, using for each ham or shoulder about a tea-spoonful. If they are sugared, the molasses or sugar should be put on before salting. After the salting process is over, the bacon is hung up and suffered to drip 5 or 6 days before drying commences, which is done in the following manner:—Every morning a small fire is made in the middle of the smoke-house, using hickory wood, which is best, and, if the weather is freezing, the fire should be kept up all day, never suffering the meat to freeze. It should only be discontinued on damp, rainy days, when the bacon is dripping. In March the hams are taken down and put in good, thick cotton bags, then rehung and smoked as before, until the weather becomes warm and dry. It takes $\frac{3}{4}$ of a yard of cotton cloth, sewed up diagonally, to each ham, the hock end foremost, and tied closely at the gammon.

Another method is, after the hams have remained two weeks in salt, to take them out, resalt them, using equal parts of salt and hickory ashes. Sprinkle on the saltpetre, and again put them in bulk for two weeks more, when they are hung up and smoked, after covering the inside of the hams and shoulders with hickory ashes. In either of these methods, the meat should be well sprinkled with Cayenne pepper before salting.

Fruit Culture.—A Remedy for the Yellows on Peach-trees.—The culture of fruit in this section has been much neglected for several reasons—the high price of land, frequent changes in the ownership of landed property, orchards not enhancing the value of land, and, lastly, the spirit of emigration. But the spirit now manifested towards the production of fruits gives assurance that we shall, in a few years, be in the enjoyment of the most delicious fruits our soil and climate are capable of producing. Our farmers know very little about grafting or budding, and are entirely dependent on nurserymen for fruit and ornamental trees. I am indebted to my neighbor, Mr. Christian, for an effectual remedy for what is termed the *yellows* on peach-trees, having tried it for 8 years with complete success. This disease is caused by a grub-worm, about an inch long when full grown, largest at the head and tapering down. It is propagated by a long, slender, dark-colored fly, about the size of a *yellow-jacket*. The eggs are laid at the foot of the tree, in July and August, and, when hatched, the maggot descends and enters between the wood and bark of the roots, on which it feeds, until the leaves turn yellow, and the tree ultimately dies. The remedy or preventive is, to put stable-manure, closely packed, 3 or 4 inches about the trunk of the tree. This should be done in May or June, before the fly lays its eggs. It is a good plan to make small frames of plank, about 6 inches high, to put around the trees and hold the manure, thus keeping it in a compact body. Fresh manure should be applied every spring.

Very respectfully, &c.

BIRD SMITH.

Hon. T. Ewbank, *Commissioner, &c.*

FARMING IN WORCESTER, MASSACHUSETTS.

The Office is indebted to the Hon. John W. Lincoln, of Worcester, for having procured from an excellent practical farmer the following valuable essay:—

Wheat is but little cultivated in Worcester County, nor has it been for many years, as it is considered a very uncertain crop, owing to the blight, or rust, that strikes the straw before the grain has filled.

Many experiments were tried in 1837–8 and 9, to try to reproduce this necessary and useful crop, but I do not recollect of hardly an instance where the experiments succeeded.

Corn.—Indian corn is raised in this county in larger quantities than any other grain. This grain is produced more easily on our light land, and is considered by many to be a profitable crop. On most of this kind of land, from 20 to 50 loads of compost manure are spread on the acre broadcast, instead of being put in the hill, as in former time. The land usually ploughed twice before planting; corn planted in hills, 3 feet apart; seed planted

from the 1st of May to the 15th, and it should be worked out with a horse cultivator between the rows, and hoed each time, the last working to be done before the middle of July; the weeds all to be pulled in August. The average yield on this kind of land is 30 bushels per acre; cost of one-half of the manure taken by the crop, $15; paying carting, spreading manure, cultivating, and hoeing three times, $8; corn fodder against the harvesting, which will well pay. The corn crop, as it is usually cultivated on this kind of land, is not considered a profitable crop, though a remunerating one to a certain extent, as the corn produced in this way, and on this kind of land, will usually pay a reasonable charge for all labor and manure; and, as the manure is not all consumed by the crop of corn, the remainder assists in carrying out a crop of oats and one or two small crops of grass, and then leaves the land in the same low condition it was in before this process was commenced.

Corn is more usually produced in Worcester County, by the grass-growing farmers, for a different purpose than as above described on our more hilly and deeper soils. Corn is considered as one of the very best crops, as the first in a rotation of crops where our best English grasses are to be grown. Much of the land in the county will produce a good crop of hay for from five to eight years, without manure, after a crop of corn and oats, managed in the following manner. After the land has been cropped from six to eight years without manure, it is to be ploughed as soon after the hay harvest is over as may be, so that all the vegetable matter may have the autumn months to decompose in; this ploughing is the better for being shallow, say from three to four inches, as the grass stubble will more readily decompose than when turned under seven inches. In April following, from 40 to 50 loads, of 30 bushels per load, of whole or long manure should be taken from the barn-cellar, (and no farmer should be without one,) and spread evenly on each acre, and ploughed directly under, full seven inches deep. After lying a few days to the sun, this may be worked advantageously with a harrow, when it is in a condition to be planted as before described. Or the same quantity (more is to be preferred) of manure is frequently spread on the grass, about the 10th of May, and then ploughed under full seven inches, the furrows to be rolled with a heavy roller, and harrowed lengthwise of the furrows, and corn planted directly on top of the furrow. In this way, much green grass and stubble as well as manure is carried down to such a depth as will invite the roots of the corn down to where they should go, and the weeds are found much less troublesome than where the manure is near the surface. These furrows are not to be disturbed to their full depth by the plough or cultivator until the last time of hoeing, which is in July, and perhaps not at all, for the corn crop would be better. The majority of our deeply cultivated clay soils will give from 40 to 80 bushels per acre with the above treatment, but the average crop on this kind of land, with the cultivation it usually gets, will not exceed 45 bushels, but leaves the soil in good condition for oats and large grass for from six to nine years.

The most preferable way of feeding this valuable grain, is to grind with the cob, and mix 1 bushel of rye with 2 of corn, and to be used for swine with as many bushels of carrots or other roots, well boiled or steamed, and the meal well mashed in with the boiled roots, and then be permitted to stand 12 hours, with as much salt added as would be used for the like quantity of bread. This feed, in all cases in cold weather, should be fed while moderately warm. Four pounds of this meal, and 3 of roots, will probably make a pound of pork. The meal will cost one and one-fourth cents per pound, and the roots one-half cent per pound, and pork has averaged 6½ cents per pound for the last 5 years: any one of our more enterprising farmers would willingly feed swine in any numbers, and cook the food, for the manure. Corn, fed to cattle, is to be ground and fed raw, formerly from 4 to 6 ears twice a day, to a bullock of good size, that was intended for slaughter, for 3 months, on an average, before slaughtering, to be in good condition when put up from the pasture. This meal is used now with more economy on cut hay or straw, at least for milch-cows, horses, and working oxen, especially when the fodder is not of first rate-quality. It has been questioned by some whether it pays the labor for all kinds of stock.

Oats are cultivated on any of our soils that will produce corn, potatoes, or carrots; follow corn best, two bushels per acre on well-tilled land, and more on a poorer soil. Usual time of sowing is in April, or as soon as the land can be worked; later sowed oats will make more straw, but less grain, average crop is 35 bushels per acre. Oats are considered the best feed for road horses, and good for all other stock; they are not considered a great exhauster of the soil, and leave the land in fine condition for clover, which crop usually follows.

Barley has been considered a profitable crop, but for the last 4 or 5 years it has not done well, and has very much gone out of use; average crop in former years was 30 bushels per acre, fed principally to swine; usual time of sowing, from the 1st of May to the 15th of June: it has usually followed corn, and left the land in fine condition for grass.

Rye is cultivated but little, chiefly on worn-out pastures, or for one crop with grass seeds on newly cleaned land; it is considered a great exhauster of land; cultivated exclusively for home consumption, and is used principally as a mixed feed with corn, and is considered equal to corn for swine, when mixed in equal parts; average yield on old pasture land, 12 bushels, new land, 25 bushels per acre: average price in our market, 88 cents per bushel.

Peas and Beans are not cultivated to any extent in the county; field-beans are produced in moderate quantities, for table use, but not for market. Peas are seldom grown out of the kitchen garden.

Clover, timothy, and red-top are sown together, with oats or barley; 12 pounds of clover, one peck of timothy, and half bushel of red-top, per acre, on land of medium quality; more should be used if the land be poor, and less, if in a high condition, for this way clover predominates the first year, and averages from 2 to 3 tons per acre; clover is considered good hay for milch-cows, and young stock; average price, $9 per ton; timothy and red-top prevail the second year, and hold good during the time the field is to grass, which is usually from 6 to 9 years; average per acre, 3000 pounds. These are considered decidedly the best and most profitable grasses cultivated in the county. It is believed there is no crop that pays so well for the labor, and returns so much in way of manure. Average price is $12 per ton at the barn.

Dairy Husbandry.—Considerable attention is paid to this branch of business. Cows for the dairy have been much improved within the last 10 years; many cows may now be found that will produce from 10 to 15 pounds of butter per week, for two or three months, on grass alone; but no farmer has a whole herd of such cows: where we have one such cow, we have six that do not produce more than 9 pounds per week for the same time. One class of our farmers say in theory, that the Ayrshire or Durhams are the greatest producers; in practice, the other adopts the native, because he happens to have one of them, or a whole herd on his farm, or, more likely, because he has not thought on the subject at all. Our good cows are mostly cows of accident. These things ought not so to be. There are some honorable exceptions, however, among some of our most liberal and intelligent farmers. The Ayrshire stock, in a few instances, being introduced, and, it is believed, though experiments will be carried out, to prove very beneficial to the dairying farmers of the county. The Ayrshire seems well adapted to this part of the country, much more so than the Durhams, and they are destined, ere long, to take the place of any and all other breeds for the dairy.

The North Devons have recently been introduced here, and it is believed that no other cattle can excel them for the yoke, or early beef, but are not considered deep milkers. Great credit is due to the Massachusetts Society for Promoting Agriculture, for the introduction of the Ayrshire and North Devon, a bull and cow of each of these breeds having been presented to our county society from their importation, and there is no doubt but great good will result from their universality. Butter is manufactured in the north part of the county, and milk is produced in the south and east, for the Boston and Providence markets; milk at the farms here is worth, for these markets, 2 cents per quart for eight months, and 3 cents for the remaining four months. Average quantity per cow is 7 quarts per day for 10 months, or about $50 per year; and for butter, 8 quarts of milk for a pound of butter; average price of butter, 20 cents per pound: in either case our cows pay $50 per year; where butter is manufactured, the waste milk for swine or other purposes covers all cost of labor in its manufacture.

It is believed that to manufacture our milk into butter, instead of sending it to market at the above prices, would prove more profitable to the farmers of the county, first, because the waste milk goes far towards growing and fattening swine, and in all cases where suitable help can be obtained at fair prices, or, more fortunately, where the farmer's wife or daughters can personally attend to its manufacture, it is believed that the waste milk very much more than pays for all labor; besides, the economy of feeding swine with this milk causes the farmer to feed double the number of swine that his neighbor does that sends his milk to market; hence the difference in the manure heap. Good cows should be the first object for the dairy. The difference in cows for butter is not generally understood: good keep and cleanliness are indispensable when we want good cows. Milk should be strained in tin pans, and, with the exception of the extreme cold of winter and heat of summer, should be kept on the ground-floor of the house, in a room fitted up expressly for the purpose, well ventilated, and far removed from pig-sty or kitchen; the milk to stand from 24 to 40 hours, according to the weather, the cream taken off into stoneware vessels, and churned while fresh; the process should not be rapid, as the butter does not separate from the milk so well as when from 45 to 60 minutes are occupied in churning. When removed from the churn, the buttermilk should be worked out, and one ounce of the best pulverised rock-salt worked in—should stand 24 hours, and then all the buttermilk should be worked out, and lumped or packed in stone pots, where it may be kept for 8 or 12 months. Butter of this description is worth, on an average, 23 cents, while butter from the same cream, that is manufactured in a careless way, say where 2 oz. of salt are used, and 2 oz. of buttermilk are left in, will bring but 17 cents, and is worth but 14; hence the difference: the one that produces the good from the same materials, realizes from each cow his $60 per year, when his neighbor, that makes the poor, gets but $40; and all this difference in merely working and salting the article.

Neat Cattle.—Fifty per cent. of all our cattle are raised in the county, and the other half are driven in principally from Vermont, Maine, and New Hampshire. This foreign stock is purchased late in autumn, principally for the purpose of consuming the poorer sorts of fodder, and to be grazed in summer, and used to supply our markets with early beef. The best farmers select their best calves for raising: the usual way has been to take them from the cow at 3 days old, and teach them to drink milk; new milk is given until 4 weeks old, and skimmed milk continued until 10 or 12 weeks, when they are turned out to pasture, which practice is considered more judicious than to let them have a run with the cow, as it is considered injurious to the cow to be teased by them for so long a time, and not so well for the calf. Heifers are not permitted to come in until about 3 years old; steers are broken to the yoke at 2 and 3 years old; cost of keeping to this age is $25. Steers and heifers that are raised in this way are always in demand, and sell, for the yoke or dairy, 25 per cent. higher than foreign, or those from other States. Steers, well broken to the yoke at 3 years old, if well matched, sell for from $75 to $100. Heifers, at this age, with a calf at their side, sell for from $30 to $40, such as are raised at home, and those from other States for 25 per cent. less. Our Agricultural Society have offered large premiums for all kinds of stock raised in the county, which has stimulated our farmers to select the very best calves from the best cows for the dairy and the yoke. Much attention has been paid to the training of oxen for all purposes of agriculture, especially for the plough and cart, and it is believed that more well-matched and well-trained oxen are to be found in Worcester County than in any other section of the country.

The question is asked, which will yield the greatest amount of meat from a given amount of food—the Durham, Devon, or Hereford? The Durham is considered too large for profitable feeding; a cross with our native is preferred, as the animal matures one year earlier than the full-blood Durham. The beef of the half-blood is as well marbled at 4 years old as in the full-blood at 5, and it is considered more profitable with us to feed the grade than full-blood. Young cattle, from 2 to 4 years old, that are in good condition the first of May, are turned into our sweet pastures, and are fit for our markets in August, before the western and northern beef comes in, pay much better than larger and older cattle that depend on winter-stalling and consume much grain, which is quite too costly for this section, and the beef is worth but little more per pound than the grass-fed, which goes into market early. The North Devons have but recently been introduced into the county. Two animals of this breed, a male and female, were presented to the Worcester County Agricultural Society by the Massachusetts Society for the Promotion of Agriculture. These animals are of pure blood, from the importation of the Massachusetts society in 1846, and it may fairly be presumed that the experiment of a cross with our natives will greatly improve our stock, at least for the yoke and grazing. No pure-blood Herefords have as yet been brought into the county.

Sheep are not kept, to any extent, nor have they been for the last twenty years. Small flocks of the middle-wool sheep are kept, for producing early lambs for the June and July markets. Lambs fit for market at this season sell for from $2 to $3, and are considered profitable by those who have conveniences for keeping sheep.

Hogs.—25 per cent. less of hogs are now kept than ten years ago. Hogs are not considered profitable, as the grain raised on the farm is wanted for feeding to cows, to supply our markets with milk, and consequently we do not have the wash of the dairy, as in former times, which greatly aided in feeding our swine, and increasing our manure heaps.

The Suffolk, crossed with our best native, is considered the best for all purposes. Some inquiries are being made, to know if pork cannot be made without a loss on corn brought into our markets from the South and West, and which usually costs at our door $1\frac{3}{8}$ of a cent for good; strong shoats usually cost, the first of May, 5 cents per pound. Fresh pork is worth, on an average, $6\frac{1}{2}$ cents per pound the first of October; shoats bought the first of May, weighing 100 pounds, will consume 5 pounds of corn-meal per day for 5 months, and, if well cared for, will gain, on the above feed, $1\frac{1}{2}$ of a pound per day. From each hog, if properly managed, one cord of good manure can be made, which, in our market, is worth $4; this should go against all work for tending.

Best method of curing bacon and hams, put two quarts of butter-salt into an iron kettle, and place it over a slow fire, and stir it occasionally, so that it does not bake in the kettle; and while the salt is dissolving, the ham should be placed on a strong bench near the fire, and a common-sized tea-spoonful of saltpetre to be rubbed smoothly with the hand on the flesh-side of the ham; it will soon dissolve and disappear. The salt in the kettle is now hot; lay a table-spoonful on the ham, and rub it with the hand; continue to apply the salt to all parts of the ham until the ham *sweats*, which is an indication that the salt has penetrated through the ham. The above quantity of saltpetre is for a ham of 20 lbs.; a ham of this weight may be cured in 10 minutes; the ham may be thus treated before the animal heat is entirely out, and it is fit for the smoke-house, where it will be ready for use in 10 days, or it may remain with perfect safety for a year, or longer, before being used; the smoke-house is the safest place for keeping. Any lover of good ham, after trying this method, will be satisfied that it is the best method; certainly for family use, as it can be kept the year through.

Hemp is not cultivated, nor has it been for the last 25 years.

Root Crops.—Seventy-five per cent. more of turnips, carrots, and beets are now grown than 10 years ago.

Turnips.—The round flat for field culture have, in former years, been cultivated with our corn crop—1 pound of seed per acre is sown broadcast at the last dressing or hoeing of corn, which usually takes place the first part of July. No other attention or labor is required until harvest: from 100 to 200 bushels are gathered in this way. More recently, waste lands are broken up for the purpose of reseeding, and permitted to be summer-tilled without any other crop, until the last of June, and, at any time before the 1st of August, to be well manured, and seed as above sown and covered with a bush-harrow: from 300 to 500 bushels have been harvested in this way. This crop is not considered a great exhauster, and is worth, for stock to consume at home, $12\frac{1}{2}$ cents per bushel, fed principally to dry stock, while consuming the poor fodder. Seed should be imported from England or Scotland once in 3 years at least.

Carrots are grown in any kind of land that is favorable for corn—a deep, mellow loam is preferred. The land should have been used 1 year, at least, for corn or some other like crop, until the sod is completely rotted, and then manured liberally and ploughed to the depth of 10 or 12 inches; and if subsoiled, all the better: this should be done as early as the ground and weather will permit, generally as soon as the 1st of May. The ground should be deeply and thoroughly ploughed once or twice a week up to the time of sowing the seed; the land, as soon as in condition to take the seed, should be levelled with a bush-harrow, and 1 pound of seed to the acre is sown in drills with a common seed-sower, 15 inches apart. The wheel of this seed-sower shows the time on which the seed is dropped, and a light hoe should be passed between the rows before the young plant makes its appearance; by this process, the weeds are kept back and the land kept light; weeds in no case should be permitted to get the start of the plant. The hoeing and weeding should all be done while the sun shines. From 500 to 1000 bushels per acre have been produced, and this valuable crop is coming much into favor with our farmers. Ten dollars per ton is considered a fair price; feed principally to horses, milch-cows, and, more recently, to hogs. Carrots have been raised for several consecutive years on the same land, and apparently with better success than the first or second year.

The *mangold wurtzel* and *sugar-beet* have been cultivated for quite a number of years with considerable success: from 700 to 900 bushels to the acre have been raised; the land to be treated the same as for carrots. Worth from 17 to 20 cents; fed principally to milch-cows; 25 per cent. less of these roots have been raised for the last two years, on account of a blast that has struck the leaf before the root had matured.

Irish Potatoes.—Fifty per cent. less of this once valuable tuber was secured the present season; the vines looked remarkably well until about the 8th day of September, at which time we had a heavy fall of rain, and immediately after this, the vines had the same appearance that they usually do after a heavy frost; and, at harvest-time, the vines had nearly disappeared by decay, and nearly one-half of the potatoes were in a decayed state, and this decay has continued after housing, so that, at this time, 25 per cent. of what were saved at harvest-time are now lost.

Fruit culture is receiving increased attention in our county; young orchards of the most approved kind, principally winter fruit, are being planted out in large numbers, and much care and attention are now being paid to grafting all of the more hardy trees that have produced less valuable fruit. The Baldwin apple is receiving the most attention, and next the Rhode Island Greening; the Golden Russet and Roxbury Russet are considered the best varieties for market. High land, with a clay subsoil and a gradual descent to the east or north-west, is to be preferred; before setting out the trees the land should have been cultivated with corn or some other hoed crop, for at least one year. The young trees should be at least of 5 years' growth from the bud, straight and thrifty, and set not less than 35 feet distant in straight rows; the holes should be dug of a circular form, not less than from 6 to 8 feet in diameter, and 18 inches deep. Fine dry topsoil should be used to fill the hole; the roots of the tree to be nicely arranged and brought out in straight lines; from 1 to 2 bushels of bones may be used in filling the hole; whole ones are to be preferred, or at least they should

not be ground very fine, as the glutinous and limy qualities of the bone would be taken up too rapidly by the young tree; care should be taken that the tree should stand as near the surface as it can with safety; no staking or propping should be used; early in November earth should be placed about the trunk of the tree, which tends greatly to keep it in place during the winter months, and should be removed not before the 1st of May, which will prevent the buds from putting out too early.

The land to be kept in constant cultivation by some hoed crop for at least 12 years, or until the tree comes into full bearing. After this, no crop should be suffered to be taken from the land, except the product of the trees. The land must be kept light and free from weeds, either by the plough and cultivator, or by young pigs being confined in the lot during the summer and autumn months up to harvest-time. The latter practice is to be preferred, as all the apples that fall prematurely are taken up as fast as they drop by the pigs; and by this means all the worms, as they fall in the apple, are destroyed. All the worthless apples should be gathered up each day as they fall, to the 20th of September, or until harvest-time, so that no opportunity is left for slugs or worms to make deposits for future time. The unnecessary limbs should be removed several times in each year after the first, the process to commence the 1st of June, and no pruning after the middle of August: the young limbs to be removed, while small, with a sharp pocket-knife. Great care should be taken not to graze or loosen the bark. No one, on any account, should be permitted to step on or into the limbs while pruning or harvesting; care should be taken that not too much nor too little of the top or branches should be taken out at once: if too much, the sun strikes the trunk too hard; if not enough, the useless limbs take too much sap from the trunk. Great care should be taken that the tree does not limb out too low: the lower limbs should be at least high enough to permit a horse to pass under freely, without interfering with the limbs. If the limbs should incline down too much, one or two crops of corn may be grown on the land instead of roots, while the trees are yet young, which crop will cause the young shoots to go up, and by this process the top can and should be made very beautiful, and the better calculated to hold its fruit.

Winter fruit in this section is harvested from the 20th of September to the 10th of October, to be picked from the tree by hand and placed in flour-barrels, the barrels immediately headed up, and to be placed in a cool, dry situation for the first month, and then removed to the cellar or carried to market.

Average price for the Baldwin and other best kinds of winter fruit at our nearest market is $1.75 per barrel; fall apples, 33 cents per bushel. It is believed orchards cared for as above described pay a good interest, while trees scattered here and there in grass land, all over the farm, are worse than nothing. Some attention is being given to growing winter sweet apples. The Danvers Sweeting and Honey Greening keep well through the winter. The Lady Sweeting has but recently been introduced—is said to be a profitable apple.

Apples have not been used for feeding to cattle, but in a limited way. No experiments have been tried with milch-cows or other stock. It is believed that sweet apples will prove very valuable for milch-cows. They have been fed to some extent to hogs, both raw and cooked. Cider for drink has come into disuse, and refuse apples are used for swine, cooked and used with meal. Considerable attention is being paid to setting out peach orchards, and it is thought that peaches of quite as good flavour are produced here as further south. The early crop pays well, while the late crops are not worth cultivating. It is believed the market will be overdone with what trees are already set.

The pear has attracted some attention; orchards of this kind of fruit are now being set, and a countless number of varieties are being experimented on; with what success, after-time must show.

Our native grapes have been greatly improved within a few years, in quantity and quality, by being transplanted from their native forest to the garden and well-cultivated field. Many varieties of the foreign grapes are cultivated (mostly for home use) both in open fields and under glass; bones are considered the best substance that can be used as a manure.

Quinces flourish, perhaps, as well here as in any other section of the country, and have been considered profitable for the market; average price $1.50 per bushel.

Manure.—Fifty per cent. more manure is made and preserved for use now than 10 years ago. Barns are now built with cellars under them. The most convenient plan is to set the barn on a slope or side-hill—facing to the south is to be desired; the cellar to be walled on three sides and open on the other; 9 feet deep, if the land is dry on which the barn is to be set; the floor of the barn should run lengthwise, with stalls for cattle on one side and a deposit for hay on the other: in this way, the droppings of the stock are let down through scuttles into the cellar. In this way, the liquids as well as the solids are all preserved, and held fast until wanted for use. If the land is light and dry where the manure is to be applied, muck or swamp-mud if wet and heavy, loam or sand should be used, and all the waste hay and straw and other vegetable matter that can be collected should be deposited in this cellar, and the whole mass to be composted and worked over when the weather is too wet for out-door labor. The cattle to be kept in the stall all but a short time in the middle of the day in winter, and the cows to stand in over night the year round. Plaster should be sprinkled on the floor each day, and permitted to mingle with the manure below. The manure may be forked over as often as convenient during summer, and perhaps small quantities of lime may be used to advantage, to help decomposition. If the cellar does not get too much filled up, this whole mass should remain in the cellar until a convenient time for using—September is preferred. The cellar is then to be cleaned out and the manure to be ploughed immediately in, to prevent evaporation, where it may remain until the following spring. Hogs are frequently wintered on the compost, and, if properly cared for, will do well and thrive, besides doing much of the labor of mixing these several ingredients.

It is thought that from 37 to 50 per cent. is saved in this way in manure and labor, besides having much spare room for storing roots and housing farming-tools.

So much is thought of the above method of preserving manure from waste by evaporation and wet, that the most of our more thinking farmers are digging cellars under their old barns, rather than be without them.

Plaster is used 50 per cent. less than in former years.

Lime is used but in small quantities for agricultural purposes, as the cost in our markets is quite too high.

Guano has never been used in any great quantity, nor will it be until its market value is lower, and the different quantities are better understood by our common farmers. Guano may yet successfully compete with other manures; much every way may be done by our national government in securing and preserving the trade in this valuable article.

It is confidently hoped that the Agricultural Bureau, at Washington, will seasonably look to this matter.

Sutton, February 7th, 1851. HARVEY DODGE.

Hon. Thomas Ewbank,
Commissioner of Patents.

South Union, Kentucky, December 28th, 1850.

Sir:—Below you will find such answers to the inquiries from the Patent Office, on the sheep husbandry of this district, as our limited means for information will permit us to give. Answer 1st. The prevailing breed of sheep in this district is the common native, with the exception of some of the best flocks, which have crosses of the Merino, Saxon, Cotswold, and South-down breeds, with some thorough-bred.

2d. Two pounds per head of clean-scoured wool, ready for the manufacturer, are about the usual clip. The Cotswold and their crosses will yield from 4 to 10 pounds suitable for the comb.

3d. The sheep in this district of country are generally healthy and productive in young, the number of lambs being nearly or quite equal to the ewes, though, from the practice of unrestrained intercourse between the sexes and the want of shelter, from 25 to 50 per cent. of the lambs is usually lost during the months of January and February; but it is our practice to keep the bucks from the ewes until about the 20th of October, or 1st of November, so as to have the lambs come in the months of March and April, at which time the ewes can get something green to feed upon—consequently the lambs are more healthy.

4th. Hunger is to be far more dreaded among the native sheep of this region, than all the other diseases combined, excepting the devouring jaws of the dogs. Blooded sheep are not so healthy, the lambs being carried off during the months of August, September, and October, at the rate of from 10 to 50 per cent. by a lingering disease, known probably in the books by the name of pines.

5th. I cannot say the number of sheep is increasing in this district faster than the number of inhabitants—though they may be.

6th. Small farmers make no surplus wool—larger ones dispose of their surplus to the mechanical and non-producing class.

7th. From 50 to 60 cents per head, varying with the different range of neighborhoods, may perhaps be a fair estimate of the cost of keep in this district.

8th. The usual time of foddering is from the latter part of November until some time in March.

9th. The summer feed for sheep is in the wild range of the woods, consisting principally of grass and herbage, in great variety and abundance, of which some flocks get more or less the year round.

10th. Sheep are fed in this section during the winter on corn-fodder, hay, and sheaf-oats, with the addition in severe cold weather of Indian corn. Our flock of sheep, consisting of about 600, will average about 3 pounds of clean-scoured wool per head, about one-half of which is of the Saxon and Merino breeds; the other half, Cotswold, Bakewell, and Southdown crosses on select native sheep. The staple we consider good, and, if the sheep have proper treatment, it is, perhaps, equal to any in the United States. The Saxon and Merino fleece is worth about 30 cents per pound in the dirt, which loses about one-half in scouring. Other kinds vary in price according to grades, and will bring from 30 to 40 cents per pound when scoured.

Your friend,

URBAN E. JOHNS.

Hon. FINIS E. McLEAN,
Washington, D. C.

Great Crossings, Scott County, Kentucky, December 26th, 1850.

Sir:—I have just received your circular, and, as I highly prize the Patent Office Report, will attempt to give you some information upon the desired points, so far as I am able.

Wheat.—Several varieties are used in this neighborhood; the Missouri white, which is ten days earlier than any other, Illinois velvet-chaff, red-chaff, bearded, and Mediterranean. The Missouri white is moderately productive, and makes very fine flour. The Illinois velvet-chaff is a fine, heavy wheat, weighing, in good seasons, 65 pounds per bushel, yielding well, and makes a good article of flour. The Mediterranean is coming into general use; the flour is not so white as some other, and it is not so liable to rust; bears heavy grazing, and yields a fair crop. Average crop on our good lands, about 15 bushels per acre. Time of seeding, from 15th September to 15th October, and of harvest, from 20th June to 10th July. We sow from 4 to 5 pecks to the acre, and without any preparation of seed. Our wheat is generally sown after corn or clover, no regular rotation of crops having been adopted. We cut up and shock the corn, then plough the ground perhaps 3 inches deep, sow the wheat, then harrow, and the work is done. Some sow and plough it in, and do nothing more. Where wheat follows clover, the object is to enrich the land; hence the second crop of clover is allowed to grow, and is then turned under, thus affording a good coat of manure; the wheat is sown on the furrow, harrowed in, and left to grow. We have not been troubled with the Hessian-fly for a number of years, owing, I suppose, to late sowing, which was adopted when they were troublesome.

In order to avoid the white weevil, we get out our grain as soon after harvest as possible, and put it in rail-pens in the chaff, and cover well with straw, which is a certain remedy. Average price per bushel, about 60 cents.

Corn.—This is our great crop. Varieties, the Craig cone-gourd-seed, white flint, and yellow flint. The gourd-seed is supposed to shell the most, while the flint is thought to be the most nourishing. Average produce per acre, 40 to 50 bushels; cost of production, 17 to 20 cents. While the usual yield is as above, still, on highly manured land, an almost incredible yield has been obtained—150 to 175 bushels have been reported. Our lands have been so productive, and our farming operations of such a character, that no effort has been made to ascertain the best system of culture. But

a brighter day is dawning. Western farmers are becoming interested in so arranging their operations as to make the least number of acres yield the greatest number of bushels. Sufficient importance has never yet been attached to preparing the soil. We have generally ploughed our ground only two or three inches deep, then (if for corn) it was laid 4½ feet each way, and planted; but we now have better ploughs than formerly, and plough deeper, and plant our corn nearer, say 4 feet by 2, which is better than the old fashion. I now grind all my corn with the cob, that I feed. I intend to make some experiments with regard to feeding raw and cooked food, and, when I do, will forward you the result. For feeding corn to horses, mules, and cattle, I am fully satisfied that there would be a saving of at least 25 per cent. by grinding it.

Manures.—We rely mostly on small grain (wheat, rye, oats, and clover) for manures: we however occasionally haul the accumulated piles from the stables and barnyards, and scatter on the fields. The usual mode of resuscitating worn-out land, is to sow down with clover, about 6 pounds to the acre, and let it remain three or four years, pasturing it during the summer, and in winter feeding our cattle with the shocked corn or fodder; thus keeping the manure of the cattle, as well as that made by the waste cornstalks, on the ground. In this way, the produce of one field is removed to another, which keeps the land in good heart. I do not know a single farmer who shelters his manure heaps, or attempts to increase the quantity by adding muck, leaves, straw, or any thing else. That made in the usual course of farming, is on rainy days thrown out of the stables, there to remain till some convenient time arrives for drawing it away. All our level lands in Scott, Woodford, Jessamine, Fayette, and Bourbon counties, are capable of producing, when properly managed, 100 bushels of corn to the acre; and the time will come, in my opinion, (if the Union of these States is maintained,) when that will be the average.

Oats were formerly regarded as a very exhausting crop, and not much cultivated; but their excellence as an article of food for horses and mules was not understood. They now occupy a prominent place in every good farmer's rotation. Average yield per acre, 40 to 50 bushels; quantity sown, 1½ bushels per acre. *Barley.*—None raised in this county. Rye was extensively cultivated a few years since, and was highly esteemed as an article of food for horses; it was also esteemed for the fine pasturage it afforded for young stock in fall and spring, but it has become an uncertain crop, and is not much grown. Average yield per acre, 20 to 25 bushels; quantity sown per acre, 5 pecks. Beans and peans not cultivated here. Clover is seldom used in any other way than as a fertilizer, and, if not pastured, is left on the ground to act as a manure. Timothy is the meadow grass of this region. Mode of culture:—The soil is well prepared in August or September, and the seed sown by itself, when we wish to mow the next season. Sometimes it is sown with wheat and rye, or, in the spring, with oats, or on rye and wheat in February and March. Average crop, about 1½ tons per acre. Leached ashes is considered the best manure for timothy.

Butter and Cheese.—The price of butter is from 10 to 20 cents per pound, according to the season. No cheese is made, worth reporting.

Neat Cattle.—I suppose the cost of rearing until 3 years old, to be $15 to $17.50 per head, and the average price about $20 per head. Value of good dairy-cows in spring, from $30 to $50; and in fall, $20 to $30 each. I have no means of ascertaining how many pounds of beef 100 pounds of corn will produce. I believe the general calculation is to feed 50 bushels of corn to the steer during the winter, and that a fair gain is 150 pounds to the bullock. The short-horned Durhams are the favorites in this region; there is not a herd to be found which is not crossed with the Durhams. The Devons and Herefords have not been introduced here.

Sheep.—Some attention has been paid to them. Southdown, Bakewell, Merino, Saxon, and Cotswold, have, at different times, claimed attention. The Cotswold is now the favorite, the coarse wool being generally preferred for the manufacture of jeans and linseys. The Southdowns are the best for mutton, and a cross of the Cotswold upon the Southdown produces a fine carcass, good mutton, and a fair yield of wool. My own opinion is, that upon our lands, that cost from $50 to $60 per acre, wool-growing is not profitable. I think that 6 lbs. wool in the grease (worth 25 cents per lb.) is above the average per head for our flocks to yield, and that would pay only 10 cents per month for keeping. I suppose the number of lambs raised annually to be about ¾ that of the ewes.

Hogs.—The best breed, Woburn crossed with the common hog. They are long and deep, and fatten easily. I am clearly of the opinion that the cheapest way of making pork is to keep hogs always fat, which may be done with a little attention. I suppose 100 lbs. of corn, fed raw, would yield about 20 lbs. pork.

Hemp is next to corn in this part of Kentucky, as a crop; its culture is on the increase. It is a crop that requires good cultivation in order to obtain a good yield. The soil must be well pulverized by ploughing and harrowing before sowing the seed. Average yield, about 6 cwt. per acre. Cost of production, about 3½ cents per pound.

Root Crops.—None raised.

Potatoes.—Irish and sweet are all planted for home consumption. Owing to the peculiarity of the season past, there was almost a failure. Irish potatoes are worth $1 to $1.25 per bushel; the usual price at this season being about 40 cents.

The cultivation of fruit in this neighborhood has received but little attention. The old settlers planted a few seedlings, and turned their attention to farming, and, as the next generation came up, they were satisfied with what their fathers had done in this way; but a "better day is coming." A number of young orchards of good fruit are just coming into bearing. Some of the varieties are Pryor's Red, Jennett, June apple, Bell-flower, Holland Pippin, Newtown Pippin, Northern Spy, Roxbury Russet, Summer Pearmain, Minister, Emperor Alexander, &c. A large number of orchards have just been planted, and there are not trees enough here to supply the demand. Increased attention is paid to the character of the fruit, as well as to the quantity, and we hope to be able, in a few years, to show some good fruit. There is a decided interest, as well as improvement, in the smaller fruit, such as cherries, raspberries, strawberries, gooseberries, currants, &c. Pippins and other good-keeping apples are worth 16⅔ cents per bushel on the tree. Peaches are cultivated to a considerable extent, but the ravages of the worm at the root of the tree, causing early decay, almost discourage our efforts to raise them.

Permit me to say, in closing, that I am so fond of agricultural pursuits, that I introduced a resolution before the board of trustees of Georgetown College, for the appointment of a committee to inquire into the expediency of attaching an agricultural department to that institution. What are

termed the learned professions, are full, and the people begin at last to think that some learning is essential for a man to make of himself a successful agriculturist. I trust that in the wide-spread diffusion of useful knowledge, obtained through the agency of your office, an impulse will be given to the subject that will not be allayed till our fields shall be brought to the highest state of fertility, and until, in every county, associations of intelligent farmers are formed, for the better promotion of the science of agriculture.

Respectfully yours,

Y. R. PITTS.

Victor, Ontario County, N. Y., December 13, 1850.

Sir:—Among many other cultivators of the soil, I have received a circular from the Patent Office, soliciting information upon various points of agriculture, which I shall undertake to answer in the same order that they are found in that document.

Wheat.—Varieties in use, Soule, flint, and the Hutchinson; average, 25 bushels per acre; time of seeding, from the 10th to the 20th September; time of harvesting, from the 10th to the 30th July; preparation of seed—the only usual preparation, is to clear it of all foul seeds and sow it dry; we sow 1½ bushels to the acre; we plough three times, or once, and use the two-wheel cultivator; we plough from 7 to 10 inches deep; the yield per acre is increasing. Our most approved rotation is to sow wheat every third year, and seed with the large red clover each time; the intermediate seasons between the wheat crops, we mow the clover for hay, or use it for pasture. The best remedy for the Hessian-fly is to keep the land rich, and not exhaust it with spring crops, nor sow wheat oftener than once in three years; prepare the land first-rate, sow, in proper season, a moderate quantity of seed, and give it room to produce a large, rank, and vigorous stalk; upon such stalks of wheat the flies can do little or no injury; on the contrary, I have noticed that wheat sown too early in the season, or too late, or upon a poor, half-tilled, half-manured soil, and after spring crops, and where too much seed, by half, is used, would generally have a sickly appearance, a soft and tender leaf and stalk, most easily perforated, and altogether, it turned out to be just the wheat for the Hessian-fly to riot in. We have received about $1.13 this season per bushel.

Corn.—The most esteemed varieties are the Dutton, the eight-rowed yellow, and eight-rowed white. We get, on an average, 40 bushels per acre; cost of production, 8 cents per bushel, exclusive of land-rent. Best system of culture:—Plough the land early in May, harrow it fine; mark for rows, both ways, 3½ feet apart; plant from 5 to 7 grains in each hill; as soon as the corn is fairly up, plaster it with gypsum, ashes, and lime; in a week afterwards, go through with the shovel-plough or one-horse cultivator, two furrows in a row, each way; let a hand follow with a hoe, to uncover the hills that get covered with the plough. At this time it should be examined, and all over four stalks in a hill should be cut out. Corn should be ploughed at least three times, and well ploughed. If land is well broken up in the spring, and well harrowed, the rows run straight, the work of dressing corn can mostly be done with the plough. It is sometimes useful to grind corn for hogs; it would be useless to grind soft corn, but dry hard corn ought to be ground, and, under some circumstances, it is thought to pay well for cooking it; for instance, where animals have been fed a long time, and are pretty fat, then it will do to cook their meal. If the manure made from 20 bushels of corn be well applied, I think it will increase the yield at least 10 bushels.

Oats.—We sow 2 bushels to the acre, and get a yield of 40 bushels.

Barley.—We sow 2 bushels, and an average crop is 30 bushels per acre.

Peas.—I sow 3 bushels per acre, and get about 20.

Beans.—We sow beans in drills 2½ feet apart; 20 quarts is the usual quantity per acre; an average crop is 20 bushels.

Rye.—Those who sow this grain, sow 1½ bushels per acre; they get, on average, 15 bushels per acre. Peas are the least exhausting crop, and are not sown as a renovating crop.

Clover and Grasses.—1½ tons per acre is an average yield. The best fertilizers for meadows are plaster and stable manure. The grass seeds for meadows are red-top, timothy, and clover; we sow from 6 to 8 quarts per acre. The cost of growing, cutting, and stacking hay, including seed and plaster, is $2.50 per ton.

Dairy Husbandry.—In this vicinity, it is thought that cows will produce 150 lbs. of butter per year. It costs about twice as much to make butter as it does cheese. Milk, for butter, is treated something in this way:—It is strained into tin pans about 4 inches deep, and set in a place of the right temperature, where it stands until the cream rises, when it is immediately skimmed, not waiting for the milk to sour, for it is thought that the acidity of the milk destroys or neutralizes a portion of the cream. The cream is churned in the usual way, by agitating it in the churn, keeping it in a place of the right temperature. The point is not yet settled among good butter-makers, whether it is better to churn the milk with the cream, or the cream only; but one thing they all agree in—that is, that the pails, pans, and all articles used about milk should be kept entirely clean. Butter, after it is churned, should be thoroughly worked, to get out all the milk; if this part of the business is not well done, it soon becomes soft and rancid, and is unfit for market. Cows, for making butter, should be kept in good condition, with plenty of green food, be salted often, have plenty of water, and have shade in hot weather, and a good, warm stable in winter, with plenty of roots and other feed. All these things are requisite, both as regards the quality and quantity of butter. The average price of butter has been about 13 cents per pound; for the last season, cheese has brought 6¼ cents.

Neat Cattle.—It costs, at the usual rate charged, $30 to rear a heifer or a steer till three years old. The usual price at that age is $25 for a heifer, and $30 for a steer. The value of a good dairy-cow in the spring is $30, and $25 in the fall. A given amount of food will yield no more meat in a Durham, Devon, or Hereford, than in a native animal, if they are in every other respect equal.

Sheep and Wool.—The growing of wool is not profitable in a grain-growing country. It costs, at the usual rate charged for keeping sheep, 50 cents a pound to grow fine wool, and 45 cents a pound for coarse wool. A ton of hay is worth $7, and will winter 8 sheep, that will shear 28 pounds of wool. It costs 5 cents per pound more to grow fine Saxon or Merino, than it does coarse wool. The proportion of lambs reared is 8 to 10 ewes.

Hogs.—The best breeds are the Berkshire, Leicestershire, and Byfield. The cheapest way to produce pork is to keep just hogs enough to eat all the sour milk, small potatoes, and "bits o' bread," that may be produced upon the farm. Hogs, if allowed to run in the orchard, can be kept pretty cheap until they are 15 or 18 months old, when they will have usually got their growth, and will fatten easily upon corn, peas, or barley. One hundred pounds of corn, upon the closest calculation that I can make, will make 25 pounds of pork. Hogs should be killed in cool weather, and, after dressing, should hang till quite cold: otherwise the meat will have a strong, disagreeable taste. Pork for pickling should be cut in small pieces, the bloody parts well washed: the best rock or solar salt should be used. It should not be packed very tight, for the brine should flow through in liberal quantities: if not, the pork will have a greenish and bloody appearance. When it is packed down in large pieces, it is apt to taint before the brine strikes through. Casks that have ever contained sour brine should not be used again, for they are sure to "leaven the whole lump." Hams should be salted down a few weeks in brine made of common salt, saltpetre, and molasses: they should be smoked pretty thoroughly—when they are fit for market.

Cotton, sugar-cane, tobacco, and *rice* are not raised in this part of the country.

Carrots, Beets, and Turnips.—The cultivation of these roots is not on the increase. Land for these should be manured pretty heavily; it should be warm, sandy, or gravelly; it should be ploughed deep and subsoiled; it should be harrowed fine and laid into ridges two feet apart, and four or five inches high; they should be made true with an implement made for that purpose. Carrot-seed should be sown as early as the land can be prepared; it should be soaked till near sprouting before being sowed; it may be sown with a hand-drill running on the ridge; if they are carefully sown in straight rows upon ridges, the after-culture is greatly facilitated. I have a shovel-plough with a share made for the purpose, that cuts about 8 inches wide. By planting thus, I am enabled to plough with a gentle horse very close to the rows; the roots in the rows may stand two or three inches apart. This plan has some advantages over the old plan of doing all the labor with the hoe and the hands; it loosens the earth deeper, and enables the roots to send out their lateral fibres to a greater distance, which improves them very much, both in size and quantity per acre, and, more than all, it saves two-thirds the labor. Carrots yield, on an average, 600 or 700 bushels to the acre; beets, 350; and turnips, 250. For fattening animals, these roots should be boiled, but for milch-cows, or working cattle and horses, they are better in a raw state; but in all cases they should be washed clean before feeding.

Potatoes.—Average yield, 150 bushels per acre; cost of raising, 10 cents per bushel; the most prolific are the Rohan and Merinos; the most profitable are the early June, pink-eyes, and kidneys. The best system of planting, in order to escape the blight, is to select a piece of dry, sandy, or gravelly land; manure and plough it as early as possible; harrow it fine, and mark for rows 3 feet each way; plant the earliest varieties, put two potatoes of medium size in each hill; as soon as they are a few inches out of the ground, plough them both ways, two furrows in the row; hill them lightly with the hoe. Three times ploughing and hoeing are enough, if well performed.

The cultivation of fruit is receiving increased attention. From 500 to

800 bushels of apples can be produced on an acre; there have been large quantities shipped from this place this fall. Good winter fruit has been selling at from 75 cents to $2.50 per barrel of 2½ bushels, so that it is easy to estimate the product of an acre at from $100 to $200. The difference between apples and potatoes for feeding is about 30 per cent. in favor of potatoes. The best varieties for keeping, are the Northern Spy, Roxbury Russet, Spitzenburg, Greening, and Newtown Pippin. These are best also for exportation.

I think I know a preventive for the blight in pear and apple-trees. I have examined the subject carefully, and think I have traced the cause to the unsuitable nature of the soil upon which they are planted. I have examined pear-trees, with reference to this disease, in at least one hundred and fifty different localities, and have invariably found, that when they are planted on a rich, deep, loose soil, at the foot of a cultivated hill, they live to a great age, and bear heavy crops of fruit annually. On such soils they are healthy and free from blight. The soil for pear-trees should be at least 4 feet deep, as its roots are long, and almost fibreless. It is a rapid grower, and requires a great deal of nourishment, so that, upon a poor, thin soil, it soon becomes weak, like a straw-fed animal, and dies of the blight. The black ash, a native of low, rich soils, when removed to high, light soil, is subject to the same disease. I have never seen a pear-tree standing on the top of a dry, sandy hill, that was ten years old and free from blight, nor upon a thin soil of any kind.

It takes a long time to get them in bearing; so the land should be cultivated while the trees are young. Corn, potatoes, or other roots are preferable to grain. I have about two acres of apple orchard, and consider it the most profitable of any crop I raise. It will average fifty dollars per acre. My orchard is grafted with russets, which are the best for keeping, and will not injure by freezing so soon as other kinds. They are not so good on wet land as the Baldwin.

Currants are easily raised, and never fail; they make excellent wine, with very little labor. Moist land is the best for them.

Yours, most respectfully,

MOSES FRENCH.

Barbour County, Alabama, November 9th, 1850.

Dear Sir:—In making out a report in reply to your circular, I have endeavored to collect the most reliable information, derived from observation and other sources deserving confidence. I am happy to state that the general condition of the agricultural interest in this section of our widely extended country is very healthy and prosperous; more so than I have ever witnessed it before in a period of 13 years' residence. And, by the blessing of Providence, no people on the habitable globe are better prepared to live more comfortable and happy, would we but use the proper means to insure ourselves the rewards of industry, frugality, and enterprise. It is true that, in some things, we are far behind our colaborers in other sections, who have been blessed with advantages which we do not possess; but, at the same time, there is visible a spirit of improvement, which will gradually be infused among a people whose efforts are to advance in their respective callings; and we now see dawning upon us a general prosperity, the sure

reward of a people whose minds and energies are directed to an honorable pursuit.

With these preliminary remarks, I shall now proceed to answer the inquiries set forth in your circular.

Wheat.—My report for 1849 gives as fair an account of the condition of wheat culture in this section as could now be made out without repetition. In Columbus, Georgia, 45 miles north of this, extensive flouring mills have been established, which must, in time, encourage the growth of wheat. At present, much grain is imported from the West, to keep 3 mills in operation. The flour made is of very superior quality, equal to any of Northern manufacture.

Corn.—The most esteemed variety is the white corn; and, by proper management and cultivation, it will average from 25 to 35 bushels per acre. Of late years, much attention is bestowed to selecting the corn for seed, and it is better cultivated than heretofore, which results in a heavier yield per acre. From the protracted drought in May and June, the corn crop has been materially shortened; but sufficient has been harvested to meet the wants of the county.

There was introduced last spring, by Colonel Eli S. Shorter, a planter in this county, two new varieties of corn, the "Oothkalooga" and "Early Ohio Flint," which he pronounces to "have made the best corn he ever saw," yielding from 50 to 70 bushels per acre without manure. Some ears of the first-named variety were the largest I ever saw. I have handed Colonel Shorter one of your circulars, and requested him to make out a report for your department: in so doing, he will give a full account of this corn, its culture and production. The introduction of such seed among us will largely increase the production of corn, which, I think, can be made for 40 cents per bushel. My system of culture is to break the land deep at first, with large skooters, lay off the drills 5 feet apart, drop the seed 30 inches apart. In laying off furrow, manure at the same time with cotton-seed, and cover the corn and manure by running a light skooter-furrow on each side of it, and breaking the balk thoroughly out with shovels. This, however, is not the general system, as many still adhere to the old hill culture and covering with the hoe; and some in drill plant in a bed, covering with a board on the heel of the plough-stock. For my own part, I have found the first-named system most successful, and the after-culture easier. Three ploughings, and a hoeing after the first and last ploughings, is the culture given to corn, and the sweep-plough is becoming the one most in use for this purpose, as it performs the work rapidly, and, at the same time, stirs the land thoroughly. As regards feeding corn to stock, it is usually fed in the ear, as gathered, and the true economy of preparing by mills, or boiling, is lost sight of. I know of no experiments or calculations having been made in turning grain into manure by feeding stock of any kind.

Your next inquiries are in relation to *oats*, *barley*, *rye*, *peas*, &c. Oats, rye, and peas are extensively sown, but of barley and beans, none to my knowledge. Oats are sown down after corn, in October and November, and sometimes in February, from 3 pecks to a bushel per acre. I am partial to putting much seed in the ground, and have always done best when sown thick. Average yield, from 15 to 20 bushels per acre.

I deem this crop more exhausting to land than any other of the grains above named; it does best on low, wet lands, and we find it stands the winter's cold better on such lands than on high, dry, porous soils, where it is often winter-killed. When chopped and mixed with corn, oats make an excellent summer food for our mules and horses; as a renovator of land, I cannot speak of it as beneficial, further than its stubble prevents washing.

Rye is sown down for green pasturage more than for its grain, and serves as an excellent winter pasture for young stock to run upon; and I am only surprised that it is not more generally thus sown than it is, especially on broken lands, where it would prevent the washing of the soil during the winter rains, and, early in the spring, might be turned under to rot, in time for a late-sown crop. I have known instances where the overseer, in picking cotton in the fall months, scattered the seed ahead of the pickers, by whom it was trampled in, and in due time a good stand was had, with little or no trouble, furnishing a fine winter pasture, and, on undulating lands, preventing the alleys of the cotton-beds from gullying by the rains. The average yield is about 15 bushels per acre.

Peas.—These may be made one of the most valuable products of the South. Heretofore, and even now, a proper estimate is not set upon their beneficial qualities as a renovator. In this respect, they can be made to the South what clover is to the North and West. It is true that my experience with peas as a renovator is limited; but, so far as tried, very satisfactory, and I am now engaged in saving a large quantity for sowing broadcast on my corn lands next summer. I have never seen a piece of ground sown exclusively with peas for the purpose of turning them under as a fertilizer; but I have conversed with those who have tried it with very successful results. The manner in which have I tried them is in the last sweeping given to corn, sowing them broadcast before the ploughs, where they shade the ground completely from the penetrating heat of our summer's sun, protect the land, and keep the roots of the corn moist and cool, which, in a dry time, very much aids the corn in maturing well. In the fall, by early breaking up the ground for another crop, a vast amount of vine and litter is turned under to rot, which makes manure. By this system, but a partial benefit is derived from the peas as a renovator, although, considering the protection afforded to the corn from the influence of heat upon its roots, the preserving of the land from washing, and the keeping under of the noxious weeds and grass, this plan, involving but little labor and trouble, is well worthy the attention of planters.

Again, the vines, with the peas on, can be pulled up and cured so as to make an excellent winter forage for cows, mules, and sheep; in this way they readily fatten animals, very much increasing the milk of cows, if put away in a barn underneath which cattle can go and reach them through slat floors and racks. Or, they may be littered in lots, so as to make an abundance of manure. Thus a large amount of corn is saved, and stock can be wintered more economically than in any other method.

It is only with a certain class of planters, however, that this system will be adopted; for the putting in of the pea-seed is at a time when cotton-picking is most pressing, and where making large crops of cotton is the prime consideration of the planter, all other objects are lost sight of, embracing a general system of raising all things at home, which is the farmer's true policy and interest. Cotton is now bearing a high price, and the whole energies of the planters are bent on making all they can. The result will be, that they will find themselves dependent upon others for every thing they need, having neglected their provision crops, stock, &c. for cotton.

We are unable to answer your inquiries about *clover* and the *grasses*, they

not being cultivated in this section of country; also *dairy husbandry*, as nothing is done in this branch of rural industry, except for domestic wants.

Neat Cattle.—The cost of raising neat cattle to the age of 3 years may be set down as merely nominal; for, in summer, they are sustained by the range, and, in winter, the run of the fields with shucks is found sufficient. At 3 years old, in beef, they are worth from $7 to $9, and as stock cattle, from $4 to $5. The value of dairy-cows ranges from $12 to $25, according to their quality as milkers. As regards the amount of food required to fatten different breeds of cattle, we are unable to say, as with us blooded stock is scarce. Beef is used only in the summer months, where fattened by the range. Fall beeves, killed and cured for winter use, are generally fattened in the pea-fields.

Sheep and Wool.—We cannot answer the inquiries in your circular, for sheep have not been raised for the wool, except for domestic use. The breeds here are the most common kinds, and the average clip not more than 1½ pound per head. In Columbus, Georgia, 45 miles north, are several large woollen factories, lately established, and others now being erected, which will cause a demand for wool, and be the means of turning the attention of farmers to this important branch of business, now entirely neglected. I have been thinking, for some months past, of investing some capital in sheep, for the purpose of selling wool to the Columbus factories; and it strikes me that, with little trouble and good management, it can be done successfully and with profit; for we possess many advantages here in climate, woods-pasturage, and rye-fields, so that little expenditure is necessary in raising and sustaining them.

Again, our factories at present, and perhaps for years to come, will require but the coarser kinds of wool, as they manufacture coarse fabrics. This will enable us to begin with the common breeds, and, by importing blooded stock, to cross and improve the breeds gradually; thus ascertaining what breeds turn out the heaviest fleeces, and the quality most needed by manufacturers. No one can read the letter of Mr. Mark A. Cockrill, of Nashville, Tennessee, on the raising of sheep at the South, in the Patent Office Report for 1848, without feeling deeply interested on this subject. He has removed all doubts, done away with prejudices, and opened the way for all who may be disposed to make the trial, and who must succeed, with good management on his own part. With the farmers of the South, the starting of factories in our midst should be hailed with pleasure, and supported with zeal, for we have it in our power to supply the raw material, cotton and wool, and the food of their operatives. In short, an exchange of products is all that is necessary for us to be satisfied that we can, at last, live at home; and creating a diversity of products, and drawing our minds from the one object, cotton-planting, will add to the comfort of the farmers, and result beneficially to the country at large. Wool-growing I deem an advantage to the South, and no time should be lost in procuring the necessary stock and raising large flocks of sheep. The manufacturers now import from foreign countries 8,000,000 pounds of wool a year, to carry on their business. With this deficit in the supply, should we not be encouraged to furnish our own manufacturers, knowing that factories are on the increase, and being erected at our very doors?

Hogs.—The native or common stock we find to answer our purposes best, owing to its hardy habits, and being the most thrifty range-hog. There is no doubt, however, were proper attention paid to hogs, the improved breeds would be found most profitable; but among cotton-planters, and especially when prices range high, they raise only for their own supply, and import Western bacon for their negroes. What few hogs of improved breeds we had brought to the country did well so long as they were kept up, well fed, and attended to; but when turned on the range, they dwindled away to nothing. Pasturage is necessary for pork-raising, and, with the cotton-planter, none, comparatively speaking, is to be had; hence it is we are deficient in this branch of agricultural industry. Our climate, too, is so variable and uncertain, that it is a hard matter to save what pork is raised in the country. The drove-pork purchased is often much injured in saving, and the risk is so great, that the planters feel safer in purchasing their bacon from New Orleans, than in raising and curing. In putting up our meat, the worst enemy we have to contend with is the skipper-fly, which produces a bug that in summer destroys it. Many preventives against this enemy have been resorted to, but none, so far as I have heard, has proved entirely successful. Some have buried their meat in salt, some in fodder and shucks, and others in charcoal; still the ravages of this bug are manifested. So far as my experience goes, I have found it best, when the bacon is well dried, to take it down and brush it over carefully; have a large box in readiness, and pack it away in pulverized charcoal. It keeps better in this way than in any other that I have tried.

Cotton.—The season has been considered unfavorable, particularly to the upland crops, which are set down at 500 pounds per acre. It is allowed that it takes 1600 pounds in the seed to make a bale of 450 pounds clean cotton. The rotation of crops is governed by no regular system, for where corn and cotton are the only crops planted, cotton is generally run the longest, on lands best adapted to it, while the corn crop is kept up by manuring highly with cotton-seed. But, where the small grain crops are sown down, the rotation is corn after cotton, and cotton after small grain. So far, no preventives have been found against the rust and boll and army worms. Cotton can be made here at a cost of 5 cents per pound.

In relation to the remaining inquiries on your circular, most of the articles are not grown among us, while others are grown in such small quantities as to afford no important conclusions as regards production, culture, &c.

Very respectfully,

JNO. H. DENT.

Hon. Thomas Ewbank,
Commissioner of Patents.

Lake Swamp, Horry District, S. C., November 25, 1850.

Sir:—In reply to your inquiry relative to the culture of sugar-cane, and its premature decay from rattoons, &c., I can give you but little information, as I have never depended on rattoon crops. But so far as my experience goes, I think the cane does become inferior, shorter joints, and produces less juice than formerly. I have raised sugar-cane for four years, from the planting each year; and though I am 35 or 40 miles from the seaboard, and within nine miles of the North Carolina line, my cane does well, and I think it a profitable crop. I am of the opinion that cane can be raised in South Carolina or North Carolina, anywhere within 40 miles of the sea-

coast, to considerable advantage, and I do not think the time to be very distant when the sugar-cane will form a portion of the crop on every well-conducted farm; at least, enough for home consumption. Experience has taught me that this would be for the interest of every farmer.

I have had some experience in feeding apples to hogs, and can say that sweet apples will fatten them as fast as potatoes, but sour apples will not. I have a kind of apple, called Sweet James, which ripens in the month of June, and bears very full. I would as soon have a bushel of them for my hogs as a bushel of sweet potatoes; but when these were gone I fed on sour apples, and my hogs lost flesh, instead of gaining.

As to raising rice on high or upland, it is quite common. The gold rice or white-hull rice does well. There is a certain kind of soil, however, on which it prospers best, and that is a level, sandy soil, inclined to moisture. On such land, I have known the yield of rice to be three bushels to one of corn, from the same field.

Yours, with respect,

THOMAS A. BEATY.

Value of Dry Goods entered for Consumption, at the Port of New York, during the years 1849 *and* 1850.

MONTHS.	WOOLLENS.		COTTON.		SILK.		FLAX.		MISCELLANEOUS.		TOTAL.	
	1849.	1850.	1849.	1850.	1849.	1850.	1849.	1850.	1849.	1850.	1849.	1850.
January	480,591	1,585,186	1,108,448	1,774,888	2,196,750	2,061,816	402,276	1,055,756	861,881	[illegible]	[illegible]	[illegible]
February	898,811	1,266,968	1,609,522	1,106,145	1,572,882	1,861,499	467,441	685,157	404,169	270,504	4,946,825	5,190,278
March	582,065	802,202	1,048,282	946,597	963,619	1,191,483	587,847	754,261	885,838	174,568	3,517,646	3,869,056
April	587,540	1,821,810	557,472	1,148,289	888,876	879,996	845,225	1,848,491	299,776	165,117	2,678,889	4,863,158
May	287,652	768,810	275,090	556,829	267,592	1,080,895	176,877	198,981	798,981	52,528	1,756,142	2,607,998
June	474,287	596,170	876,450	289,551	454,577	835,851	158,000	215,398	151,787	72,100	1,615,001	2,008,570
July	1,020,678	3,552,120	817,520	1,607,775	1,784,797	4,572,161	231,650	741,095	262,297	880,698	4,116,987	10,858,849
August	2,968,604	2,254,069	1,142,686	948,925	2,859,992	2,803,145	706,075	619,777	361,336	888,468	8,038,693	7,094,884
September	1,380,783	1,380,248	548,816	546,523	1,180,528	1,874,495	448,266	488,040	209,248	342,998	3,662,331	4,627,304
October	600,418	576,580	269,654	814,028	529,068	762,281	227,291	451,455	95,184	202,295	1,721,605	2,806,589
November	418,584	379,899	245,812	267,516	501,270	673,488	291,829	328,704	101,382	240,445	1,558,277	1,884,502
December	465,659	225,717	368,264	806,972	764,762	582,307	224,184	216,914	139,072	123,195	1,961,891	1,455,105
Total entered	10,055,062	14,708,779	8,367,216	9,808,938	13,909,208	19,128,766	4,211,910	7,093,978	3,590,791	2,678,809	40,134,182	53,419,270
Add withdrawn	1,928,217	1,856,287	1,152,756	1,229,457	1,386,550	1,152,268	544,651	468,963	368,419	208,628	5,380,598	4,910,553
Total passed to consumption	11,983,279	16,565,016	9,519,972	11,038,395	15,295,758	20,281,034	4,756,561	7,562,941	3,959,210	2,882,487	45,514,775	58,329,823

Dry Goods Reporter.

Portland, January 16*th*, 1851.

Sir:—Some 8 or 10 weeks ago, I received a circular from the Patent Office, making inquiries concerning agriculture in this section, the which numerous pressing engagements have hindered me from considering until now.

Our farmers are by no means systematic or scientific in their agricultural operations; and, could they be induced to profit by the teachings of science, I am well satisfied that the result would be at least the doubling of their crops, with less labor than they now bestow on their farming operations. The experience of some two or three systematic and, to some extent, scientific farmers, with whom I am acquainted, bears me out in this opinion. I am happy to add, however, that there seems to be a growing interest in regard to the matter, induced, perhaps, by the operations of our county agricultural societies.

But to your inquiries:—

Wheat.—We raise comparatively little wheat in this (Cumberland) county, and, indeed, in the whole State—not *half* enough, I think, for home consumption. In 1850, 169,879 barrels of flour were imported into Portland alone, much of which went into the interior. However, since the failure of the potato crops, our farmers are turning their attention to the more extensive cultivation of wheat—the kinds most in use being the Kloss blue-joint and white-flint seeds. These varieties, so far as I have been able to learn, have not as yet been attacked by the weevil. The time of seeding is in all September; of harvesting, from the 1st to the 20th August. The average product cannot, I think, exceed 15 bushels per acre, owing to the unskilful manner with which it is cultivated. The seed is not prepared in any way—5 pecks of seed is about the usual quantity used per acre in planting; average price per bushel, $1.87½ cents. The ground is generally ploughed twice; depth, I think, not more than 6 inches. We have no system for rotation of crops; know of no remedies for flies or weevils. The yield per acre is increasing.

Corn.—The "Golden Field" variety is the only one planted; average product per acre, 45 bushels; cost of production per bushel, I should judge, might be set down at 55 cents. Most approved method of fertilizing is by spreading the manure broadcast. Our farmers generally plant in "hills," one hill to about every 12 square feet of ground, and hoe twice or three times. The best method of feeding it to hogs is, I think, decidedly, ground and cooked, or scalded. We raise more corn than wheat, but not enough for home consumption, 222,641 bushels having been imported into Portland last year. That corn can be raised in this section to advantage, I have abundant reason to believe. Last year, I knew an *amateur* farmer to raise 92½ bushels to the acre, and, as secretary of the Cumberland County Agricultural Society, in 1849, a written statement was put into my hands, *sworn to* before a justice of the peace, that the writer had raised, on one acre of ground, the almost incredible quantity of 123 bushels and 26 quarts of round yellow or golden-field corn!

With regard to the cultivation of oats, rye, and barley, there is a diversity of opinion here. I should judge the average yield per acre of oats was 20 bushels; of rye, 20 bushels; of barley, 25 bushels; average quantity of seed per acre, oats, 6 pecks; barley, 6 pecks; rye, 5 pecks. About enough of each of these grains is raised for home consumption. Peas, so far as I know or can ascertain, are not cultivated as a renovating crop. Beans are not much cultivated as a field crop, except among the hills of corn, one and sometimes two seeds being used to the hill. In this way, perhaps, an average of 8 bushels is raised to the acre. Separately and alone, I have heard of 35 bushels of beans being raised to the acre.

Clover and Grasses.—The grass crop of this (Cumberland) county is one of the chief dependences of the farmer, and generally, perhaps, his most certain and profitable crop, as things now stand. Much hay is annually exported from Portland to New Orleans and other Southern ports. I have known of 4 tons being cut to the acre on richly manured lands, but think the average quantity throughout the country cannot be more than 1¼ tons to the acre. The best fertiliser for mowing fields, where it can be had, is what is called "mussel-mud"—the mud and shells dug from salt-water flats or mussel-beds. Algæ, or sea-weed and kelp, thrown up on our sea-shores by storms, are also used, wherever they can be obtained, as fertilizers, and with much success. In the interior, ground plaster is used with most encouraging results, especially on heavy, clayey lands. Each of these manures is generally used as a top-dressing. Stable and barn-yard manures are also used. By "meadows," I presume you mean mowing lands generally. The seeds used in laying them down generally are herds-grass and clover—different lands requiring different proportions of the two seeds—but, on an average, I should estimate the proportion at ⅔ herds-grass, ⅓ clover. Red-top and foul-meadow are used in laying down boggy lands, or what are here called meadows. I do not think the average quantity of seed used in laying down grass lands is over half a bushel to the acre; but our farmers would find it to their advantage to use more. The average cost of growing hay per ton I shall set down at $5; average price from one year to another, $8 per ton. The Southern clover-seed does not work well here at all. I have known a skilful farmer enter upon a new farm, and, by the application of mussel-mud, plaster, and stable-manure, and the manure made by some half a dozen hogs, which he almost solely kept for the purpose, in the course of 7 or 8 years, increase the hay crops of his fields from 15 tons up to an average of 100 tons.

Hemp is not cultivated in this county, nor, so far as I am aware, in the State. It has been frequently tried; but without success.

The growing of carrots, turnips, and beets has been on the increase, as a field crop, since the commencement of the ravages of the potato disease, previous to which but little attention was paid to them as articles of agriculture: I have, therefore, but little experience on which to found an opinion as to the best mode of growing. I have an instance in mind where 900 bushels of carrots were raised to the acre; I should think the average yield of carrots and beets might be put down at 600 bushels per acre each. English turnips are not planted to any extent as a field crop. Ruta-bagas, however, are beginning to be planted extensively. Their yield will go above that of carrots and beets; but I am unable to give any definite information on the subject.

I cannot, from personal experience, afford any information as to dairy husbandry, neither have I been able to obtain satisfactory information on the subject.

Your interrogations in regard to neat cattle are likewise almost equally out of my line of experience. In Cumberland County, we have only here and there a single specimen of full-blooded *Durham;* and as to Devon or Hereford, I know of none in the country. Still, there may be some of each. The cost of rearing 3 years' old neat kine of our mixed breed is from $18 to $20 per head. The value of good dairy-cows in spring and fall averages about $25.

I am unable to give correct information in regard to sheep or wool-growing.

The best breeds of hogs, I believe, are the Berkshire, and a species called here the "Newbury White," and a cross of the two. The Newbury White fatten with a small amount of food, but do not grow very large. Most farmers, I believe, prefer the cross breed. The only method of putting up pork, is by packing in barrels, in salt pickle, excepting that a few hams are well smoked; but as to the manner of curing these latter, I am not able to give information.

Potatoes.—Prior to the advent of the disease, the average yield might have been put down at 200 bushels per acre, and they would pay for raising at 16 cents per bushel; but recently they cannot be considered a paying crop, generally, at four times that price. The varieties least subject to the *disease*, are the Churchill, (so called here,) the peach-bloom, and early blue. It was for some time thought that seeding the potato would prevent its decay, but this hope has proved fallacious, and I know of no preventive of the potato-rot or disease. I have tried experiments; have tried with the strongly recommended *peat-charcoal*, pulverized, for instance, but without satisfactory results. I shall, however, give it a further trial. Potatoes grown on *new* ground, without manure, suffer least. The method universally practised here, is planting in hills, about one hill to the square yard, and hoeing after the plants are 3 or 4 inches high. Some farmers hoe twice. As to manuring, some farmers spread manure on the land, before breaking up; some manure in the hills; no general system. We raise no *sweet* potatoes.

Fruit.—The culture of fruit is receiving increased attention in this county, and, I am inclined to believe, in the greater portion of the State. The apple crop, I think, *can be* made the most profitable one the farmer raises; and some of our farmers have, I believe, discovered this to be the case. The varieties here esteemed best for keeping, are the Baldwins, the Greenings, and Russets. Those who have had experience on the subject, say that in feeding hogs and cattle, if you can sell your apples at 37½ cents per bushel, and buy corn at 66 or 70 cents, you will be the gainer.

Manures.—The use of lime is little understood with us, and little used. Plaster (ground) is used successfully in the interior, on almost all kinds of crops. Mussel-mud works better on grass land than with other products. Guano has not worked so well here as on older cultivated lands, where the ammoniacal properties have been more nearly extinguished. Pulverized peat-charcoal, (a new article,) I am disposed to believe will be found to be a most excellent fertilizer; especially, composted with other manures. It is a *perfect* deodorizer, rendering human excreta and the most offensive offal, entirely scentless, as I have ascertained from frequent experiments. Hence its discovery will prove of great utility to the world, in a sanitary point of view, as well as for its fertilising qualities; and I am happy to add that a large manufactory of the article is just going into operation in our vicinity.

Meteorology.—The enclosed printed slip will afford all the information I can give on this head. I procured it for publication at the *Observatory*, a tall, octagonal building in our city, where inbound vessels are signalized in the offing.

With regard to the quantity of *rain*, I think it cannot average far from 35 inches per annum. Dr. William Wood, of this city, keeps a rain-gauge, and has promised to favor me with more specific information; but thus far I have not been able to find him sufficiently at leisure to fulfil his promise. Professor Cleaveland, of Bowdoin College, Brunswick, I believe keeps a rain-gauge.

Very respectfully yours,

S. B. BECKETT.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Thermometrical Table for December, 1850.

Date.	Sunrise.	Noon.	Sunset.	Date.	Sunrise.	Noon.	Sunset.
Dec. 1	30°	43°	34°	Dec. 16	17°	37°	34°
2	26	32	31	17	32	32	28
3	28	30	34	18	11	20	14
4	32	36	38	19	0	10	10
5	38	39	33	20	14	22	20
6	28	36	31	21	4	20	18
7	20	20	22	22	14	18	14
8	22	24	18	23	14	16	8
9	18	31	26	24	0	7	4
10	24	34	24	25	2	15	16
11	10	24	22	26	10	26	28
12	26	34	22	27	15	32	26
13	8	14	10	28	28	31	24
14	4	21	19	29	4	11	14
15	18	32	26	30	2	12	14
				31	5*	10	18

REMARKS.—The average temperature for this month is 27°; 3° warmer than the average for the last 31 years, but colder than any December since 1846. The highest for the month was on the 1st at 43° above zero; the lowest was on the 31st, at 5° below zero.

* Below zero.

The following Table gives the Average Temperature for each Month of the Year, and the Highest and Lowest for each Month.

	Highest.	Lowest.	General Average.	Average for 30 years.
January	41°	1°*	28°	20°
February	45	14*	28	21
March	47	2	31½	31
April	71	17	37	38
May	64	26	47	44
June	89	43	62	60
July	84	50	67½	66
August	83	44	66	64
September	76	36	56	56
October	65	26	49	45
November	70	20	38	33
December	43	5*	27	24

* Below zero.

Observatory, January 1st, 1851.

The following table exhibits the average for the last 31 years, on the mean of observation, noted at sunrise, at noon, and at 8 o'clock, by the same thermometer, (Fahrenheit,) and continued in the same situation, and exposed to a true current of air; also, the highest and lowest degree indicated by the same thermometer, for each of the years, with the atmospheric temperature of Portland:—

Thermometrical Register, kept at the Portland Observatory.

Years.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Highest for Y'r.	Lowest for Y'r.	Average Temp.
1820	16°	24°	27°	40°	50°	62°	70°	65°	60°	46°	34°	19°	98°	15°	42¼°
1821	18	26	28	38	51	61	68	66	58	46	39	22	90	17	42¼
1822	15	21	34	39	53	62	66	64	60	47	37	23	88	15	43¼
1823	19	15	27	40	48	58	65	66	56	46	31	26	90	11	41¼
1824	22	22	32	41	49	58	65	63	59	46	32	23	82	18	43
1825	21	23	33	44	51	64	71	64	57	49	36	23	100	12	45
1826	22	23	32	39	56	62	68	66	59	49	36	23	97	24	46
1827	16	21	31	44	51	59	67	64	59	49	30	24	94	18	43
1828	28	31	32	39	51	63	68	66	60	46	38	30	90	5	45
1829	18	18	28	41	55	50	65	65	54	46	35	32	94	15	43
1830	17	19	31	45	51	59	67	65	56	48	43	30	96	18	44¼
1831	18	21	36	43	53	65	68	68	59	49	37	12	91	10	44
1832	21	20	30	37	48	57	62	63	56	48	36	23	93	15	42
1833	22	17	20	41	53	57	66	62	56	46	38	26	92	15	42
1834	16	27	31	41	46	58	68	64	59	44	35	20	90	18	41
1835	21	18	27	38	51	60	67	63	55	49	34	17	92	18	41½
1836	20	14	28	36	50	56	66	61	56	41	38	23	93	17	40
1837	14	19	26	38	46	58	63	61	54	43	34	24	84	11	40
1838	28	14	32	36	49	62	68	64	56	48	30	20	92	5	42
1839	20	22	30	41	49	56	65	64	57	48	34	28	86	10	43
1840	18	28	30	42	51	61	67	67	56	46	34	21	87	10	42¼
1841	25	25	28	37	48	61	65	66	60	42	35	27	92	2	43¼
1842	22	27	33	41	48	57	67	64	55	46	34	20	92	6	43
1843	26	15	34	38	50	59	63	66	58	45	32	25	86	6	41¾
1844	18	21	30	45	52	61	64	63	58	45	34	24	86	14	43¾
1845	21	21	30	39	51	62	65	66	55	47	40	20	88	5	43
1846	21	16	32	44	50	60	66	66	67	45	39	24	97	4	46
1847	20	20	27	37	49	59	69	64	58	44	38	29	94	8	42
1848	25	25	29	45	51	60	66	65	55	46	35	30	96	14	44½
1849	17	15	31	39	48	65	66	66	58	46	42	23	94	12	42
1850	23	28	30	37	47	52	67	66	56	49	38	27	89	14	44

Augusta, Kennebec County, Maine, December 20, 1850.

Sir:—The following observations on a few of the topics embraced in your late Agricultural Circular are respectfully submitted for your consideration.

Wheat.—Previous to 1839, spring was pretty generally cultivated in this section of the State, but since the depredations of the wheat-midge (grain-worm, or weevil, as it is called here) have become so extended, the crop has been very precarious, and generally unprofitable, until, at the present time, comparatively little of it is sown. Within three or four years, the attention of farmers has been directed to the cultivation of winter wheat, and the success that has attended those who have given it a fair trial, is truly encouraging. Winter wheat, here, is seldom or never injured by the midge when it is sown in proper season. J. D. Lang, Esq., of Vassalboro', several years ago, introduced a variety of winter wheat from Poland, which has, thus far, stood our winters well, and yielded a very satisfactory return. The Kloss blue-stem has been extensively introduced, principally by the exertions of Rev. William A. Drew, of Augusta, who, six years ago, sowed in his garden a few kernels of this variety, which were sent from the Patent Office, from the produce of which, it has been estimated, that at least 5000 bushels were sown the past autumn in the valley of the Kennebec. Several other varieties have been cultivated. Nearly every bushel of the last crop of winter wheat raised in this State was used for seed, and it sold readily at an average price of more than $2 per bushel. Moses Taber, of Vassalboro', who cultivates the Poland variety, harvested, the present year, 50 bushels from 1½ acres. Other varieties have done as well as this. Mr. Taber, in a communication in the Maine Farmer, remarks, that where the proper method of cultivation has been pursued, the average yield, in this vicinity, for five years past, has been about 20 bushels from 1 bushel of sowing, and in no instance has there been a failure, or less that 14 bushels to the acre.

The method of cultivation adopted by many, is as follows:—The ground is ploughed in July, or early in August, and afterwards it is top-dressed with compost or well-rotted manure, which is thoroughly incorporated with the soil. The most favorable time for sowing is from the 20th to the last of August. The seed is covered with a small horse-plough, and the ground is rolled. The amount of seed recommended for the acre varies considerably. Mr. Taber sows from a bushel to a bushel and a peck, while others consider it best to sow from 2 to 3 bushels to the acre.

Indian Corn is very generally cultivated in this portion of the State, and it is regarded by many as the surest crop raised. An eight-rowed, yellow variety is the most common for field culture, although the twelve-rowed is raised to some extent. The usual planting-time is from the middle of May to the 5th of June, and the common varieties of corn planted during this period usually ripen well in the month of September, and before the frosts injure it. Corn is generally more highly manured than any other field crop, and its cultivation is seldom attempted without manure. Most farmers spread a portion of their manure, and apply the remainder, which must be well rotted, in the hill. The cultivator, plough, or harrow is used among the corn at each leafing, and the corn is usually hoed twice. The stalks and husks are used for fodder for neat stock. The expense of raising an acre of corn may be estimated at about $15, exclusive of manure; the fodder being worth the expense of harvesting. Beans or pumpkins are usually raised with the corn. Mr. Guild, of Sidney, raised 190 bushels of ears, or 95 bushels of shelled corn, to the acre. Mr. Wadsworth, of Kennebec, raised 72 bushels of shelled corn to the acre; and Mr. Snell, of Winthrop, raised 71 bushels, at an estimated cost of $17. These are among the best crops which were raised in this vicinity in 1849. The crop of the present year, I think, is full equal to that of the last. The average price has been not far from 80 cents per bushel. The average yield, per acre, I think, may be set as high as 30 bushels.

Potatoes.—Twelve years ago, it was estimated that more than $250,000 were paid for potatoes sent out of this State by way of the Kennebec river alone. Now, there are not enough, which are free from disease, to supply the wants of the inhabitants. Potatoes are now being sold in this market at 60 cents per bushel; but the disease is so prevalent that traders and con-

sumers are unwilling to purchase more than enough to supply their immediate wants. Last year, the potatoes in this vicinity were less diseased than they had been for several years previous; but this year, on some farms with which we are acquainted, they have rotted worse than ever. The summer of 1849 was unusually dry, while the spring and summer of 1850 have been wet. This difference in the seasons may have had something to do with the rot.

Turnips, and other Root Crops.—Turnips, and the root crops which are generally cultivated, may be successfully raised here, and they are, to some extent; but too little reliance is placed upon them for the support of stock. The hay crop is the most valuable one in Maine, and upon it nearly all our farmers are greatly dependent. For five years past, we have had a succession of good hay seasons, and the farmers have not considered it necessary to raise many roots for their stock. So far as I have observed, it appears to me that the root crops do not now receive more attention, perhaps not so much, as they did 10 years ago, among farmers in this vicinity. I can hardly account for this neglect, more especially since the failure of the potato crop. The root crops most cultivated here are ruta-baga, turnips, and carrots. In 1849, Mr. Watson, of Fayette, raised 425 bushels of ruta-bagas from half an acre, at an expense of $25. The same year, Mr. Taber, of Vassalboro', raised 395 bushels from half an acre, at an estimated cost of not more than 4 cents per bushel.

Fruit Culture.—An increasing attention is being paid to the culture of fruit. Many new orchards are being set out, and the old ones are being renovated and ingrafted. Our apples, for keeping qualities, are unsurpassed; and there is usually a ready market for all the good fruit that is raised, at remunerating prices. No branch of business, it is thought, will yield a better or surer return, in this part of the State, than orcharding, or fruit-raising, when properly conducted. A gentleman who has had considerable experience in these matters, calculates that an orchard of 12 acres, well cared for, will yield a clear annual profit of $800. Prime apples have averaged at least $1 per barrel in our markets; and when we take into consideration our facilities for sending them abroad, and their keeping qualities, it seems highly probable that they will continue to be in demand at fair prices. For three seasons past, we have not had a full crop of apples, although some orchards and some particular varieties of ingrafted fruit have done very well.

Meteorology.—The following, which is copied from the thermometrical record, as kept at the Insane Hospital in Augusta, will exhibit the mean temperature of the thirteen months previous to November last, together with the quantity of rain which fell, and the number of wholly fair and stormy days in each month.

Month.	6 A.M.	2 P.M.	9 P.M.	Range.	Inches rain.	No. wholly fair days.	No. rainy or snowy.
October, 1849......	42.	51.	44.60	31 to 60	5.28	17	11
November, 1849...	39.18	47.26	41.26	31 to 59	3.49	9	10
December, 1849...	17.38	26.66	20.75	6 to 48	0.47	9	10
January, 1850.....	11.41	27.20	21.	3 to 48		14	9
February...........	19.75	32.75	25.25	12 to 47	3.30	14	4
March	28.16	35.22	28.47	4 to 58	2.18	18	6
April	32.67	46.83	37.	19 to 66	1.65	20	4
May	45.54	56.54	48.83	39 to 78	10.27	12	8
June..................	59.66	74.66	62.50	46 to 92	5.91	19	11
July	64.	74.85	67.60	52 to 96	3.98	16	11
August...............	60.12	78.45	64.	52 to 86	3.95	18	7
September..........	54.50	68.	58.67	42 to 82	3.70	16	7
October..............	45.20	57.40	48.90	31 to 68	5.26	11	7

REMARKS.—The autumn of 1849 was unusually mild. The rains of early autumn, succeeding the severe drought of summer, seemed to infuse new life into vegetation. Roses and dandelions were frequently seen in blossom in October, and ripe raspberries and strawberries were gathered in the open fields during the same month. There was hardly frost enough to check vegetation until the 1st of December. The coldest weather for 12 years past was in February, 1850, the mercury, at one time during the month, remaining below zero for more than 36 hours in succession. The last spring was wet and backward. An unusual number of freshets have occurred during the season on the Kennebec and its tributaries, which were attended with considerable loss of property. The freshet of May 25th was greater at Augusta than any which has occurred since 1832. The navigation of the Kennebec was closed about the 5th of December, 1849, and the ice left the river April 1st, 1850.

AGRICULTURE OF AROOSTOOK COUNTY.

Before closing this communication, I wish to call attention to the wild land in the north-eastern part of Maine, and say a few words relative to the soil, products, and agricultural prospects of this new country. I have travelled, during the past autumn, some 200 miles in the county of Aroostook, visiting the principal settlements, and noticing, so far as I had opportunity, the success that had attended the hardy and industrious pioneers. There are many thousands of acres of very good land in this county, which, by industry and skill, may be converted into beautiful and productive farms. From what I there saw, I feel confident in the opinion that the valley of the Aroostook is the best grain-growing district in New England. Much of the land lies in beautiful ridges or swells, not too abrupt for cultivation; it is well wooded, there is a great abundance of noble cedars for fencing and other purposes, and the soil is deep and fertile, and generally free from stones. There is an abundance of lime in almost every township, and an inexhaustible supply of gypsum may be conveniently obtained from New Brunswick.

The crops of the past season were excellent. I have never seen any better wheat, oats, buckwheat, millet, and potatoes, than I noticed on this journey; and the average yield of all these crops is much greater than in the older settled portions of the country. With the single exception of

Indian corn, (and I saw some good and well-ripened corn there,) the field crops of Aroostook county will not suffer by comparison with those of the most favoured portions of our county. The potatoes are of very superior quality, and, in many neighbourhoods, they appeared to be entirely free from disease.

Mr. J. W. Haines, who resides in township letter D, informed us that, for the last 3 years, his wheat averaged 25 bushels to the acre for the first crop after a burn, and 20 bushels for the second. This crop, last year, averaged upwards of 30 bushels to the acre. His oats yield 60 bushels to the acre.

The following statement of the amount of crops raised the present year by Mr. John F. Goss, of Presque Isle plantation, was communicated to me by a trader of that place, whose name I do not now recollect. He assured me that reliance might be placed upon the correctness of the statement. The prices affixed were what he regarded as the fair market value of the articles in that township. Mr. Goss, in raising these crops, had only the assistance of his son, 17 years of age, and a hired man 4 months.

25	tons of	hay, $8 per ton..	$200
700	bushels of	oats, 30c.	210
100	....	wheat, $1.25...	125
200	....	buckwheat, 50c..	100
40	....	millet, 75c...	30
25	....	rye, $1	25
30	....	corn, $1	30
300	bushels of	potatoes, 20c..	60
100	....	turnips, 20c..	20
300	....	carrots, 20c..	60
6	....	beans, $1	6
			$866

Hon. John Hodsdon, of Houlton, raised, in 1849, 54 bushels of spring wheat to the acre, and the present year his crop was at the rate of 45 bushels to the acre. These examples (and their number might be much enlarged from the materials before me) are very encouraging: they speak well for the agricultural resources of the county.

A gentleman, who has had much experience in draining new land in this part of the State, informs me that he hires the trees felled for 3 dollars per acre, and pays only 7 or 8 dollars an acre for draining. At this rate, the first crops not unfrequently yield a clear profit of $15 per acre, besides paying for draining the land.

It is true the county of Aroostook lies far to the north, being in latitude about 46°. The seasons are short, and there are probably some frosty locations; but we saw nothing while there to lead us to suppose that much of the land is so liable to frost as to render it unsafe for the principal crops in ordinary seasons. There was no frost to check vegetation until after the 25th of September. The snow generally falls early and covers the ground until spring. Besides the advantages of good sledding and sleighing, this prevents the ground from becoming much frozen; and, as soon as the snow melts away in the spring, farming operations may be commenced, and vegetation progresses rapidly. With their abundance of fuel and building materials, I am satisfied that the people of Aroostook suffer less from the cold than do those who live on the seaboard many degrees further south.

In accordance with an act passed at the last session of the Maine legislature, the land agent has caused to be surveyed 10 townships of the public lands. These are offered to citizens of the United States, for settlement, in lots not exceeding 200 acres for each individual, for 50 cents per acre, payable in 1, 2, and 3 years, in labor on the roads in the township where the lots purchased lie. No cash payments are required, and the labor is to be expended in opening highways for the benefit of the settlers. This very liberal arrangement offers an excellent opportunity for our industrious and enterprising fellow-citizens to procure for themselves tracts of land without money and almost without price, on which they may soon have comfortable homes, surrounded by smiling and fruitful fields, affording a support for all their reasonable wants. I have passed through 4 or 5 of the townships designated. The most of these have mills and schools already established; and I know of no better soil, or more pleasant natural scenery, than may be found in them.

Yours respectfully,

B. F. ROBBINS.

Windham, Connecticut, December, 1850.

Sir:—In compliance with a circular from your office, I submit a few remarks in relation to the interests of farming, and very briefly. The making and application of manure lies at the foundation of all agricultural operations. The best mode of making manure, as far as I can judge from experience, is, in summer, to yard your cattle on swamp muck, turf, or loam, in sufficient quantities to absorb all the urine, and composting the solid excrements every morning. Thus the loam absorbs the volatile portions of the manure, and retains it for the use of the farm. In winter, stables should be constructed large, admitting the animals to be turned in loose, and made without a plank floor, a quantity of straw put at the bottom, where the manure is allowed to accumulate until spring. Bed down your stock every day with a sufficient amount of straw to keep them clean. The solid excrements and litter will absorb and retain the urine; and, when the mass is removed in the spring, you may safely take the evidence of your sense of smell as an assurance that your manure is of the first quality. As this mass is removed, sprinkle it freely with gypsum, and plough under as soon as possible, and you will save the volatile portion from escaping. The hog-pen should be supplied with fresh loam every day, in quantities sufficient to neutralize and keep down all unpleasant odour. A hog weighing 300 lbs., where loam is added as above, will make 10 loads of excellent manure.

Potatoes.—This is an important crop in this part of the State, it being accessible to the large markets. The rot, during the past season, has been unprecedented: they have rotted on free sandy loams, where hitherto they have been exempt; but it may be remarked, that lots highly manured have suffered most. As far as my own experience goes, I have been most successful on new lands, or land which has not been manured with barn-yard manure, but which was of sufficient fertility to bring the crop to maturity. From this it would seem that a crop of clover, buckwheat, or some other grain crop, would be the best preparation (ploughed under) for a crop of potatoes. Fruit begins to attract the attention of the farming community in some degree, as it deserves, and, in particular, the different varieties of winter apples. The kind most esteemed here for its long keeping quality is the Roxbury Russet, which holds its flavor when other varieties become insipid. The Baldwin, Rhode Island Greening, Hubbartson, Nonesuch, Peck's Pleasant, &c. are among the leading varieties. The common error in regard to fruit trees is that they will grow anywhere and without culture. Having planted an orchard of 700 trees, within the last 4 years, I am satisfied that the growth of the trees depends mainly upon the culture given them. No orchard should be suffered to stand in a pasture or mowing lot, for the turf and grass will appropriate all the moisture in the shape of rain or dew, robbing the trees of all nourishment. The ground should be kept open, either by harrowing repeatedly or ploughing. If the latter, be very careful not to cut the roots, some of which are very near the surface. In planting, the trees should be set near the surface. The addition of a pail of water to the roots I consider to be useless, the soil, early in spring or late in fall, being sufficiently moist without such addition. I have set about 800 trees within the last 4 years, planting, both in the spring and fall, without using water, or losing any trees. I forbear to multiply topics of remark, but will take the liberty to add, in regard to the interest of the agricultural community, that what they want, to stimulate them to improvement, is a steady and reliable market for their produce. The farmer wants a home market, which can dispense with the jobber, the shipper, the wholesale dealer, &c., in order to enable him to make that improvement which the interest of our country demands.

Very respectfully,

WM. P. GATES.

Montgomery, Alabama, December 10th, 1850.

Sir:—The Agricultural Circular from the United States Patent Office, under date of 26th August, a copy of which has been sent to me, demands my attention, and I do not feel at liberty to withhold what knowledge I may possess on agricultural subjects from my fellow-citizens of a common country. Experience has taught me that it is good to stick close to old landmarks, and that nine-tenths of all experiments in our branch of industry better suits for periodicals and common talk than for profit. Improvements of real practical value are not of every-day occurrence, but are rare, and ought to be treasured up; and, if you find, in the remarks I shall make, any thing of value, I shall be glad to think I benefit my fellows. The kind of wheat best suited for this latitude is called "little white," and should be sown on the 1st of October. It does not produce largely to the acre, but makes fine flour if ground in June, so as to avoid the weevil. Rolling land, moderately rich, if a clay foundation, is best. Open prairie I do not find good for wheat. It is not a profitable crop here, on account of our frequent failures. A mixed kind of corn, of the flint and gourd-seed, is the best. We average about 30 bushels to the acre. Frequent ploughing is the best culture. The usual method of feeding corn is, unbroken and raw. I find boiling the best for hogs, and at least a fourth saving in it. The best method of manuring corn is to put the manure in the hill with the corn when you plant, and cover both together with the hoe or a good turning-plough.

We sow oats for pasture in the spring, commencing the first good weather in January. We cut some for summer feeding of horses, and the rest is fed off the land by the cattle and hogs, putting up barely enough for seeding. I have not yet seen any foreign grasses worth the culture. Indian corn, drilled thick, in rows about 3 or 4 feet apart, makes the best summer feed, or "soiling," of any thing I have ever seen.

Those who wish to raise stock on grass, better not come as low as latitude 32°, for cotton at 10 to 12½ cents per pound is much more profitable. All our planters who consult their best interests will attend to their dairies, neat cattle, sheep, hogs, and horses, for their own use, not for profit, but for saving. I am sure this section could produce sugar largely; but will not while cotton is our staple. From the tanyer, a tropical plant, to the salsify that flourishes at Green Bay, we can rear these and all intermediate sorts of vegetables: I may say as much of fruits. On the grape-culture and wine-making, I have about the same opinion that I have of grasses and cheese-making—they will not do for this country. The vicissitudes of our seasons are very great. I have known the mercury to fall 50° in 24 hours. The average of our winter weather is about 60° Fahrenheit—the range is 10° to 80°. In summer, the average is about 78°—the range from 10° to 100°. We are subject to long and heavy rains, lasting 6 weeks and more, and the same of dry weather. These great changes will account for the difficulty in raising exotic fruits or vegetables. And now let me make a closing remark. It is our best policy to improve our native plants and animals, and be less solicitous for the introduction of foreign ones; and, to succeed in this, we must be more industrious—directing and seeing to it ourselves, and not trusting to servants.

Very respectfully,

ELBERT A. HOLT.

Dennysville, Washington County, Maine, Dec. 16th, 1850.

Sir:—The following estimates, in answer to your agricultural circular, require an accompanying statement of the fact that they are given for the products of a district lying far north, the climate of which is less favorable to quantity than to quality of produce, and the soil not naturally fertile; that an average of the crops represent not so much the average productiveness of the soil as the quantity of manure and the labor and care in cultivation—the crops, except on new land, depending almost wholly on the manure; and that, as agriculture in this section of the country is, for the most part, made secondary in the pursuit to other employments, the crops are not so great, nor so economically obtained, as they would otherwise be. Therefore the estimates of actual cost here given are unduly large.

Corn.—The eight-rowed yellow Canada corn is preferred:—average produce per acre, about 35 bushels: is little raised, except in the interior, the cost being more nearly equal to its value than that of other crops raised.

Oats, Barley, Rye.—Average yield of oats, about 40 bushels per acre; of barley, 30 bushels; and of rye, 18 bushels. Quantity of seed used, 2½ bushels of oats or barley, or 1 of rye, per acre. Oats are least exhausting to the land, or, at least, they can be raised oftener on the same ground. The two-rowed barley is most in use.

Clover and Grasses.—Average quantity of hay, about 1 ton to the acre.

Red-clover, herds-grass, and brown-top are the kinds preferred. Quantity sown, 10 pounds of clover and ½ bushel of herds-grass, or herds-grass and brown-top to the acre, generally sown with grain. Meadows and pastures are usually renovated by ploughing up and manuring. Near the coast, sea-weed is used as a top-dressing with good effect. Hay can be grown for about $7 per ton.

Dairy Husbandry.—Average yearly yield of butter per cow is about 110 pounds. The climate being peculiarly favorable for butter-making, but little cheese is made—average price, 8 cents, and of butter, 20 cents per pound.

Neat Cattle.—The usual price at 3 years old is $20, and of good dairy-cows, in spring, $30; in fall, $16. Young cattle are housed for the first 3 years about 5 months in the year, and during the second and third winters, they are kept on the poorer hay. A given amount of food has been supposed to make less meat in a Durham or other large breed than in a native animal, they being smaller and hardier. Small cows are preferred as a general thing, and small oxen also, except where particular cases require heavy cattle. The native cattle will thrive where the Durhams will not—this opinion, I believe, is universally held. Whether native cattle will not gain proportionally to the amount of food consumed, when put upon the high keeping adapted to the Durham, has not been made a matter of accurate experiment to my knowledge.

Hogs are not generally raised but to consume the waste of the dairy and kitchen, and are fattened on potatoes and meal. It is thought by many that the Berkshire and some other celebrated breeds will grow faster than our native breeds, but make more lean meat—therefore are not much sought after.

Sheep and Wool.—Wool-growing for exportation is not considered profitable. The majority of small farmers keep about as many sheep as neat cattle, which goes to show that the relative profit of sheep and cows cannot be far from the proportionate expense of keeping; inasmuch as the cattle are not raised for beef, the oxen being kept only for their work. Small sheep are more profitable here than large ones. The finest Merinos are not raised here. The number of lambs annually reared will fully equal that of the ewes.

Root Crops.—Turnips, carrots, and beets. The cultivation of these as a field crop is increasing. Average crop of turnips (ruta baga) is about 700 bushels per acre.

Potatoes.—The Irish only are raised. Average crop, 250 bushels to the acre; cost to raise per bushel, 16 cents. The most prolific varieties raised here are the long red and the orange potato. The most profitable variety, and one which has nearly superseded all others, on account of the great price it bears in market, is the "white blue-nose." During the last 6 years, the potatoes have suffered so much from the rot, that their cultivation has lessened very much, and will soon be abandoned, unless a favorable change takes place.

Fruit Culture.—The culture of apples and plums is receiving increased attention.

Manures.—Lime has been tried at various times and in various places; but, so far as I can learn, without effect. Plaster is sometimes beneficial, though little used.

Very respectfully, your obedient servant,

THOMAS LINCOLN.

METEOROLOGY.

The subjoined notes have been taken from a register of the weather which has been kept for 35 years without interruption. This register has been kept at such a distance from the ocean as to be only slightly affected by it. The thermometer rises a little higher and falls a little lower in the interior than here. A record of two observations per day only has been kept; but it is believed to be essentially correct.

Mean Temperature.

Months.	1845.	1846.	1847.	1848.	1849.	1850.
January	21.5	18.	Omitted by accident.	25.2	14.4	22.5
February	21.	13.8		25.	18.7	25.7
March	28.1	31.5		31.5	30.7	27.2
April	39.5	44.1		39.2	40.	37.5
May	51.4	51.6		52.8	50.	50.
June	62.	62.		60.	62.7	62.
July	64.	67.		66.	67.2	66.5
August	65.8	64.8		66.4	65.4	63.5
September	51.7	58.6		56.2	57.1	58.5
October	47.6	44.5		46.8	47.	50.4
November	41.2	38.		35.2	41.5	37.8
December	18.6	23.7		28.2	22.5	
Highest range	June 9th. 90° above.	July 11th. 96°	July 10th. 93°	June 23d. 86°	July 18th. 98°	June 20th. 96°
Lowest range	Jan. 15th. 16° below.	Feb. 11th. 20°	Feb. 1st. 14°	Jan. 12th. 13°	Feb. 14th. 35°	Feb. 6th. 20°

Mean Temperature of each Year for Thirty-four Years.

Years.	Degrees.	Years.	Degrees.	Years.	Degrees.	Years.	Degrees.
1816	40.8	1825	43.8	1833	41.2	1842	42.5
1817	41.	1826	41.1	1834	41.5	1843	42.3
1818	41.6	1827	41.9	1835	41.	1844	42.2
1819	43.6	1828	44.8	1836	40.6	1845	42.6
1820	41.5	1829	42.1	1837	40.4	1846	43.1
1821	41.4	1830	43.9	1838	41.6	1847	43.7
1822	42.1	1831	43.7	1839	42.6	1848	44.5
1823	41.1	1832	40.7	1840	42.7	1849	42.7
1824	42.6			1841	43.1		

REMARK.—Mean temperature for thirty-four years, 42° 2'.

Depth of Rain and Snow for the Years 1849 and 1850.

Months.	1849.		1850.		Remarks.
	Rain.	Snow.	Rain.	Snow.	
January	½	5	2½	25½	The quantity of rain is not given as entirely accurate, but as a near approximation.
February	...	7	3	10	
March	2	3½	1½	19	
April	½	1½	3	18½	
May	1¼	...	6¼	...	These two were seasons of very unusual drought.
June	1¼	...	2¼	...	
July	1	...	1½	...	
August	2	...	4½	...	
September	4½	...	4½	...	
October	3½	...	5	...	
November	3	½	2	3	
December	1½	16	...	...	
Aggregate......	21½	33½	36½	71	Up to December.

THOMAS LINCOLN.

Byberry, Philadelphia County, 12 *mo.* 3*d*, 1850.

Sir:—I proceed to give answers to some of the questions in your circular, sent me, calling for agricultural statistics for the year 1850. But as there is a large and efficient agricultural society in the county, (which appears to me to be the most reliable source of information,) my answers will be quite brief.

The wheat crop promised very fair while growing, but was very much injured by (what is here termed) the grain worm, a small insect which feeds upon the grain while in a soft or milky state. The varieties of wheat that have matured early have, as yet, escaped the new enemy, consequently the Mediterranean wheat is now almost universally sown. The quantity of seed sown is 2 bushels per acre, and the average yield is about 20 bushels per acre. The time of seeding is from the middle of September to the 1st of October, and of harvesting, the early part of July.

The average price this year has been $1.10 per bushel.

Corn.—This is an important staple, a good crop of which has been harvested say from 50 to 80 bushels per acre. The most esteemed varieties are a mixture of the gourd-seed and Cooper corn, and the gourd-seed, the former of which I think preferable. Corn is generally planted on timothy-sod, ploughed in the spring about 6 inches deep, and planted about the 1st of May, and worked principally with the cultivator and hoe.

Broom corn is extensively cultivated, and is generally planted after Indian corn. The average produce is 800 brooms and 30 bushels of seed per acre, worth, in the rough, $40. The brooms are principally manufactured by the cultivators of the corn, during the winter season. It is considered a profitable crop in this vicinity.

Oats are generally sown after corn,—about 3 bushels of seed, with an average yield of 40 bushels per acre. They are generally sown as soon as possible after the frost leaves the ground in the spring. The price this year has been higher than usual, being from 40 to 45 cents per bushel.

Clover and timothy are both sown with wheat. The quantity of hay is from 1 to 2½ tons per acre. The price this season has been about $18 per ton.

The dairy business is not very extensively carried on, although most farmers make some butter to sell. The average yearly produce of butter from one cow is about 200 lbs., worth about 20 cents per pound. It is generally taken to market while fresh, in lumps of one pound each. The usual price of a good dairy-cow, 3 years old, is about $30.

Very few sheep are kept for their wool, as it is impossible to compete with the great West in this particular. The Southdown breed is considered the most valuable. There are but few flocks of this kind in the county. Large numbers of common sheep are purchased from droves, in the fall, and are fed during the winter season.

Hogs.—The best breeds are the Berkshire and Chester county. They are much raised for market, but are principally kept to consume the offal about the farm. They usually weigh, at one year old, if well fatted, about 300 lbs.

Of the turnip kind, the ruta baga, or Swedish turnip, is by far the most valuable, though very little cultivated. Flat turnips are frequently sown among corn at its last dressing, or after early potatoes, and often yield from 200 to 400 bushels to the acre. The ruta bagas are planted upon ridges three feet distant about the first of July, and worked with plough and hoe. If properly cultivated, they frequently yield 600 to 800 bushels per acre. They are the best food for cattle of all the root kind.

Potatoes have become such an uncertain crop that many farmers have relinquished their cultivation. They have been more affected with the rot the past season than in any former one, and no remedy has yet been discovered. The most common variety is the Mercer. It also finds the most ready sale in the market.

Manure.—The main source of manure is the barn-yard, where the straw, cornstalks, and refuse of all kind are collected. Many farmers feed cattle during the winter, which helps to increase their stock of manure. Compost is often made of swamp-muck, loam, &c., mixed with lime, plaster, salt, &c. Lime is used in considerable quantities, and is generally applied on wheat stubble at the rate of 40 bushels to the acre. Plaster, or gypsum, is universally sown on clover fields in the spring, when the grass is about 4 inches high, at the rate of one bushel per acre, with most astonishing effect. It is a valuable agent in absorbing manures in the form of gases, and is used very profusely about manure-heaps, cattle-yard, and stables. Its action is just the reverse of lime, the one retaining the gases and the other assisting them to pass off. Guano has been used in small quantities, and with good effect, but the high price prevents its coming into general use.

JAMES THORNTON, Jr.

Richmond, Massachusetts, January 24, 1851.

Sir:—Your circular was duly received, and should have been replied to long ago, but unavoidable circumstances prevented my giving that attention to the subjects upon which it invited remarks, seasonably to address you before the present time.

As the seasons have much to do with the failure or success of agricultural labors, I remark first, that the months of December, 1849, and January, 1850, were of a mild and even temperature; so much so that the branches and buds of the peach and apricot looked nearly as well when they were past as when they commenced. During these months the ground was nearly free from frost, and during the greater part of the time was protected by several inches of snow. March was a cool, windy month, and although it thawed much nearly every day, it froze hard nearly every night. The consequence was that the branches of peach-trees soon began to exhibit at their extremities indications of shrivelling, which continued through the month, so that one-half or three-fourths of the previous year's growth in many situations were destroyed. It is not to be wondered at that many of the buds on the live part of the branches should be destroyed too, under these circumstances. April and May were cool. There were many cloudy days in both months, and much storm, so that the labors of spring were retarded, and many thought if it continued so it would not be much of a corn year. June, and until the middle of July, were warmer and drier, so that by the first of July vegetation had advanced to about its usual position at that time. From the 15th of July forward, there was much rain, and some sweeping winds, whose effects upon the grain were any thing but favorable to rapid harvesting. Thus much for the season.

Wheat.—Winter wheat is rarely sown in this region. Spring wheat has gradually been receiving more attention, but the last crop was an unfortunate one—not indeed half a crop. That was probably owing in some measure to the fact that the season of its filling was very wet. It suffered some from the fly, but the straw was unusually bright, and the empty heads stood erect. Spring wheat is usually raised after some hard crop, for which the land is well matured. It has usually but one ploughing at the time of sowing, which varies in depth according to the notions of farmers and the character of the soil. The importance of deep ploughing is now better understood than formerly, and farmers are practising accordingly. We are not troubled with the Hessian-fly. The best remedy for the weevil that I know of is to sow gypsum over the wheat while it is in blossom. This insect does its work while the berry is soft, and the plaster sown at this time operates as a stimulant to hasten its maturity and carry it beyond the insect's reach.

Corn.—Almost every farmer has his favorite variety. The early Dutton is probably as productive as any, though some prefer an eight-rowed variety with large kernels, growing more loosely on the cob, for its still earlier maturity. The crop of the last season was good, though many circumstances in its growth were unfavorable. The yield, of course, was as various as the soils on which it grew or the skill of the cultivator. Forty bushels to the acre were, perhaps, a fair average last season. The cost of producing a bushel of corn depends upon circumstances. An intelligent and successful farmer who never fails with his crop, and whose average produce is seventy bushels per acre, told me that it did not cost him over six cents a bushel to raise his corn. He estimated that the tops and shucks would pay for the labor, and that the increased productiveness of the land would pay for the manure. But all farmers have not his favorable soil. The process of cultivation varies with different persons. We think a very successful one to be to plough sward-land deep, and lay the furrow flat but a few days before planting. We say lay a flat furrow that the sod may not interfere with cultivation, and we would have the ploughing recent that the grass may not start up between the furrows, and for the reason that the later a clayey soil is ploughed in the spring the more friable it will be, and of course better adapted to the growth of roots. The ground is then thoroughly harrowed and struck out in rows for planting. Manuring in the hill is an almost universal practice, and from six to eight loads are applied to the acre. Farmers who can afford it use rotted manure of the previous year. Ashes and plaster are used as top-dressings.

Oats, Barley, Rye, Buckwheat, Peas, and Beans.—Oats and buckwheat are more generally raised than the other crops. The former because they are subject to but few accidents, and the latter because it will admit of a later sowing than other crops. Oats are an exhausting crop, but they command a ready market at an average of forty cents for thirty pounds. Buckwheat is a cleansing crop. From its rapid growth and shady habits it chokes weeds, which often overrun old fields, and one or two crops usually eradicate them. It is well adapted to low moist lands where other ploughed crops would fail, and its yield on such land is usually greater than on dry soils, like rye, of which but little is raised, and barley, which is not a very common crop it is good to stock after.

Potatoes.—The early part of the season being cool and wet, the expectation of farmers was that this crop would succeed well; consequently, larger quantities were planted than usual. The crop, however, has never been so near a total failure before. The rot commenced in July, earlier by some days than ever known before. Every variety, the earliest and most hardy, suffered more or less from its ravages. Peach-blows and some of the coarser varieties suffered least—and those more delicate, the most. A great proportion of the fields yielded no more than the seed, and in many instances the failure was so great that whole fields were left undug. Where they escaped the rot, the quality was poor and probably unhealthy. In consequence of the oft-repeated failure of the potato crop, other root crops, such as turnips, carrots, and beets, are receiving more general attention. In the culture of turnips, a piece of sward-land is turned over very flat in July, over which a dressing of well-rotted manure is applied, after which the ground is thoroughly harrowed. The seed is sown broadcast from the 10th to the 20th of July, and covered with a light harrow or bush. Soon after the plant appears, a dressing of ashes is applied, and the labor is done till the time of digging. The yield varies from 100 to 200 bushels per acre, and the uniform price of good turnips in the fall is 25 cents per bushel. A variety known as the cabbage turnip is coming into repute. In form it resembles the ruta baga, and in taste it has somewhat the flavor of a cabbage. Its productiveness is great, and its keeping qualities are beyond a question, it being, if possible, more tender in March and April than in November, and retaining its good qualities until June. They are easily raised, and are worthy of commendation to general cultivation. It endures the winter with only a slight protection, and will grow where other root crops will succeed.

Yours truly,

W. BACON.

Kalamazoo, Michigan, December, 1850.

Sir:—In answer to your circular of 26th August, 1850, I would say:—

Wheat.—Soule, Blue-stem, White-flint, Red-chaff, and Bald are varieties most in use, and preferred in the order I have placed them. A new variety called white-chaff blue-stem is said to have come from your office, and is much esteemed where it is known; average yield the past season, 20 bushels per acre in this county; time of seeding, from 1st to 20th September, and of harvesting, about the middle of July. Quantity of seed, one bushel and a peck per acre: plough twice, about six inches deep. The yield per acre is on the decrease. Our rotation of crops, is, wheat after wheat, every other year. The average price for the past season, 65 cents per bushel.

Corn.—Yellow-dent, two-thirds, and white-dent, one-third; product, 40 bushels per acre; cost of raising, 6 to 10 cents per bushel; tillage done by small plough and cultivator, once each. Corn is mostly used on the cob in feeding.

Oats.—White oats preferred; yield on prairie land, 50 bushels, and on oak openings, about 20 bushels per acre; price, this season, 20 cents per bushel.

Barley not much raised.

Rye, Peas, and *Beans.*—Seldom seen in cultivation.

Clover.—The medium size preferred; produces one and a half tons per acre, with the use of plaster. Other grasses are not much known.

Dairy Husbandry.—No surplus in the county.

Cattle.—Value: calves 8 months old, \$3; yearlings, \$5; two years old, \$8, and three years old, \$10 to \$14. Good cows, \$12 to \$20. Sheep are profitable and largely on the increase, but I am not able to reply to other inquiries.

Hogs.—We have a variety of crosses of all kinds, and the quantity of pork is on the decrease in this county, and I may say in this part of the State.

Tobacco does well, and matures before frost affects it, though now raised in small quantities. I think that a few years hence it will be next to wheat among our surplus crops.

Hemp.—Not raised.

Turnips, Carrots, and *Beets.*—Not cultivated in the field.

Potatoes.—Many varieties; cultivation much neglected; product, 100 bushels per acre; cost of raising, about 5 cents per bushel. Sweet potatoes do well; raised only in small quantities, on account of scarcity of seed, for we do not know how to keep them.

Fruit does well, and is of excellent quality; a great deal of attention is being paid to all kinds—also to grapes. This section of the State is of recent settlement, and it is only within a few years that a supply of trees could be procured at a reasonable cost, and the orchards are yet quite young; but a few years will give a large surplus of excellent grafted fruit.

Manures are almost wholly neglected, except plaster, which is used some on corn, and much on clover, at the rate of 60 pounds per acre, every spring soon after snow is gone. This section of the State is increasing in the culture of corn, and rather on the decrease in other grains, owing, I think, to the yield being less, arising from the soil being run hard, and neglect to manure; but more attention is being paid to a regular system of farming, and of applying the means to keep the soil in good heart.

The circulation of agricultural papers is producing much good, by stimulating the farmers to greater efforts, and in applying the recent improvements and labor-saving machines to carry out the work. One hundred copies of your Patent Office Report, in this county, would do much good, and I have made quite an effort to get a copy, but without success as yet, through Lewis Cass of the Senate, and William Sprague of the House.

Yours, respectfully,

WM. L. BOOTH.

URTICA WHITLOWI.—SUBSTITUTE FOR HEMP.

Townsend, Huron County, Ohio, January 30th, 1850.

Sir:—In looking over the Patent Office Report for 1847, I find, on page 163, under the article *Hemp*, an extract from Niles's Register, vol. 8, page 188, referring to the plant *Urtica Whitlowi*, discovered by Charles Whitlow, of New York. The plant alluded to underwent, at the time of its discovery, a very critical examination as to its merits and adaptation to the purposes of hemp and flax, by the persons or committees appointed for the purpose, and whose investigations were in accordance with the remarks contained in the Register.

Now, perhaps, some light may be thrown on this subject. I was well acquainted with Mr. Whitlow, and have seen the plant, together with a piece of the cloth manufactured from it, which was remarkable for its white and silk-like appearance, and also for its uncommon strength. Mr. Whitlow informed me, that General Macon, then a Representative in Congress, remarked that "the discovery was worth the whole contents of the Patent Office;" but this of course will go for just what it is worth.

The reason why no further experiments were made to test its utility was this:—Mr. Whitlow was making preparations to fallow for following it up on an extensive scale, but unfortunately death put an end to any attempt on his part to bring about the anticipated result. The fact that Mr. W. was a foreigner, (a Scotchman by birth,) and that he had but few friends in this country, and none who felt an interest in the speculation, will account for the abandonment of the enterprise.

But I think a knowledge of the plant may be reclaimed, if it has been lost, which seems to be intimated in the Report. I will attempt to give a description of it; but it is merely from recollection, and may be erroneous. The plants have radical stems, or rather they may be said to be all radical, as there are many springing directly from the root. Smooth or glabrous, or dark purplish red, or dark mahogany color, the leaf lanceolate, serrate, acuminate, sessile; but I am not certain, nor am I botanist enough to determine whether it is necessary that a plant should be pubescent or hirsute in order to constitute it a species of *urtica*. Be this as it may, I think I should recognise the plant if I should see it again. Mr. Whitlow informed me that he discovered it a few miles from the city of New York, on some of the moist grounds so common on the island. I have troubled you with these remarks more for the purpose of eliciting further research than with any other design. Should I visit New York the present year, I intend to make inquiries in order to discover what was thought to be of such immense value. Should I succeed, information will be duly communicated. I will add that if you should think it necessary to ask any questions relative to the above facts, or that will throw any more light upon the subject, as far as I am able, they will be given with the greatest pleasure.

Respectfully, your obedient servant,

BENJAMIN BENSON.

Hon. T. EWBANK,
Commissioner of Patents.

Remarks.—A space is given to the above as a matter of some interest to the public.

The family of plants to which the *Urtica Yucca* referred to belongs, flourishes principally in the Southern States, where it has attracted some attention from its textile properties. Its fibre, however, is not so strong as that of hemp.—ED.

Searsmont, Waldo County, Maine, January 6th, 1851.

Sir:—In answer to your circular, I submit the following:—

Wheat.—The variety used here is the Red Sea, so called here, and is preferred because it is less liable to be troubled by weevil, and matures about 15 days earlier than any other, and produces more grain; but the flour is not so good as that of another variety, called bald wheat. Average product, about 12 bushels per acre. We plough twice, about 5 inches deep, and harrow well, then roll or brush the ground. The yield was better the past year than for 4 or 5 previous years. Rotation in crops is almost universal. We know of no remedy for the weevil. If the Hessian-fly troubles our wheat, we do not know it. The average price is about \$1.50 per bushel. We have not sowed any other than spring wheat till within the two past years, when a few farmers have tried the white winter wheat and have succeeded well.

Corn.—The most esteemed varieties are the 8 and 12-rowed yellow, which will mature in about 3½ months from the time of planting. Average product, about 30 bushels per acre. Cost of production, say 65 cents per bushel. The most approved method is to plant upon ground that had been broken up the year before, plough twice, and spread on all the manure we have to spare for that purpose, say about 25 cart-loads to the acre; furrow it out about 5 feet apart, and manure in the furrows with well-rotted manure, and drop the seed in drills about 8 inches apart, and cover with the hoe. When the corn comes up, sow on unleached ashes and hoe it sufficiently to keep down all weeds, but not hill it up nor use a plough between the rows. The cultivator is the best, and not so liable to cut the roots as the plough. The seed, before planting, should be soaked in a solution of saltpetre or copperas, and stir in some warm tar, then dry with lime. We think this will prevent the worms, crows, and birds from eating it. We believe at least 25 per cent. is gained by grinding corn, and 15 per cent. more by boiling the meal. The next inquiry I cannot answer to my own satisfaction, never having known of an experiment of the kind, but am well satisfied that the value of the manure produced would be much more than is generally supposed. The average crop of oats is about 25 bushels per acre, and of barley, about 15 bushels; rye, 25 bushels; peas, 10 bushels; and beans, about 15 bushels per acre. The quantity of seed used is as follows, viz.

oats, 8 bushels; barley, 2 bushels; rye, 1 bushel; peas, 2 bushels; and beans, 1 bushel per acre. I think peas are the least exhausting to the land.

Clover and Grasses.—Average crop, about 18 cwt. to the acre. The grass seeds preferred for laying down meadows are red-top, tall meadow, and herdsgrass.

Dairy Husbandry.—The average annual product of butter and cheese per cow is about $20. The price of butter is about 15 cents per pound, and of cheese 10 cents per pound. The cost of rearing neat cattle in this State is all that they will sell for, which is about $25 per head. The price of good cows is about $25 each in the spring and $18 in the fall. The Durham, Devon, or Hereford are a decided improvement upon our native stock for every purpose.

Sheep and Wool.—We think the rearing of sheep more profitable than that of any other stock at this time. Large sheep are supposed to be the most profitable both for fleece and mutton. The proportion of lambs reared to the ewes is about four-fifths.

Hogs.—The most approved breed is a cross of the Newbury white and Tuscarora. The usual, and probably the cheapest, way of raising and fattening pork in this State is to feed with boiled potatoes, turnips, and pumpkins, mixed with meal and milk, and, a short time before slaughtering, to give them (the hogs) boiled meal either of corn, oats, peas, or barley, or of meal from corn ground in the ear, which last we have used as a substitute for potatoes for the last 2 or 3 years. Our method is to first crack the ears in what is called a corn-cracker, and then grind in a grist-mill. We learn, from experiments made, that the nutriment contained in 30 lbs. of corn-cobs is equal to 28 lbs. of oats, which weigh 30 lbs. to the bushel. This we believe from experience. The miller takes 3 quarts per bushel for cracking and grinding, instead of 2 quarts for grinding the corn alone. For this extra quart we get our corn shelled, (or, rather, are spared the trouble of shelling,) and save the nutriment of the cob. This meal makes excellent feed for horses and cattle. I do not think it profitable here to make pork by feeding on clear corn.

Root Crops.—We consider the cultivation of the ruta baga as one of our most profitable crops, and which is rapidly increasing. The cultivation of the largest crop within my knowledge was as follows, viz.:—The land was planted the year before with potatoes; the next year the ground was ploughed, and 40 loads of manure and 10 loads of leached ashes were spread to the acre; then a deep furrow was ploughed, and two furrows turned into that, which would leave the land in ridges. Drop the seed on the ridge and rake in, then roll with a horse-roller. When the plants appear, we thin them out, that they may stand 3 inches apart all over the ridge. This mode of planting will make the rows about 2½ feet apart. I have known the produce of an acre thus served to exceed a thousand bushels. The usual crop is, I suppose, about 700 bushels. Carrots and beets are not thought to be profitable crops.

Potatoes.—We do not raise any sweet potatoes, and comparatively few of any kind for the last four or five years. We, probably, cultivate 20 different varieties of Irish potatoes, and consider the long red to be the most prolific, though not so good for the table as the white and blue varieties. We plant on new land, preparatory to other crops. I think the best method is to manure the land and plant them in drills about 3 inches apart. The large ones should be cut. We usually hoe but once. Average crop, about 150 bushels to the acre; but before the disease affected them, our average was about 400 bushels per acre. Then we could make it profitable to raise them for 10 cents per bushel.

Fruit Culture.—The cultivation of fruit is increasing in this State; especially the apple. I think, if the apple should continue to flourish as it has for the last 10 years, it will be a very profitable crop. Thirty-four years ago, I planted 500 apple-trees. None of them, nor of the second crop, and only two of the third crop, are now alive, but I have continued to replace them as they have died, and I now have a very flourishing orchard, which I find to be profitable. The price of apples here is from 33 cents to $1.25 per bushel. We do not think it profitable to feed apples to hogs. It has not been profitable, in this part of the State, to rear apple-trees, until within the past few years. Russets are the best kinds to keep for winter.

Manures.—The best plan for making manure, we think, is to cart into our hog and barn-yards swamp-muck in the spring, and in the fall draw it into the field for use the next spring, and, before using, mix with lime. To preserve manure from waste is to cover it up as soon as applied to the land. The above are correct answers to a part of your questions, according to the best of my judgment.

Very respectfully, yours, &c.

HARRY HAZELTINE.

Scottsville, Monroe County, N. Y., January 14th, 1851.

Sir:—The circular issued by you from the U. S. Patent Office has been received by me, and the following are answers to the questions therein contained, so far as I am practically acquainted with the subjects upon which information is desired. The town of Wheatland lies on the Genesee River, in the very heart of the great wheat-growing region of Western New York, and possesses, in its soil and climate, in an eminent degree, those essential characteristics which have rendered Genesee wheat and flour so famous.

Wheat is the great staple article of produce both of this and all the adjoining towns, to which all other branches of farming are subservient. The varieties chiefly cultivated here are the white flint and Soule. The white flint was introduced here about 25 years ago, and quickly superseded all the kinds then in use, and still continues to be a favorite with most farmers. Its characteristics are, singular hardiness of constitution, which renders it less liable to damage while growing than any other variety now grown, and less liable to be destroyed by the various depredatory insects which infest this crop. It is also an excellent wheat for flouring purposes, making a large quantity, per bushel, of the richest and whitest flour. The Soule is of more recent introduction, not having come into any considerable degree of favor till within the last five or six years. This variety of wheat, as generally raised, consists of two kinds, a white and a red chaff, very similar in their habits of growth, and appearance after being threshed; so much so, that it is very difficult to distinguish them. It is a less hardy wheat than the white flint, the growth of straw is much less, and it is about a week earlier in ripening. The probability is, that it will not make so much flour per bushel as the flint, but it is of excellent quality. The Mediterranean variety has been introduced here from Maryland and Pennsylvania lately.

It is a coarse, hardy wheat, but not fit to be raised on the fine wheat-growing lands of Western New York. It will not make superfine Genesee flour, and its introduction here would destroy the high character that flour has hitherto sustained. The average product per acre for this town, according to the last State census, was 22 bushels, and was the highest in the State. The yield has undoubtedly increased since that time, and will now probably range as high as 25 bushels. Many farmers get better averages than that. Our seeding-time is from the 10th to the 25th of September, and our harvest from the 15th to the 25th of July. The general practice is to sow good clean seed, without any preparation, at the rate of from 5 pecks to 2 bushels per acre. Our usual manner of cultivation is to sow on summer fallow, ploughed two or three times; though it is becoming common to plough but once, the after-cultivation being done with the harrow and cultivator. The depth of ploughing varies from 5 to 10 inches. Our yield per acre has undoubtedly been increasing, ever since the settlement of the town. The most common rotation is to sow wheat every other year upon a clover lea, pasturing or mowing one year out of the three. As to remedies for the Hessian-fly and weevil, I know of none. The fly, of itself alone, in my opinion, is very rarely the cause of the destruction of a crop of wheat, but, when combined with other causes, it often finishes what they have begun. The average price of wheat at our mill in Scottsville, has been $1.03 per bushel.

Corn is cultivated here to a considerable extent, and its cultivation is on the increase. The most esteemed varieties are the Dutton, eight-rowed yellow, red blaze, and white flint. The average product per acre varies very much, some farmers getting 50 bushels, and others only 25 bushels per acre. It would be, however, not far from 30 bushels. The lowest cost to produce an acre is not less than $12, including interest of land and taxes, which, at an average of 30 bushels per acre, would be 40 cents per bushel. Thirty bushels of corn at 50 cents would be $15, stalks worth $3, which would leave a net profit of $6 per acre. My crop has averaged, for the last 8 years, 45 bushels per acre, including 1 year of almost total failure from severe drought. My practice is to raise corn on a clover lea manured with about 16 loads of good barnyard manure to the acre, ploughed in deep. I plant in hills, about 3 feet apart each way, about the 20th of May; the after culture is almost wholly done with the plough and cultivator. The whole expense would not exceed $14 per acre; so my net profit would be about $12 per acre. The best mode of feeding corn to hogs is, in estimation, to give it to them raw and unground, and for cattle raw, but ground. I do not think the increased value of the feed will pay for the labor and expense of grinding and cooking. As to the increased quantity of grain per acre that the manure of 10 bushels of corn consumed by hogs would make, I cannot say; but think it might be from 2 to 3 bushels.

Oats are only raised here in small quantities; many farmers not producing any. The average product per acre would not exceed 30 bushels.

Barley.—The cultivation of this grain is increasing. Average per acre, about 25 bushels.

Rye is not raised here at all.

Peas and *Beans* are raised only in small quantities; they do not average more than 20 bushels per acre.

Clover is chiefly cultivated in this town for pasturage and hay. Average per acre, about 2 tons. Gypsum is the only fertilizer used here for pasture and meadow. Clover and timothy are the only grasses used here for seeding meadows; quantity of seed sown per acre is from 6 to 8 lbs. of clover, and from 6 to 8 quarts of timothy. The cost of growing hay per ton will not exceed $3. The price it now brings is $12 per ton.

Dairy business is not pursued here as a means of profit; farmers generally producing merely enough of the dairy products for family use.

Neat Cattle are raised by most farmers to some extent, and are mostly fed on rough fodder, such as straw, corn-stalks, &c. The cost of raising till 3 years old in this way is but trifling, as they consume but little which would be valuable for other purposes; and the manure they make is worth quite a portion of the cost of their keeping. Average price at that age, from $25 to $30. A given amount of feed will produce more meat in a Durham or Devon than in a native animal. I am not acquainted with the Herefords.

Sheep husbandry is profitable here. The cost of growing coarse wool is greater than that of fine. Some of the coarse breeds were introduced here some years ago; but, after trial, they were universally abandoned. Many good flocks of fine-woolled sheep will average from 4 to 5 pounds per head. The cost of production is small; as, like cattle, they are fed on what would be otherwise wasted. The lambs, from a well-managed flock of sheep, will pay nearly all expenses. The Merino sheep are the most profitable, both for mutton and wool. The proportion of lambs annually reared to the ewes will not exceed one-half.

Hogs are raised by every farmer; but pork, as an article for market, will seldom pay. The best breeds are grade animals, produced by a cross of the China with some of our larger breeds, such as the Leicester and Byfield. One hundred pounds of corn fed to good hogs will produce 10 pounds of meat. We put down our pork in salt, using nothing else.

It is gratifying to be able to say that a better system of farming is taking the place of the old, careless, and slovenly method heretofore practised in Western New York. This is to be attributed chiefly to the liberal prices obtained for our produce for the last few years, thereby producing in the farmer a stimulus to exertion, which he does not often feel when prices are so low as barely to pay the cost of production. Give us a market and remunerating prices, and we can raise an amount of produce that will astonish the world.

I am, sir, yours very respectfully,

SAMUEL WOOD

THE TEASEL, AND ITS CULTIVATION.

Paris Hill, Oneida County, N. Y., December 26th, 1850.

THOMAS EWBANK, Esq.:

Dear Sir:—I had designed writing an extended communication, including a reply to several interrogatories contained in your Agricultural Circular, bearing date the 26th August last, a copy of which was forwarded to me: on reflection, however, I have concluded to confine my remarks to one subject, having reference to a branch of agriculture pursued to some extent in this State, as well as in a portion of New England, and which is not included in your list of inquiries. I refer now to the cultivation of *teasels*—an article of agricultural production of some importance, not embraced in the census returns, and of which, consequently, no reliable statistics can be obtained as to the quantity or value of the annual product. My present purpose is principally to call the attention of others to the subject, hoping some one more competent will be disposed hereafter to do it better justice.

The teasel is a biennial plant, found in the north temperate zone between the latitudes of 40° and 44° in the United States, and cultivated also in England, France, and Germany. The bulb or ball of the plant is the only part of it which is of any value, and that is highly useful, and, indeed, necessary in the manufacture of cloths and other woollen goods, being found far superior to any thing else for the purpose of raising and laying the nap, thereby enabling the manufacturer to give his goods a more perfect finish. In fact, although a great variety of experiments have been tried with other materials as substitutes, nothing has as yet been discovered that would answer the purpose equally as well; the flexible hooks of the teasel being admirably adapted to the purpose, and, with proper precaution, not injuring the texture of the goods upon which they are used.

There are several varieties of the teasel. Some of these grow spontaneously in the Northern States in old meadows, and by the roadside, and, in soils favorable to their growth, become sometimes difficult to eradicate, and are reckoned among the noxious plants. They attain a height of from 4 to 6 feet, and are in full bloom in this latitude in the latter part of August, bearing a purplish blossom. The head, being furnished with long, flexible, but perfectly straight prongs or spires, has never yet been found of value for any purpose. These varieties are therefore never cultivated.

The cultivated varieties, although distinct from each other, yet being similar in their general character, and requiring the same mode of cultivation, it is not necessary in this article to speak of them otherwise than generally. At what time the cultivation of the teasel commenced, or when and by whom it was introduced into the United States, I have not at hand the means of ascertaining. In the infancy of our woollen manufactures, however, it was cultivated only in gardens and small plantations, and that to a very limited extent. The cultivation, however, increased with the demand caused by the increase of our manufactures; but it was not until the year 1820 that it was known as an article of field culture among agriculturists. The supply being seldom equal to the demand, till within some 12 or 15 years, the deficiency was made up by importations from Europe: with the increase of the manufacture of woollen goods, however, there has been an increased cultivation of the teasel; and as the nature and wants of the plant have been more closely studied, and its cultivation better understood, there has been a corresponding decrease in the price, without materially diminishing the profits of the producer. The first grown in this country were sold, it is believed, as high as $10 per thousand; and as late as 1835, teasels were imported at a cost of from $4 to $5 per thousand. Since that time, there has been a gradual reduction of the price in market, until within the last 5 years, within which time it is believed they have reached their minimum price, being sold as low as 75 cents to $1 per thousand.

As no census has been taken of the quantity annually produced at the present time, no correct estimate can be made: any attempt at such an estimate must necessarily be only an approximation. It is to be hoped that hereafter teasels will be included with the other agricultural products in relation to which the various marshals and their assistants will be required to make inquiries, and report in their census returns, both as to the product and value. The benefits resulting from such a course can be properly appreciated by those who are fully aware of the importance of the article to the manufacturers, and as a substitute for which, no other production, either of nature or of the ingenuity of man, has yet been found *suitable*.

With these preliminary remarks, we will now proceed to give some directions (founded on experience) of the proper mode of cultivation of the teasel. And first, of the *soil*:—The teasel, being taprooted, requires a deep, rich soil. A strong, gravelly loam, if of sufficient depth, is found generally preferable—the teasels grown on such a soil being more durable in use, and the roots of the plant being less liable to be thrown out during the severe frosts of winter, which on many soils is frequently the cause of great loss. As a preventive of this evil, sward-land, ploughed deep, and well turned under, in April, is to be preferred. A subsoil plough will be found highly beneficial in giving a good depth, and preparing the soil in such manner as to enable the main root of the plant to penetrate freely, and to a sufficient depth to insure a vigorous growth. After ploughing, the surface should be thoroughly pulverized, and made as smooth and even as possible, by harrowing, or other suitable means. This will not only be of great benefit to the young plants, but will facilitate the after culture.

Planting.—This should be done in the month of April, or as nearly as possible in May; it being highly important that the plant should be well rooted before the coming on of the hot, dry season of midsummer. Another advantage in early planting is to enable the plant to attain sufficient maturity by the first season to insure its forming the stalk the second year, which small, late plants are likely to fail in doing, and, consequently, are a loss. The ground being properly marked out in rows, one way only, the seed may be sown in drills, by hand, or, more conveniently, with a drill-harrow adapted to the purpose, the drills being from 3 to 3½ feet apart. The latter distance is perhaps more suitable when the land can be afforded for the purpose, as giving a more convenient distance for working between the rows, especially in harvesting the crop. The seed should be but slightly covered. This may be done with a hand-rake, or more expeditiously with a light wooden drag, drawn by a horse, and following directly on the rows. Six quarts of seed, if properly distributed, is a sufficient quantity for an acre of ground.

Hoeing.—The seed being sown, no further attention is requisite till the plants are of sufficient size to admit of weeding, which will generally be between the 1st and middle of June, if the seed was put in early. As the plant in its earliest stages is a very slow grower, it will be necessary, unless the ground is quite clean, that the weeding should be done while the plants are yet quite small; otherwise there will be danger that the weeds will overtop them, and the after culture be likewise greatly increased. Usually, the hoe and the fingers are the only implements that can be used to advantage at this stage; the most important part of the work consisting in cutting or pulling up all the weeds in or adjacent to the row, and dressing down the plants into as narrow a row as is practicable, and thinning in the row to a distance of from 4 to 6 inches. Little or no earth should be thrown around the plants at the time of weeding.

The *hoeing* should principally be done about a month after the weeding—say from the 1st to the 10th of July. The plants by this time will have attained sufficient size to allow a cultivator to be used between the rows, and a portion of the earth may be drawn lightly around the plants with a hoe, thinning them at the same time, as they may require, to a distance of from 6 to 8 inches in the row. After this, if the work has been faithfully performed, but little further attention will be requisite the first season, other than to keep the ground mellow, by passing through between the rows occasionally with the horse-hoe or cultivator. The ground, however, should be kept perfectly clean and free from grass or weeds, and if this cannot be done without, another hoeing will be necessary, say in August.

As early in the spring of the second season as is convenient, or as soon as the ground is sufficiently dry to work properly, go through the piece again with the cultivator. Follow with the hoe, and give the plants another light dressing of earth. If the ground has been well tilled, as the plants will now commence forming the stalk, and will soon thoroughly shade the ground, but little further cultivation will be required. Should any weeds or thistles show themselves, remove them with a hoe or with the hand, but avoid working the ground to any depth, as, by disturbing the numerous fibrous roots now shooting out near the surface in every direction, the plants may be seriously injured.

Soon after vegetation has started freely in the spring, the stalk of the plant manifests itself, shooting upward, and attaining nearly its full height about the first of July, by which time the burs or balls of the earliest teasels will be visible. The plants attain to various heights, according as circumstances are more or less favorable to their growth, say from 4 to 8 or 9 feet, with several branches shooting out from the sides, and these again have their side branches, on the ends of all which, as well as on the rest of the main stock, the young teasels are formed.

These commence blossoming about the middle of July, and usually by the 1st of August the earliest are sufficiently ripe for cutting. This should be done as soon as the blossom is entirely off the bur or ball, and before the seed is fully matured; otherwise, the teasel becomes discolored and brittle, and materially diminishes in its value. As the teasels are formed at different stages, and ripen successively, at different times, they are, consequently, not all fit for cutting at the same time. It therefore usually becomes necessary to go through the field two or three times, to collect them all at the proper age, to prevent any being injured by remaining on the stem while others are being matured.

The process of cutting may be performed most conveniently with a large knife, held by the workman in one hand, while he seizes the teasel with the other, and, by a slight, quick, downward stroke with the knife, separates the stalk from 3 to 6 inches below the teasel, which is thrown into a basket ready to receive it. After a little experience, the workman will cut and retain 3 or 4 teasels in the hand before emptying it in the basket. In the height of the season, an experienced workman will cut from 20,000 to 25,000 in a day, if the crop is a good one.

The gathering of the teasels will generally be completed in the month of August. While in the green state, as taken from the field, they should be carefully spread, about 6 inches in depth, in some open, airy place, under cover, on open floors, permitting a free circulation of air. Should the weather be very fair or dry, but little attention will be necessary; otherwise, they should be frequently turned, to prevent heating and mouldiness. When sufficiently dried, which may be known by the seed separating freely

in moving, they may be stored away, or packed in boxes for market. As to the yield that may be obtained per acre, it is so various in different localities, and so likely to be affected by a great variety of circumstances, that no certain average can be named, it varying from 50,000 to 200,000 per acre, when the plants all come to maturity, and, in some instances, exceeding the latter quantity.

The common white grub is a great enemy to the teasel, feeding on the root of the young plant to such an extent, in some instances, as to destroy a whole crop that promised fair when the plants first made their appearance, and even for some weeks after. The winter also makes great destruction in some years, the plants being partially or entirely killed by an open winter, accompanied by severe frost. This may also occur in consequence of a sudden change from moderate to severe weather in the spring, after the plants have commenced growing, which they will do as soon as the frost is entirely out of the ground. The young and tender leaves becoming then expanded and open in the centre or crown of the plant, are far less able to withstand a severe frost than in mid-winter. In exposed situations, the effects of frosts may be guarded against, in some measure, by the erection of temporary cross-fences of rails, boards, or other convenient materials, which will serve to keep a covering of snow on the plants, and protect them, in some degree, from the bleak winds and severe frosts of winter and early spring, and prevent, perhaps, the loss of a valuable crop. These cross-fences should be removed as soon as spring fairly opens. A failure of the crop sometimes occurs after the teasel are fully formed, if at that time there is a long continuance of warm wet weather, which may cause a rust to strike them, which is very likely to injure materially, if it does not wholly destroy the crop. This was peculiarly the case, in some sections, during the last season, many pieces having been entirely ruined by the rust. Other evils sometimes befall the crop, and blast the expectations of the cultivator, but it is not necessary, at this time, to specify them.

I have thus, in the scattering fragments of time hastily snatched between the performance of other and more pressing duties, endeavored to give a brief outline of the most prominent and essential features in the mode of cultivation of the teasel. Although much more might be written, still, in this, as in all other matters appertaining to agriculture, very much that is essential can only be learned by experience.

Hoping that what I have thus hastily written will be acceptable to you, and also prove the means of calling the attention of others to the subject, I remain,

Very respectfully yours,

LORENZO ROUSE.

Union, Franklin County, Missouri, December 17th, 1850.

Sir:—Your circular, dated August 26th, 1850, has just come under my observation, printed in the "Valley Farmer," at St. Louis, Missouri, a journal devoted to agriculture.

Desiring to furnish information on the important subject of agriculture, and the products of the soil, that may be useful to the country, I have taken the familiar branch of raising Irish potatoes. The little time left me for investigation and inquiry (before the 1st of January) will compel me to give only my own experience, while I would have been pleased to add that of my neighbors also.

Irish Potatoes.—This is a good crop for the Western States, and, in first-rate ground, will yield 200 bushels per acre, and, in some instances, it has been known to exceed that amount. The best mode of raising them is to drill them in deep furrows, and cover them over first with rotten straw, and then throw on the dirt. The furrows should be 3 feet apart, so as to admit a plough, the use of which will be necessary once or twice to kill the weeds. In no case would I cut the potato before planting, and, instead of planting the small ones, (which are generally reserved for seed,) I would plant the largest size. Large potatoes yield large potatoes, while small potatoes, when planted, yield small potatoes. This is true, and let him who doubts it give a fair trial to the sizes, and the difference will be seen. The common white potato is the best for family use, but not so prolific as the large red-skin potato. This last quality is fine for fattening hogs and cattle, and, when boiled, will be eaten by them with an almost ravenous appetite. I consider potatoes the cheapest crop that can be raised, and, at the same time, one that repays the farmer better than almost any other.

Irish potatoes are now worth 75 cents a bushel in this county, and are never sold for less than 25 cents. So, you see that an acre, yielding 150 bushels of potatoes, brings the farmer $37.50, at 25 cents per bushel, the lowest price, and, at present rates, would bring $112.50—a nice little sum from one acre of ground, that did not require more than two days' tilling.

I will try and obtain statistics of different crops, the average yield, &c., for next Report, and also give such information on some of the various branches of agriculture as I may be able to collect.

Very respectfully, your ob't servant,

R. B. JEFFRESS.

Hickory Creek, Louisa County, Virginia.

Sir:—In reply to your circular addressed to me, I will state that it is not to be expected that one individual can profitably answer your numerous queries.

Passing by the previous questions, I will make some remarks on the tobacco crop. The average yield, in this part of the country, is, I think, about 1000 pounds per acre, on good land, though more can be made on very rich or highly manured lands. I have made on some land as much as 2000 pounds per acre. The cost of production varies according to circumstances: the cost does not exceed $30 per acre. It is highly important that the plants should be set out early, and, consequently, great care and attention should be paid in raising early plants. I am satisfied, from experiments made by myself and others, that the application of Peruvian guano will greatly facilitate the early and rapid growth of the young plants. I have applied it, both with and without burning the land, and its effects were very beneficial in both instances.

Being encouraged by its success in growing wheat and other crops, I applied it broadcast on tobacco land, not using over 200 pounds per acre, and, on a portion of the crop, not over 100 pounds per acre. The effect was decided and highly favorable. The tobacco grew faster, and ripened earlier than it did on better land adjoining, to which no guano had been applied, and the amount of the crop was unquestionably greatly increased.

I have pursued a plan in regard to topping tobacco, which I believe few planters in Virginia follow. I do not take off any of the bottom or ground leaves. I direct that the plant shall not be topped until it runs up high, nearly ready to blossom, then leaving the leaves on at the bottom for about four or five inches, the ordinary height of priming, I leave about eight leaves above, more or less, according to the fertility of the soil, the season, time of year, &c. The advantages of this plan are, that the tobacco is made of finer texture, that there are very few *suckers*, and that, after four or five priming leaves are stripped off for lugs, and curing what I have left, there is enough to make two small bundles of tobacco, instead of one, and that, too, almost entirely free of sand or *dirt*. From experiments I have made in priming and not priming, I am fully satisfied that I make *more* tobacco from the same land, and get a better price for it. A few of my neighbors have been convinced of it, and are now adopting the same course of priming.

The best crops to grow in rotation, to maintain the fertility of tobacco land, are wheat and clover, tobacco one year, wheat one year, and clover two years, then tobacco again.

Fruit culture is receiving increased attention. Apples, the most certain and durable kind of fruit, can be and are now by some raised with profit. Good apples are decidedly better food than potatoes for hogs and cattle.

The best variety for winter use known in this part of the country is called Milam; its color is brownish red, mellows early in the fall, is of delicious flavor, and, with ordinary care, will keep until June.

The Catawba and other grapes are extensively cultivated for the table, and but little attention is paid to wine-making in these temperance days, when more money can be made by other pursuits.

Being pressed for time, I have hastily sketched off the above crude remarks, which are at your service.

I am, very respectfully, yours,

WILLIAM A. GILLESPIE.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Tishomingo County, Mississippi, December 21*st*, 1850.

Sir:—The Agricultural Circular of the 26th August was handed to me a few days since for perusal, and I have concluded to write a few lines in answer to some of the questions therein propounded—not that I expect to add any thing of particular interest to the common stock, but, by writing something, I may probably receive the Patent Office Report, which will enable me to profit by the experience of more skilful planters embodied therein.

Wheat.—Varieties in use here are generally Orleans and red spring; I prefer the former; it is usually sown on corn or cotton land, after the crop is gathered; three-quarters to one bushel of seed per acre, put in with small ploughs, running two or three inches deep, and seldom harrowed or brushed—consequently the ground is very uneven, and a small crop the result, say from 5 to 7 bushels per acre. There is no preparation of seed, except being soaked in a strong solution of blue vitriol, for from 12 to 24 hours previous to sowing, to prevent smut, which is effectually done by this process. It is generally sown from the 20th October until the 15th November, and harvested between the 25th of May and 5th of June: it is sown thus late to prevent the ravages of the Hessian-fly; but I believe that wheat might be put in in August or September, and would furnish a good winter pasture for sheep or calves; by being grazed close in the winter, the fly is destroyed and the wheat not materially injured. I have tried this several times on a small scale, with very good success. For several years, I have sown wheat on oat-stubble, in the following manner:—Break the ground with a heavy, two-horse plough, running from 4 to 6 inches deep; (if this was followed by a sub-soil plough, the yield would be greatly increased;) I then run a heavy iron-toothed harrow lengthwise the furrow; I then put about one bushel of seed per acre, plough with a small plough the same way, and finish by harrowing or rolling; a light top-dressing of rotten straw long manure, or even leaves, will increase the yield considerably. Without this dressing I have usually made from 10 to 15 bushels per acre; the average price here per bushel the present year is $1. To prevent weevils, it is only necessary to get the wheat out as early as possible, have it well sun-dried and suffered to cool thoroughly, then put it in tight casks or boxes, in a cool place, (a good cellar is the best place,) and no weevil will be seen for 12 months.

After wheat, I plant corn, by first breaking and pulverizing the ground well; lay off rows 4½ feet apart, with a scooter or bull-tongue plough, throw two furrows to it with a turn plough, check off same distance, drop from 4 to 6 grains of large white corn to the hill, cover with a hoe, and then all the manure I can rake and scrape is put on the hill, at the rate of a shovel-full to each hill. The corn when half leg high is thinned to two stalks. I plough twice or three times, and finish the cultivation with a light harrow or cultivator. The second ploughing I plant the red-ripper or tory pea, in the step, from 10 to 20 in a place: they are a fine bearer, and a good renovator. I gather from 30 to 50 bushels of corn per acre, (but this is a poor common yield.) After the corn is gathered, I turn in my hogs, and very little corn will make them good pork. This crop is followed by oats, with a yield of from 15 to 25 bushels per acre, worth from 33 to 40 cents per bushel. I have followed this system of tillage for 10 years, and am confident my land has improved in fertility. One hundred pounds of corn, fed dry to hogs, will produce 20 to 25 pounds of pork; if boiled or soaked until soft, from 30 to 35 pounds; the manure from any given quantity of corn fed to hogs, if carefully saved, and skilfully applied to corn when planted, will increase the product from 30 to 40 per cent. of the amount thus fed away.

Sweet potatoes are a valuable crop for the table, for milch-cows, or hogs, fed either boiled or raw. The white or red yam are the kind generally cultivated here. These are generally bedded out, say from the 15th of March to the 1st of April, to secure a good and early crop of slips or plants. Dig a ditch 3 feet wide, 18 inches deep, and, for every bushel of seed, 3 feet long; fill this ditch to within 4 or 5 inches of the top, with fresh stable manure; then throw on sufficient of earth to raise it a little above the level of the surrounding ground, so as to prevent excess of water standing on the bed; on this, lay the potatoes so as not to touch each other; then cover with earth to the depth of 2 or 3 inches, as weeds and grass will first make their appearance, this depth will allow you to scrape off with a hoe or rake the first crop of weeds, leaving the covering 1½ to 2 inches thick; the ground intended to be planted should be well broken and pulverized; when the slips begin to come up, lay off rows 3 feet wide, and bed up with a good turn-plough, check the same distance the other way, and make hills, leaving the top flat, so as to catch the rain; when the slips are 3 or 4 inches high, they will do to plant. Should there not come a season to plant when the bed is well covered with plants, draw them in the evening, dip the roots in water, plant 1 in each hill, leaving 2 or 3 leaves above the ground, press the dirt close round them, pour on from ¼ to ½ pint of water to each plant, repeat next evening, and they will generally live. Four bushels of seed bedded out will be sufficient to plant one acre; in good time, after culture; as soon as the vines begin to run, scrape down with hoes; weed when they have reached 18 inches or 2 feet in length, (some will be longer, of course,) cut off the vines to within 6 or 8 inches of the root, plough both ways with a scooter-plough, running pretty deep into the hills, so as to loosen them up; hill up with a hoe, being careful to cover no part of the running vine. By cutting off the vines as above directed, new vines will start out and cover the ground much sooner than they would otherwise do; and should you be scarce of slips, the vines thus cut off answer every purpose planted in the same way; the yield is generally from 200 to 300 bushels per acre, and worth from 30 to 50 cents per bushel. On suitable fertile land, no manure is necessary: strong stable or barnyard manure injures both the flavour and smoothness of the potato: rotten straw, or leaves, are best applied broadcast. Those intended for table use may be kept in a cellar or house made for the purpose, or they may be kept in the following manner:—Raise a bank a little above the level of the surrounding ground, cover with dry straw, pile up the potatoes as high as you can lift dirt with a spade, cover with dry straw, then with earth to the depth of 10 or 12 inches, put a good coat of vines over this, and they are safe. I have not failed in upwards of 20 years to keep them through the winter in this way.

East Port, Miss.

I am, very respectfully,
Your most obedient servant,
JAMES WORD.

THOMAS EWBANK, Esq.,
Commissioner of Patents.

RICE CULTURE.

Matanza Plantation on Pee Dee, near Georgetown, S. C.
6th January, 1851.

Sir:—My time has been so much otherwise engrossed since the harvest, that it has not been in my power to communicate with you earlier, and now (if indeed it be not too late for your purpose) I must write briefly, and generally, in relation to the rice crop.

Our lands are improving under the grateful influence of the fallows and rotation practised by me, as that of a system, first in 1837–8, and they produce now rice of better quality than formerly. So much is this the fact, that there is a class of purchasers recognised in the Charleston market who will be content with nothing but the choicest samples, and for these they are willing to pay an extra price.

This system, extended as it is, and greatly improved, in the hands of my observant, skilful, and judicious neighbors of Waccamaw and Sandy Island, by manuring with rice-straw, chaff, and even flour, has been one among the chief means of producing the beautiful "long-grain" rice (cultivated now by the two most successful and experienced planters in this district, and by not more than two others, as far as I know) in the highest state of maturity.

Rice straw has long been valued as an excellent manure, when listed in and rotted, for upland corn and potatoes. It has latterly been used in the same way as a dressing for rice in the fallow swamp-land, on Sandy Island, and with favorable results.

Rice chaff, too, which formerly was discharged from the mill into the "race-way," in order to get rid of it, since its analysis by Prof. Shepard, for our Agricultural Society, is now used to some extent in renovating old lands. It is distributed over the surface, some three inches deep, and ploughed in, stimulating the production of the soil, and improving the quality of the grain.

Rice flour, notoriously of value as food for hogs, cattle, and poultry, and selling readily, when corn is scarce, at from 12 to 20 cents per bushel, has, within a very few years past, contributed its share towards improving in both quality and quantity a particular crop in Waccamaw.

The crop of last year, (1850–1,) affording, as it does, a good portion of very prime rice, where the salt-water did not affect it, will prove to be some 10 per cent. short, as estimated by us. This diminution is believed to be owing, chiefly, to the high winds which passed over the tide-lands about the middle of August last, when the greater half of the growing rice-plants were still in bloom.

Rice is essentially a "swamp-seed" here.

We do not cultivate any on the upland.

Every year, however, it is grown in small patches in the interior, and tended mostly with the plough.

The best kind of rice for this purpose is, I believe, the old-fashioned "white-seed," which was the only variety cultivated in the State until late in the last century, when was introduced among tide-swamp planters the "gold-seed rice," which is now universally approved. The "bearded rice," a variety of white rice, with a very long awn, was imported some years ago for this very purpose, (upland planting:) but, I believe, it is now nowhere seen but to be eradicated.

The "long-grain" seed alluded to above, some account of which is given in the proceedings of the State Agricultural Society of South Carolina, is the choicest variety now cultivated in this region. Like the ordinary seed, it requires particular care and attention throughout the process of culture, to have it produced of the primest quality. But, when thus produced, if it be carefully milled and skilfully prepared, the long-grain rice will command in the winter market from 50 cents to $1 per 100 lbs. more than the very best qualities of the ordinary small grain.

For example, during the month of December just past, the market in Charleston for small grain has ranged from $3 and $3.25 for prime, to $3.37½ and $3.50 per 100 lbs. for choice. Whereas the market for long grain has been influenced by fancy. Prices have been obtained for this kind of $4.25 per 100 lbs., $4.50 also, and even $5 for a small fancy lot.

These prices are never reported; but, having been informed that they were actually paid, I feel bound to mention the fact, when answering your inquiries as to improvements of the grain.

A specimen of this grain, with the entire plant, including the root, has been prepared, and will be sent to the Great Fair in London.

I have the honor to be, very respectfully,

R. F. W. ALLSTON.

Sir:—Your circular of August 26th, franked to me by the Hon. J. Smith, Senator from Connecticut, was received early in autumn, but got mislaid, and has just come to hand; and I would here remark, that I have turned my attention almost wholly to sheep and wool, but as yet I have not had experience enough to justify me in saying which is the most profitable branch of husbandry, stock or wool-growing. The prices I obtained for my wool, this year, I call remunerative—think it has paid me about 20 per cent. I have a flock of about 1000, mostly Saxons; I sheared from them, on an average, 2¾ pounds per head the last clip. I calculate to raise 80 lambs from 100 ewes; and I feed my sheep during the winter from 4 to 6 quarts of corn per day to 50 sheep, and what good hay they will eat; salt my hay when it is put up, 4 quarts to the ton. The sheep in this county are generally healthy, and there has been commendable zeal with the wool-growers in improving their flocks and wool for 2 or 3 years past.

Respectfully yours,

JULIUS S. PRICHARD.

Brunswick, Medina County, Ohio, Dec. 30th, 1850.

Cabarus County, N. C., December 31st, 1850.

Dear Sir:—I have been favored with a copy of your excellent Report for the year 1848. I have delayed my remarks to the latest hour of the present year. January, February, and March very cold and much rain, and even April very cold. The rains continued through the month of May, and up to the 3d of June. July very dry, and, up to the 24th of August, even as dry as the year 1845. Then great rain and wind from the north-west, that blew down the corn and overflowed the low grounds to a great extent. September showery; October favorable to cotton; November fine to the 17th, when there was a killing frost; and December fine for the gathering of crops till the 27th; but it went out pretty cold and wet.

Wheat not so good a crop as in 1849 by 20 per cent., although a greater quantity was sown than had been for many years. My residence, Cabarus county, Harrisburgh, School district No. 11, being 19 or 20 farmers in said district, but two besides myself raised over 100 bushels, it was so injured by the rust. Not a half crop was made. The time of sowing, from 25th of October to the 30th of November. The blue-stem white wheat much injured by the rust; the golden chaff also, with rust and big cheat, that infest our fields. The May wheat was all that was a good crop: weight, 64 lbs. to the bushel. Mediterranean is pretty good in our soil. Average crop on good land, 10 and 12 bushels to the acre. Price, from $1 to $1.25 per bushel. Indian corn is cultivated with good success in our county. The average yield, on good land, is 40 bushels per acre, and the average price is 50 cents per bushel; but this corn sold from the heap, in a very green state, at 75 cents. The drought in the months of July and August was so severe that there has been a very short crop; but I hope, with the surplus of old corn that is yet on hand, there will be a plenty to keep the price from going above 75 cents.

Cotton.—The season for this crop was, in the beginning, cold and backward and very wet. Rains continued to the 3d of June, which gave the crop a bad start; but the latter part of the cotton season was favorable both for working and gathering. No killing frost to 17th November. The time of opening so favorable, that I think there is an average crop. It will be larger than 1849; but how much, I can make no calculation.

Cotton is the important staple of this section of North Carolina. By it thousands of dollars are made, although the seasons are short and the spring cold, that make it difficult getting a start; but there is nothing the farmer can make so much by as cotton, the price being good this season, viz. from $12 to $18 per hundred in our near markets. The time of planting the crop is from the 15th of April to the 5th of May. The present crop is all gathered and in market. Negroes hire, this year, at $90 and $100 by the year.

With respect, your humble servant,
JOSHUA HARRIS.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Sir:—In answer to your circular, I will suggest the following method of cultivation, without confining myself to any form of questions or answers. Grass or hay is our most essential as well as our most sure and profitable crop, being less liable to accidents and producing a greater profit upon the labour expended than any other, and forms the basis upon which we build our beef, mutton, wool, butter, cheese, horses, hides, tallow, &c.; therefore low, wet land, not suitable for the plough, and intended for mowing, should never be grazed. In this way a good crop of hay may be had for many years, without the application of manure, which, when applied, should be directly after the crop is taken off. The quantity of manure that may be profitably put upon an acre of tillage land in producing corn, wheat, &c., should conform to the wants of the soil, to enable it to bear grass. One acre of worn-out mowing land ploughed in the fall, and put to oats in the spring, will usually produce 30 bushels without manure, and yield a small profit, as also will beans, peas, or potatoes; the latter doing better without manure, in consequence of the rot; either crop leaving the ground suitable for the cultivation of corn the succeeding year. Then, by spreading and immediately ploughing in 40 loads or 20 cords of manure in the fall, and applying 10 or 12 loads in the hill in the spring, and planting before the 1st of June, 3½ feet asunder each way, hoeing twice with the use of the horse and cultivator, and weeding the third time without it, we usually get from 50 to 65 bushels per acre, according to the value of the manure; that from the back-house and hog-yard being best, and that from barns, which has been sheltered from the rain and sunshine, being worth at least one-third more than such as has been exposed. This can be accomplished as easily and as cheap as the raising of but 30 bushels per acre, (which is about an average crop for Somerset county, Maine,) except the application of the extra manure, the cost of which should not be taken into the account, as it will produce 16 or more bushels of wheat the succeeding year, and fit the ground for grass. The third hoeing, besides forwarding the corn, will be more than balanced in the increase of bushels, and still more in the succeeding crops of wheat and grass. A greater crop of corn is often obtained, sometimes 100 bushels or more, but usually at the expense of many other acres. I never of late have applied green, long, or unfermented manures to the soil, being convinced by actual experiment that it is of less value to the present and succeeding crops; but invariably heap up all that lies flat upon the yard, and composed partly of straw, that it may undergo a process of fermentation, so that, when applied, it will easily incorporate with the soil; but if it is hauled to the field and left in long rows in the fall, as is practised by many, to be used in the spring, the wind and rain will destroy all its valuable properties, and, if it be put in the hill, will be worse than nothing. For manuring in the hill, I prefer a compost consisting of muck, lime, and ashes. The varieties of corn preferred are the 8-rowed orange-colored, producing more corn from a bushel of ears than the large kinds, and ripening earlier. Usually plant as early as the ground will admit, say the 15th of May, and often as late as the 10th of June. Average price, from 75 cents to $1 per bushel. Wheat, (spring,) red bearded or Georgia, stands the attacks of the rust and weevil better than other varieties; otherwise the bald would be rather preferable. Average per acre, about 16 bushels, succeeding a corn crop, which was well manured and kept free from weeds. Time of seeding, from the 18th to the 25th of May. Quantity of seed, from 1½ to 2 bushels per acre, according to the state of the land.

Ploughing.—In ploughing in manure for corn, usually go from 8 to 12 inches in depth, according to the quantity of manure, following, at the same depth, the succeeding year for wheat. Lands not exposed to the wash of uplands, and intended for wheat, should be ploughed in the fall and spring. The wheat crop had been increasing for several years prior to 1839, averaging in 1838 something over 20 bushels per acre, and in 1839 falling below 10, and continuing to decrease to 5; showing that it was not caused by a gradual draught upon the soil, but mainly attributable to the rust and weevil. But it has been increasing for the last three years. I have tried several preparations for seed-wheat, but consider them worthless. Average price, $1.33 per bushel. Winter wheat has been lately introduced into Maine, and so far has done well; and the quantity sowed this year is sufficient to test our ability to raise it.

Pork, if made wholly on corn, will cost 8 cents per pound; but, a part corn boiled, and mixed with other and cheaper feed, may be profitable. Milk is cheaper, and will make pork fatter. Maine can, and ought to make her own pork, and a superior article to Southern or Western, but it can never be done as cheap.

The best varieties of apples for barrelling are, Roxbury Russets and Baldwins, the cultivation of which promises a fair profit, as those raised in our latitude are hard and suitable for transportation. I have a number of trees that were grafted 85 years ago, and find that those that were grafted in the stump, near the ground, when not more than 1½ inch in diameter, are much shorter-lived than those grafted near the top and in the limbs. It is a ruinous practice to cut off the top of young apple-trees, as is often done, about 5 feet from the ground, in order to give them a widespreading top, thereby causing them to send out a number of sprouts near the wound, which, as they grow to form a top, crowd each other at the main stock, till the sap ceases to flow, and destroys the tree. The main trunk should not be touched, but serve as a conductor for the sap, and throw off limbs at a proper distance from each other. Many valuable hints may be gained by attentively viewing the trees of the forest, where the limbs of a tree rarely war against each other, from the fact that it is natural for them to grow right, without the dissecting knife to give them an artificial appearance.

Very respectfully yours,
WILLIAM D. HAYDEN,
Madison County, State of Maine, Dec. 23d, 1850.

THOMAS EWBANK, Esq.,
Commissioner of Patents.

North Kingstown, January 20th, 1851,
Western Congressional District, R. I.

Sir:—From my own observation, and the best information that could be obtained, I will endeavor to comply with the request contained in your circular, which required a statement of the agricultural products of this district, as compared with the preceding year.

The improved system of agriculture, noticed in my last, is annually progressing—the persevering industry and judicious management pursued by many of our farmers bids fair to restore to the soil that original fertility of which it has been deprived by a long course of cropping without manuring. Yet, we have some among us who are still wedded to their traditional custom of making no return to the land for its increase of products; but that class is diminishing, and their places being filled by their descendants, who are more susceptible of improvement.

The past season has been very favorable for most agricultural crops; the spring, however, was cold and backward, which retarded planting and sowing 8 or 10 days beyond the usual time. Twice the quantity of snow fell in March and April that we had in all winter. May was wet and cloudy, and not more than one week's sunshine during the month, but no frost. The summer was remarkable for its temperature; no extremes of heat and cold, and no lack of rain. The rains were frequent, and of short duration, and for the most part cleared off warm and pleasant. Notwithstanding an unusual quantity of rain fell during the summer, yet we had no destructive freshets, that visited some sections of our country, causing much damage to the crops. Autumn was very serene and pleasant, with much less rain than during summer, which gave a good season for ripening and securing crops. No killing frost till the last of October, and none to obstruct the plough before December. The crops the past season were more than an average for the last 10 years, and at least 25 per cent. better than the preceding year. On the last of May, vegetation was 10 days later than in ordinary seasons; but so rapid was its growth in June that, at the end of the month, it had received all that was lost by the backwardness of the spring.

Indian Corn was 30 per cent. better than last year, and of a superior quality. It ripened earlier, and there was much less of the soft, blighty kind. Rye gave about the same yield, but, more being sown, it is estimated that 10 per cent. more was raised. The price of corn and rye, the same, 80 cents per bushel. Other grain crops, such as wheat, barley, oats, and buckwheat, are not raised in sufficient quantities to require special notice.

Potatoes have suffered more by the disease, in this district, than in any one season since it made its appearance. An unusual quantity was planted last spring, and the prospect of a good harvest was held out till the first of September, when the blight struck them. At first it was not considered very alarming, as we had had a touch of it, in some particular localities, every year since its commencement, and it was thought that the failure would be greater than in former years. A considerable part of the early planting has succeeded in a sound state before the rot commenced; and the price opened lower than for several years preceding. Farmers offered their entire crops for 30 cents a bushel, but could find no buyers at that price. On digging the late kind, it was found that but very few yields had escaped the disease; and that the entire crop would be short full one third when the extent of the rot was known; and that it was more fatal in the neighboring States than in this. The price advanced to 50, and from that gradually to 80 cents a bushel. The crop is estimated 20 per cent. short of last year, and the price full 50 per cent. higher. The advance in the price being greater than the deficiency in the crop, the consumer has had to bear more than the whole loss, which has been the case in this district ever since the rot made its appearance. This may be accounted for by the disease being less fatal here than in the adjoining States. The producer, instead of being the sufferer by the malady, has actually been the gainer, as his product has sold for more than if there had been no failure in the crop.

Onions were 30 per cent. better, and more planted, which made the crop 40 per cent. above last year. Carrots and other roots, about the same as last year. One man in this town raised 1117 bushels of onions, and 1288 of carrots, aggregate 2405 bushels, on less than 3 acres.

Hay was above an average of the last 10 years, and 33 per cent. better than the preceding year. The weather was rather unfavorable for securing the crop. Rains were frequent during the season of haying; but of short duration, and generally succeeded by a clear sun. Hay that got wet one day, was, for the most part, dried the next, so that but a small part was put up in a damaged state; price, from $12 to $15 per ton.

Dairy—Owing to an excellent season for pasturage, was 25 or 30 per cent. better than last year.

Fruit.—Apples are the principal kind cultivated. This being the bearing year for orchards, the yield was 100 per cent. more than last year; the price at harvest was 25 cents per bushel, but at present they are worth 75. Peas, peaches, plums, grapes, &c. are not extensively cultivated—mostly for domestic use. Garden vegetables now very good—30 per cent. better than last year.

Yours respectfully,
J. G. CHADSEY.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Ann Arbor, Washtenaw County, Michigan, Nov. 25th, 1850.

Sir:—I give you below such facts as have come to my knowledge on the subject of agriculture in our region.

Wheat.—We use the white flint, Soules, the red-chaff, bald, and bearded, the Mediterranean, and blue-straw. The flint, Soules, and the red-chaff are the most approved, the Mediterranean yields well, and thus far is free from rust and insects—but the flour is dark, and consequently going out of use; the average product the past season is 20 bushels an acre; time of seeding, from the 1st of September to the 1st of October; the early sown is generally the best; usually sow 5 pecks per acre; plough always twice on fallow—better to be 3 times, and plough 6 to 8 inches deep; the yield per acre is rather increasing, owing to better tillage, and keeping sheep, &c. We have not been troubled with the Hessian-fly for 2 years past, and the weevil has not crossed the lake yet, that I am aware of, except in a bushel of wheat I received from an unknown friend from the East, and I gave them so good a portion of slacked lime and strong brine, that I have no fears of an increase from that source. The price at this place has averaged 70 cents per bushel this fall.

As regards *corn*, the eight-rowed yellow is rather the best with us; the average product being 50 bushels per acre, and cost about 20 cents to produce it, exclusive of use of land. The best method of raising is to plough in the fall, and again in the spring; plant about the 5th of May, in rows, 3 feet apart each way, 4 grains in a hill; cultivate or plough twice, and hoe twice. Best method of feeding is to grind and cook; but the most practised method is to feed raw in the ear. Most of our land is improved for corn by the application of plaster, and seeding to clover.

The average of oats and barley is 40 bushels, rye 30 bushels, beans 15: peas do not do well, being invariably buggy, and frequently an entire failure. The hay cut is 1½ ton to the acre on the average; we sow 8 to 12 lbs. clover-seed to the acre, and, when mixed with herds-grass, 6 to 8 lbs. of each; on wet sods red-top is used, and is very good for hay or feeding; it grows well on our natural meadows and marshes, of which we have a great many, where the grass is good for feeding and hay, some of blue-joint, wild oats, and a great many varieties which neat cattle are very fond of, and fat on remarkably well: such land, by ditching and then sowing with timothy and red-top, makes most excellent for mowing or pasture; but seldom makes good plough-land. There has been but little attention to dairies until the last 4 or 5 years, which has increased, and we have begun to ship to New York; but consume all our cheese. Butter is worth 12½ cents, and cheese 6 cents a pound.

The average cost of raising neat cattle to 3 years old is $12, which is about the usual price of heifers; and steers are worth about $35 the pair; good dairy-cows, new milch, worth about $16; the Durham are the easiest to fatten.

Wool-growing is very profitable this year, and, next to wheat-raising, is the chief business of our farmers. Coarse wool, common native, costs about 15 cents to grow it; finer, say Paulo Merino, about the same; Spanish Merino, 20 cents; Saxony, 33 cents; large sheep, Bakewell or Southdown, the best and most profitable for mutton; about middling kind, heavy-fleeced Merino most profitable for wool; about two-thirds as many lambs as ewes are raised annually.

Our hogs have rather degenerated in this county, within 5 years, owing to the fact that Berkshires were introduced, which have not proved to be an improvement. Leicestershire, Byfield, and grass-breed are the best, the first of which, with a cross of the second, is now being introduced.

Cotton, sugar-cane, rice, tobacco, hemp, and darkies do not thrive well in this climate.

Root crops are on the increase, such as turnips and ruta baga, carrots, and beets, and mangel wurzel being only experimented upon. Turnips do very well on new land, and all will flourish on a rich, sandy loam, with good hoeing, to keep clear of weeds.

Potatoes have done badly for the past four years, on account of the rot, but seem to be getting over it; the average yield is 200 bushels per acre. The Carolina sweet potato is beginning to be successfully cultivated by a few individuals, who have the right kind of warm, sandy soil.

A great deal of attention is being paid to raising and improving fruit, particularly apples, which are usually profitable; sweet apples, with pumpkins and meal, are better and cheaper than potatoes for fattening hogs and cattle; the best apples for winter keeping are the Russet, the Spitzenburg, and the Winter Greening. We have not been troubled with the blight as yet. Grapes will not be a profitable fruit on account of frosts in the spring.

Pears, apples, quinces, and *peaches* do well, and are as fine as in any country; plums do well in new gardens, but are destroyed by the curculio in a few years; we cannot yet discover any certain remedy, unless it be a daily and almost hourly shaking the tree in the spring, and pinching the rascals' heads. Our lands being new, do not need manure; so that but little attention has been paid to the subject, except to clear the barn-yards. You will have a report from one of the professors of our University on the subject of meteorology. And now, my dear sir, to sum it all up, I think there is no better country in the world, all things considered, for the farmer, than Washtenaw county, Michigan; our soil is good, land as easily tilled as it ought to be to prevent idleness; climate mild and healthy; sufficient quantity of wood, and good water; land rolling, but not hilly or mountainous; good mill-streams; plenty of small and beautiful lakes of pure water, abounding with fish; intelligent, industrious, well-educated inhabitants; good schools, and churches of all denominations. The rapidly increasing facilities for transportation giving us a market almost equal to a day's ride of Eastern cities.

Very respectfully, yours, &c.

WILLIAM S. MAYNARD.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Harwich, (Cape Cod,) Barnstable County, Massachusetts, December 20th, 1850.

Sir:—In reply to your circular of August 26th, I would state, that this town was originally covered with a growth of oak and pine wood, a large portion of which has been cut off, and the land cleared. The soil, which is naturally light and sandy, by the process of continual cropping, without restoring an equivalent, which has been carried on for generations, has become, to a great extent, exhausted. The average crop of corn or maize, which is the principal article produced, is not over 15 bushels to the acre; but it is found that these worn-out lands are very easily reclaimed. By applying pond-mud and muck, which are very abundant in this region, at the rate of 100 or 200 horse-loads to the acre, and sowing buckwheat, and turning it under, twice a year, when in blossom, or clover once a year, it has been well ascertained that, in one or two years, fields which were considered almost worthless are made to produce 40 to 50 bushels of corn to the acre. Seaweed, which abounds on our coast, makes a valuable manure when turned under, as taken from the shore; but its value is very much increased when carted into the barn-yard or hog-pen, with mud or muck in equal parts, and left to remain a few months. The most esteemed varieties of corn are the yellow Canada, and round, smutty white. The best system of culture we think, is to plough in the spring, plant the corn about the 10th of May, in hills 3½ to 4 feet apart, each way; thin out to 3 plants in a hill, hoeing four times during the season, each time running the plough or cultivator twice in a row one way, or, what is better, both ways. The harrow, which has been used from time immemorial, has been almost superseded by the plough and cultivator, which leave the ground in a better situation. No hilling is allowed around the corn, but the ground kept as level as possible. The corn is harvested by cutting near the ground, and is carted from the field in the husks, piled up in ridges, and then, during the pleasant evenings of *harvest-moon, husked out*, after the old New-England fashion, which is, by inviting one's neighbors and friends to *lend him a hand*. They sometimes assemble to the number of fifty or more, and in one evening husk a farmer's whole crop, which would have taken him, with his ordinary help, several weeks.

Rye has always been raised here in considerable quantities. It has been the practice to sow rye, (16 quarts per acre,) on the corn-field, at the last hoeing, about the middle of August, and an average crop has been 10 bushels per acre. But for the few last years, the crop has been very much less, and consequently less attention is paid to it. Its failure is owing, partly, to the exhausted state of the soil, and partly to the increased bleakness of the fields, in consequence of the ruthless inroads made upon the surrounding forests.

Potatoes are a valuable crop, especially since the rot has become so general, as those raised on the most sandy soil are less affected by that disease. It is also ascertained that potatoes raised on *new ground*, or land lately cleared, are less subject to disease, than on land under longer cultivation.

The *cranberry*, which is the spontaneous production of nearly all our peat-bogs, is improved remarkably by cultivation; and beach sand, or that which is most free from vegetable matter, is found to be the very best article for spreading upon the mud in which to set the vines. Considerable attention is being paid to their cultivation, and it promises to be a profitable business.

Fruit Trees thrive well in this soil with proper care and cultivation. There is much encouragement for the rearing of the apple-tree, from the absence of the canker-worm, which, although it nearly destroys orchards in the neighboring towns, has never appeared in Harwich. This is thought to be owing to the surrounding pine forests, which, in some way, prevent the migration of that insect.

Among the ornamental trees imported in considerable quantities, the silver abele flourishes remarkably in our soil.

The facility with which a growth of wood can be raised upon our worn-out lands is worthy of notice. Every neglected field, in a very few years, is covered by young pines, which spring up from the seed scattered by the winds, and grow rapidly; sometimes, also, a beautiful growth of pines is produced by sowing.

The *meteorology* of the cape is rather peculiar.

The weather is subject to very sudden changes, and is much cooler in summer and warmer in winter than in other parts of New England; the ocean, which nearly surrounds the cape, acting as a regulator of the temperature.

The subjoined tables will show the mean average temperature, as noted from the thermometer, morning, noon, and night, during the months of June, July, August, and September, for the years 1847 and 1848, and also the warmest and coldest days in those months.

	1847.				1848.		
Mean Temperature.	Sunrise.	Noon.	Sunset.	*Mean Temperature.*	Sunrise.	Noon.	Sunset.
June	57	76	64	June	50	78	68
July	64	81	69	July	64	78	67
August	68	79	68	August	68	82	68
September	59	71	68	September	57	71	61
Warmest Days.				*Warmest Days.*			
June 27	65	96	72	June 16	60	90	79
July 5	64	100	74	July 15	64	89	70
August 4	60	95	74	August 7	64	96	76
September 5	74	84	72	September 6	68	88	70
Coldest Days.				*Coldest Days.*			
June 1	50	58	56	June 8	50	56	50
July 1	60	72	68	July 8	49	72	56
August 6	58	67	60	August 20	59	64	60
September 29	58	66	55	September 28	41	56	58

Very respectfully, your ob't serv't,

OBED BROOKS, Jr.

Harwich, Barnstable County, Mass.

Protumna, near Martinsburg, Berkely County, Virginia,
January 15th, 1851.

Sir:—In reply to your circular, I beg to present to you answers to some of the interrogatories.

Wheat.—In use, Zimmerman's, blue-stem, white, and Mediterranean; the latter is most in favor just now. We have two kinds of land in our county—limestone and slate. The average crop of the county in the finer land, for, say 10 consecutive years, is not over 11 bushels; on the latter, not over 8 bushels. One ploughing before harvest, except on very stiff clay land, is now the ordinary practice. We harrow well, sow Mediterranean wheat on stubble and corn ground, and other wheats on fallow—2 bushels of the former, and 1 and 3 pecks of the latter. The drill is getting into use, and is much approved of. Pennock's Pennsylvania drill is highly esteemed, and the wheat put in with this drill looks, generally, very well. I think the yield per acre is increasing, owing to more careful farming.

A neighbor of mine, the past year, raised, on 18 surveyed acres, 37 bushels and 1 peck of Mediterranean, on stubble ground; and 280 bushels were produced on 7 acres, within a few miles of me; and a miller, near Mill Creek, cut 104 bushels from 2 measured acres. I have raised 27½ bushels per acre on a small field. These are rare instances, but exhibit clearly the great yield land may be forced to by care. On strong land, some cultivate the half of the cleared land annually in corn and wheat—about one-fifth in corn annually. We sow clover, let it stand two years, pasture it, put it in wheat, stubble it; then corn it; and sow the corn ground down in the fall with wheat, and in the spring sow clover, a bushel to 8 acres: we thus get 3 crops of wheat, and 1 of corn. This is the general practice, though some let the corn ground lay till the following year, before sowing it down. We are not troubled with weevils; and Mediterranean is the only refuge we have from the Hessian-fly. Average price, 1850, $1.

Corn.—The dark yellow, between flint and gourd-seed, is the most approved seed; white gourd-seed is cultivated. The average product for 10 years, on limestone land, is not over 25 bushels; on slate, not over 12 bushels. I have raised 65 bushels per acre of measured shelled corn from one field, but it rarely happens; it was in a spirit of rivalry against some five or six neighbors, who cultivated 10 acres against mine.

Corn-and-cob meal is much approved of, and is getting into more general use. I, however, dislike giving 10 bushels of grain in one to have it ground, believing that the hogs get all that is not digested by the cattle.

Oats are cultivated without much success. I have raised 40 bushels to an acre, but it is usually a poor crop, yielding, on an average, not over 20 bushels. The cultivation of rye is almost abandoned; it rarely fills.

Clover and Grasses.—Quantity cut, from 1 to 4 tons per acre; generally about a ton; seeds preferred are timothy and red-top herdsgrass for low lands. I sow a bushel of timothy to 5 acres. Hay costs nothing to grow it but the land and cutting; we get it cut for about $1 per acre. Hay generally is worth, within 5 miles, $10 per ton.

Sheep.—This is a great market for sheep, for mutton. About 6000 are annually sent to Baltimore from this county, and they have a high reputation for flavor, but not for size; we think 70 pounds a large sheep. They are considered the most profitable animal we can pasture. We make but little on cattle.

Hogs.—The Chester and Berkshire cross are the best hogs we have. With the assistance of our stubbles and grass, 100 pounds of corn will produce 33 pounds of very fine pork. The best method of curing hams is, ½ of a bushel of fine salt, mixed with 4 pounds of brown sugar and 4 pounds of saltpetre, to 1000 pounds of hams; changing the position of the hams once or twice in six weeks; smoke them incessantly with hickory till late in the spring, and soak them before you boil them.

Your ob't serv't,

FRANCIS PETERS.

Hon. THOMAS EWBANK,
Commissioner of Patents.

East Montpelier, Washington County, Vt., January 10, 1851.

Sir:—Your circular of inquiries relating to the productions and other matters connected with the agricultural operations of this part of the country, I have received, and now proceed to answer some of the questions it contained.

Your first inquiry relates to the production of wheat. This was formerly one of the best countries in the world for the production of that most valuable kind of grain, but since the weevil appeared, their ravages have been such that many of us do not attempt its cultivation. It is those only whose farms are favorably situated that can make it a successful business: on elevated situations, with a fair western exposure, they seldom fail of a good crop. Sixteen bushels per acre is about an average yield. Land that was cultivated with corn the year previous is preferred. Plough once, in the spring, 6 inches deep. 1½ bushels of seed, well washed, is used per acre. If the seed is thoroughly mixed with lime or ashes 12 hours previous to sowing the crop, it is seldom, if ever, affected with smut. The varieties most esteemed here are Lea, Black Sea, and red bald. The hedge-row has been tried, and proved a failure.

I cannot say that we have any system of rotation in crops; the most common practice is, oats the first year, corn the next; then follow with oats or wheat, and stock down with grass-seed. The price of flour governs the price of wheat: $1 per bushel is the price of good wheat at the present time.

Corn is our most important crop of grain. The variety raised is the eight-rowed yellow, common to New England. There are other varieties cultivated, but not to any considerable extent. Average product per acre in this county, I think, does not exceed 35 bushels, while many of our best cultivators do not fall below 60 bushels. I was conversing, a few days since, with one of the best farmers of Orange county, who informed me that he planted, two years since, 4½ acres with corn, and the yield was 800 bushels, which he did not consider an uncommon crop. The cost of producing a bushel of corn varies but little from 50 cents. The most approved method of culture is to spread and plough in manure, and manure well in the hill; cover with the hoe; plant from the 10th to the 25th of May; use the cultivator and keep all weeds down, and there will be no failure of a crop in a common season. The most of the corn raised here is ground with the cob, and fed to cattle and horses without cooking: for hogs, I think the cob had better be dispensed with.

Oats are cultivated extensively: average yield, 45 bushels per acre. The quantity of seed used per acre is generally 4 bushels—some sow more and some sow less.

Barley is cultivated by very few. I think it an excellent kind of grain to mix with corn to feed to any animal. Land that will produce a good crop of oats will yield a good crop of barley.

Rye.—The cultivation of this grain is very limited. Brown bread cannot be made good without it.

Peas are raised to some extent, by mixing with oats, and sowed in that manner, for the purpose of raising provender to feed to hogs. Almost every man has his garden peas, and a little patch in the field for family use. There should be 4 bushels sowed to the acre, if not mixed. Peas are the least exhausting crop the farmer raises. Beans are cultivated but little, except for family use.

Hay is altogether the most important crop in this section: a failure in that is more sensibly felt than that of any other crop. The quantity cut per acre is about $1\frac{1}{2}$ tons; good, well-cultivated meadows, 2 tons. The best fertilizer for meadows is manure, which should be laid on unsparingly to every acre the farmer cultivates. I do not suppose this can be done every year, but as often as one ploughs a piece of meadow, it should be thoroughly manured before it is laid down. The effects of plaster are admirable on clay soil. I think, when applied to greensward oats, it will increase the crops four times its weight. Time of sowing is, when the oats are fairly out of the ground. The grass-seeds preferred are clover and timothy: 4 lbs. of clover and 8 qts. of timothy per acre are used. If the land is highly manured, the clover may be dispensed with. The growing of a ton of hay costs $5.

Dairy husbandry is a profitable branch of business: no man fails of success if he pursues it steadily, and is economical and industrious. Some three or four of my neighbors have given me the result of their past year's operations. One milked 24 cows; made butter only, average per cow, 181 lbs.; price obtained, 18 cts. per lb. Another milked 24 cows and heifers, and made cheese, average amount per cow, 408 lbs.; price in the city of Lowell, $7\frac{1}{2}$ cts. Another milked 18 cows, made cheese a part of the time, and butter the remainder; average amount of cheese — cow, 416 lbs.; average amount of butter per cow, 88 lbs.; net proceeds of butter and cheese, $650.73. I keep but 5 cows; the average of butter made from them the past year is a trifle over 200 lbs. Three calves had all the milk they would take, until six weeks old, and raised two; sold the butter we had to spare to people near us, for 16 cts. per lb. It is the invariable practice, as far as my knowledge extends, with those that make butter, to set the milk about 36 hours, which is long enough for the cream to rise, which is then taken off and churned. None, in this vicinity, churn the milk. Our practice is to churn in the morning. When the weather is warm, and the butter comes soft, we wash it in cold water till the buttermilk will not color the water; salt the butter, set in a cool place till the next morning, then work it over with the hand. Some make use of the butter-worker, but I think a woman's hand, if it is clean and expeditiously used, is the best butter-worker I have ever seen. The butter is then put in tubs, usually made of spruce or fir, holding from 30 to 60 lbs.; fill to within two inches of the top; fit a cotton or linen cloth, the size of the tub-cover, with good, strong brine; let the cover fit tight, so as to exclude all the air, if possible. The mode of churning is very uniform; the churn used is the float, or sometimes the barrel-churn, made by Ruggles, Nourse & Co., of Boston; but, where the business is small, the old dash is preferable. I use one of Stone's, (I do not mean that the dash is of stone;) they are very easy to keep clean and sweet, and much better in warm weather. Fifteen pounds is enough to churn at once. The best butter and cheese commands the prices before stated, and there are none in this vicinity that are willing to be beat by another in producing a good article.

Neat cattle are reared extensively, and, in addition to the beef that is made, large numbers of young cattle are driven to Connecticut, Massachusetts, and Rhode Island. The cost of rearing, in the ordinary way, until 3 years old, is not far from $25. The price is so fluctuating for store cattle, that it is difficult to determine their average value. The price of good dairy-cows in the spring is $30, in the fall, $18 to $20. There has been little done here in foreign stock. Vermont has long been celebrated for raising good cattle, and we cannot see much improvement in the foreign breeds. I have seen beautiful animals produced by crossing with the important breeds; and if it were my object to make a large animal, I would select a Durham; if to make a given amount of money, the native breed would be preferred.

Sheep and *wool-growing* are profitable. Our flocks are very much reduced at the present time, owing to the failure of the hay crop of 1849, which was occasioned by the extreme drought of that season. There is but little comparative difference in growing a pound of coarse or fine wool; either will cost at least 34 cents. There is a very great difference in the amount produced from different flocks; it ranges from 4 to 5 lbs. per sheep. One flock in this vicinity, numbering 300, averaged 5 lbs. each, and was sold for 39 cents per lb. 100 sheep will consume 15 tons of hay during the winter. The pasturing will cost from $25 to $34. The large coarse-wooled breeds are much the most profitable for mutton, and less so for their fleeces: 2 lambs to 3 ewes are generally reared.

Hogs.—We used to make a large amount of pork for market, and it was a profitable business; but it has dwindled down to little more than enough for domestic purposes. The native breeds are the most esteemed. The Berkshires had a pretty extensive run here, but they proved to be of but little value, except for their foreign origin. There are some few of the Suffolk breed brought here from Massachusetts; their meat is said to possess a peculiarly excellent flavor. If it does not, I see no reason why they should be an improvement upon the native breed; they are quite small, but very handsome animals. The price of pork flesh is 5 cents per lb.

Root crops are but little attended to, except for family use; they are not cultivated as a field crop; but when their value is better understood, I think they will be extensively cultivated, especially if the *potato* malady continues. The potato crop is still an important one, notwithstanding the ill success we meet with. Before the appearance of the rot, the yield was from 200 to 400 bushels per acre; it is now uncertain: light, open soils are best to raise potatoes upon; manure light, plant deep, and the crop will be light, but generally sound. Land that has been least cultivated has proved to be the best. The most prolific and profitable varieties are the English white, and Long John, known in New York as the Mercer, I believe.

Fruit culture has been sadly neglected in this region; the old orchards have disappeared, and little or no pains is taken to supply their place with young trees. The effect is beginning to be *sensibly* felt upon the *purse*, and that always awakens the energies of a New Englander. One man told me that he set over 6000 scions last spring; the method of engrafting most common, is to split the stock, the scion is made in form of a wedge, and inserted in the split, and the wounded parts covered with wax: but few die set in this manner. Sweet apples are of nearly as much value for the purpose of feeding to cattle and hogs as potatoes; whether they could be profitably cultivated in this climate for that purpose is problematical; I think they could not. We have few varieties here; some Baldwins, Greenings, Pumpkin, Sweet Pearmain, Spitzenberg, Pippin, Russet, Seeknofurther, and perhaps some few others are the varieties most cultivated. Our latitude is too high for the general cultivation of most kinds of stone-fruit.

Manures are not attended to as their value and importance demand; much has been said and written about the manner of applying it to land, while the great question in relation to increasing the *size of the heap* has been neglected; in that lies nearly all the sweet of good husbandry. There was a young man passing this way, some three or four years since, selling Bommer's patent for making manure, and several of our farmers purchased the right at $4 for a single farm, if I am not mistaken; but they do not think much of the speculation, I presume, for I am not aware of their practising upon the principle they purchased, in a single instance. The barn and hog yards are the principal sources to look for manure. There are various ways to increase the quantity and quality. The hog is a working animal, if not too highly fed; keep his yard well supplied with muck, straw, leaves from the forest, and, by all means, the weeds that grow in such profusion about our barns and dwellings, and he will convert the whole into good rich manure, and grow fat in the mean time; besides, the only effectual method of preserving it from waste, is to keep it under cover: permanent sheds for that purpose may be maintained with economy: rain and sunshine are admirably calculated to extract the fertilizing qualities of manure.

I have thus endeavored, in my own homely way, and in as brief a manner as I could, to answer some of the interrogations contained in your circular. I hope the time is not distant, when we shall be able to give a better account of our agricultural pursuits; there seems to be a spirit of emulation among the producing classes, that must lead to good results; and nothing, in my opinion, has done more to produce this feeling and action than the interesting and valuable Reports sent out from the Patent Office.

I am, sir, very respectfully, yours,

ISRAEL GOODWIN.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Farmington, Connecticut, January 16th, 1851.

Sir:—Yours is received, requesting information on the various branches of agriculture, to some of which I will reply, according to the best of my ability. The section of country in which I reside, in the valley of the Farmington river, is admirably adapted to produce grass and corn, which are our staple productions. Our meadows are annually overflowed, whereby we are enabled to obtain large crops of grass without the aid of stable or foreign manures.

In regard to your first inquiry, the raising of wheat, I would say that but very little has been raised in this neighborhood, until, within a few years past, some attempts have been made, and very successfully, by the aid of lime, by which we are enabled to raise very fair crops—in one instance, upwards of 40 bushels to the acre. My first attempts at raising wheat on a small scale was made last year, on 3 acres of potato ground. The land was alluvial, a sandy loam, and good soil, on which I raised by measure upwards of 75 bushels. Planted potatoes in 1849; after digging the potatoes, I ploughed the land 7 inches deep with one of Ruggles's ploughs, which is the only kind I use upon my farm, and sowed it at the rate of two bushels to the acre of the yellow bearded variety, and at the time of sowing I also spread and harrowed in with the wheat about 6 bushels of air-slaked Thomaston lime to the acre; and on the 3 acres I obtained upwards of 75 bushels of excellent wheat, most of which I sold for $1.50, for seed, to the neighboring farmers. The land on which this crop was raised had lain in grass for several years, and was manured with unfermented manure spread upon the land previous to ploughing for the potato crop, at the rate of about 20 cartloads (30 bushels) to the acre, and a mixture of lime, ashes, and plaster put in the hills—to the application of which I attribute the soundness and large yield of the crop.

My wheat was sowed about the 20th September, after soaking in a strong brine 12 hours, and then applying lime; at the time of harvesting, the straw was slightly rusted, but the berry was plump and sound. I have now 10 acres in wheat, which promises well; and I trust that the time may come when our farmers may, by the aid of lime and other manures, be enabled to raise wheat, at least for their own consumption.

The corn crop being our principal grain crop, and a most important one, and there being such a diversity of opinion in regard to the different varieties, the method of preparing the ground, manures, and whether most benefit will be derived by applying it in a fermented or unfermented state, I will only state my own experience in the matter; and seeing good results from the plan I have adopted, I have determined to pursue it in future, which is as follows:—I take 5 or 10 acres of my grass ground, meadows on which the grass begins to run out, and apply from 20 to 25 loads of unfermented manure to the acre, and plough it in as deep as I can make the plough run, say 7 inches, taking care to plough in the manure as fast as applied to the land, and, at the time of planting, put half a shovel full of rotten manure into the hill—in the absence of which I use ashes and plaster, a gill to a hill. I cultivate in the ordinary way, using the cultivator three times during the season, and hoeing as many times, leaving the ground as level as possible, and have never failed to raise, on an average, 60 bushels of corn to the acre. On six acres prepared in this way in 1849, one acre through the middle of the piece was measured, and it contained 204 bushels of ears; the whole piece was estimated to yield upwards of 75 bushels of sound corn to the acre. In regard to using unfermented manures, I differ from many good farmers, I am aware; but my own experience leads me to believe that, by applying it in an unfermented state, the strength of the manure reaches the crop at a time when it is most needed, that is, to fill out the grain, and make it produce well; whereas, by applying only rotten manures at the time of planting, the strength of the manure becomes exhausted before the grain comes to maturity, and in consequence the crop fails to produce well. It is, I think, necessary to apply a small quantity of manure, or ashes, &c., to the hill at the time of planting, in order to give the crop a start, after which it will receive its principal aid from the long manures ploughed under and the decaying sod. The variety most in use, and which is most highly esteemed, is the yellow eight-rowed variety. A greater portion of the crop is used for fattening cattle among us, which is considered preferable to selling off the grains.

Oats are raised usually after corn, and produce from 50 to 60 bushels to the acre; average price, 45 cents per bushel. With this crop our lands are usually seeded to grass as follows:—Half bushel timothy seed, and 4 quarts clover, and on low and moist land the clover is omitted, and red-top is applied, at the rate of half bushel to the acre, with the timothy. The lands are then kept in grass from 5 to 8 years, or as long as they continue to produce from a half ton to two tons to the acre, after which they are again put in corn, as before. Many of our uplands, or "home lots," so called, are made to produce from 3 to 4 tons to the acre, at two cuttings, after which they are grazed closely until winter sets in.

Very little attention is paid to dairy husbandry in this neighborhood, farther than to supply our own immediate wants; considerable attention has, however, been given of late to improving our stock, several very fine animals of the Durham, Devon, and Ayrshire breeds having been introduced among us, and it has evidently improved our stock, though many farmers among us are unwilling to acknowledge that any improvement can be made by introducing foreign stock; but it is rather amusing to see these same farmers, who decry foreign stock, endeavoring to become possessed of the grade animals, at an advanced price. Whether they are, or are not superior to the native stock of the country, I shall leave with them to decide. I have, myself, a fine head of Devons, and am highly pleased with them. The grade animals are very superior, making excellent working cattle, and also good for the dairy and for beef. No attempts have been made by crossing the Devon and Durham with us, but I think, by crossing the two breeds, a great improvement might be effected, particularly if wanted for the dairy or for beef; but for working, should prefer the unmixed Devon. I have extended my remarks farther than I intended, but have omitted sundry articles of products, such as root crops, fruit culture, &c. Should the above statements be of any benefit to you, you are at liberty to make such use of them as you think proper.

I am, very respectfully, your obedient servant,

WM. L. COWLES.

Halifax County, Virginia, January 1st, 1851.

Sir:—The county of Halifax is one of the extreme southern counties of Virginia, on the North Carolina border, and is characterized by the same features as the adjacent counties of Pittsylvania and Mecklenburg. The staple agricultural productions are tobacco, wheat, corn, and oats.

Wheat.—The varieties most commonly sown are the early red May, the bearded golden-chaff, the white bearded, Mediterranean, and, in some few instances, the early purple-straw. The usual time of sowing is between the 25th of September and the 5th of November. Could I sow my whole crop in a single day, I would select the 10th of October. I have no hesitation in preferring the early red May to any other variety that I have tried. Of one thing I am sure—that the late varieties do not suit our meridian. The rust is our great enemy. I have never had my wheat winter-killed, nor have I ever had any thing like a general destruction of crop from the ravages of fly; but I have seen whole fields destroyed by rust. I have for some years soaked my wheat in strong brine, or steeped it in a solution of blue-stone, at the rate of an ounce to the bushel. The brine is found, after repeated trials, not to be a cure for smut, and the use will be abandoned. The blue-stone is a preventive of this disease; and if the wheat, after being steeped in it 5 or 6 hours, is rolled in recently slaked lime, the cure is rendered certain. In this climate, where the frost does not destroy the wheat, a bushel of seed to the acre, in average land, is deemed sufficient. But there is nothing in which agriculturists differ so much as about the proper quantity of seed to the acre. Soil and culture determine the yield far more certainly than the quantity of seed—nature, in this instance, kindly repairs the mistakes of the husbandman.

Those among us who grow wheat after clover, plough the land with 2 or 3 horses, between the 10th of July and the 1st of September, as time and seasons will allow. I think the best cultivation is to break the land in the month of July, or early in August, to the depth of 6 or 8 inches, and then, with a small dagon with a single horse, to turn again just before sowing to the depth of 3 or 4 inches; then sow, and cover with a harrow drawn by 2 or 3 horses. In the county of Albemarle there are some respectable farmers who advocate and practise the single ploughing; but now the practice has disappointed me, and I have no hesitation in saying that the second ploughing will more than remunerate the additional labor.

My greatest yield of wheat was 33 bushels to the acre, from 11 acres. This was cut off from a field of 60 acres, on account of its being free from smut, while the remainder of the field was tainted with the disease. Probably the whole field would have averaged between 25 and 30 bushels to the acre. It is difficult, in such a climate as ours, to make the soil yield more than 35 bushels. If you fertilize the land to the degree necessary to produce this crop, such is the tendency of a warm climate to make woody matter and straw, that it is very apt to fall and smother the grain, or mildew it. That wheat, then, should be selected by us, which yields least straw. It will bear the most stimulus from the manure-pile, and the greatest yield may be expected from it. The red May is a wheat of this character, and it is the wheat from which I have received the heaviest returns on highly enriched land. The only objection to it, that I know of, is its liability to the frosts of spring. This may, however, be generally counteracted by grazing it down, when there is an early luxuriance. In 15 years I have sustained but one heavy loss from this cause, and I have used no precaution, save the one of not sowing till after the 10th of October. To state the average yield for the county is impossible; but I will hazard a guess. Perhaps 10 bushels to the acre, in average years, would be near the mark. Remember, however, that there is not a very large breadth of wheat, and the land is generally manured in which the wheat grows. The tendency now is to increase this breadth, by taking for wheat more corn land, and, while the quantity of wheat grown is evidently increasing, the average product per acre is evidently diminishing.

Corn.—The varieties in use are endless. I think that there is but little difference in the yield of acclimated varieties. The early kinds, which are importations from a northern climate, are more easily parched by drought.

The average yield might be stated at 33 bushels for our river and creek flats, and 17 for the uplands. Manure applied to corn in the spring, with us, often burns up the crop. It had better be applied as a top-dressing to the clover, and the clover turned in for corn, the fall succeeding the application: unless farm-yard manure be well rotted, it will, 3 years in 4, injure the corn to which it is thus crudely applied. In a cold, moist climate, like Western New York, the warmth derived from the manure while in a state of decomposition may greatly aid in forcing forward the corn; but it will not answer here.

We grow no barley, and but little rye: once we sowed a good deal of rye; but it is now a neglected crop. Beans are not a field crop with us. Peas are cultivated by some as an improver; but it is not much used in this way. On sandy soil, where clover will not take, it is doubtless an improver; but in all clay soils, clover is incomparably the better and the cheaper. Oats are generally and extensively cultivated. The crop is thought an exhausting one; but no good reason has been given for the opinion; and in South Carolina, I hear that it is looked upon as an ameliorating crop. Very little attention is here paid to the meadow grasses. Oats and the offal of corn are our chief resources for feeding our work-animals. Some clover is cut for hay; but not a great deal. Herds-grass, or the red-top, is our best and hardiest grass. The timothy does not flourish in our climate. Planters make milk, butter, and beef enough for family consumption; but none, or next to none, for market. We have not yet made our first cheese. Our cattle are, in the main, unrelieved by imported crosses, and no great account can be given of them. The same may be said of our sheep. Our hogs are pretty fair. We have tried the Berkshire breed; but, when weighed in the balance, they were found wanting. The Irish grazier, crossed in the old Virginia hog, has the largest amount of testimony in his favor. Our pork is raised at a high cost—100 pounds of corn producing about 25 of pork. But this corn is derived from the inferior part of the crop—the short and the imperfectly matured ears.

The leading crop of this county is tobacco: more is grown here than in any other county of the State. There is no new process of culture known to me. The present mode of cultivation, in the main, was in vogue before the American Revolution. That is, the new land, which is the land best suited to the crop, is prepared now and cultivated now as it was 70 years ago. We have sometimes deviated a little, but we are always compelled to try back. In curing the ripe plant, 10 years ago, we flattered ourselves that we had made some improvements; but even here we had to fall back on first principles, or rather primitive methods. It is true that we have better implements; plough and manure better; and have introduced clover as a rotation crop.

I have known 1100 lbs. to the acre made, in a crop of 50 acres; but the average would fall, if fairly stated, to 600 lbs. for the whole county.

No root crop is cultivated in fields; we have turnip-patches, but no turnip-fields. Our climate, particularly in the month of September, is too dry for the turnip. When the land is powerfully stimulated by manure, we sometimes make a great crop, but ordinary lands yield too discouragingly to justify its extensive cultivation. Besides, an idea prevails among us that it is a poor thing at last.

We have two varieties of the Irish potato—and but two—the watery and

the waxy. The sweet potato grows well, and often abundantly, yet for the last year or two we have failed, on account of our late, cold spring.

Guano is rather a stranger yet among us, but we are well acquainted with the magical effects of plaster—especially on clover. Lime is but little used, as we have no beds of it in this county. I tried it in three different kinds of soil, some years ago, at the rates of 20, 30, and 50 bushels to the acre. I saw no effect in the corn or the wheat, nor in the clover which followed them. The late Mr. Randolph Harrison, of Elkhill, gave me the same account of an experiment which he made with lime. I believe Mr. Sampson, of Goochland, made experiments with like results. That lime does act well in some soils, there can be no doubt; it is the veriest scepticism to deny it—but that it does not act well on all soils is equally undeniable. I believe, however, that the latter opinion now is, that the most important effects of lime are mechanical—rendering clays more friable, and sandy soils more tenacious. To produce this effect, it should be used very liberally, much more so than is indicated by my experiments, or the experiments of either Mr. Harrison or Mr. Sampson.

Fruit culture, though still greatly neglected, is receiving more attention than formerly. In the absence of a blighting frost in spring, we produce, in tolerable abundance, apples, peaches, cherries, strawberries, raspberries, and melons. We export no fruit of any kind. Our pride revolts against these petty sales and petty savings, while our necessities urge very strongly the duty of submission. What will be the end of the struggle, I know not.

Pears do not grow well with us, and the grape, from bad varieties, bad management, or unpropitious climate, yields a poor return. They rot, generally, before maturing.

Meteorology.—For three years, commencing with the 1st day of May, 1838, I caused a memorandum of the temperature each day, at 3 o'clock, P. M., to be entered in a book. This book is now in my hand. The thermometer used was Fahrenheit's; the position of it, a cool passage in my house, six miles south of our court-house. The result may be confided in as accurate, as the observations and the records were made with great regularity. I regret that there was but one observation for each day, and that they do not come down to the present year.

Here is the table:—

MONTHS.	AVERAGE, 1838.	AVERAGE, 1839.	AVERAGE, 1840.	AVERAGE, 1841.	AVERAGE, for 3 years.
May	67°15′	71°09′	69°07′	....	69°10′
June	79 24	77 02	76 06	....	77 52
July	85 37	78 42	78 38	....	81 37
August	80 40	77 27	77 09	....	78 25
September	70 48	73 15	69 48	....	71 17
October	60 04	67 00	64 07	....	63 44
November	51 00	48 08	51 42	....	50 17
December	42 12	42 42	43 30	....	42 48
January	....	43 27	39 00	44°00′	42 09
February	....	48 24	55 07	43 51	49 07
March	....	56 20	58 42	54 39	56 33
April	....	65 24	66 30	57 02	62 58

From this table we have the average temperature for three years, at 3 o'clock, P. M., a fraction over 62°.09.

I conclude with the expression of my hearty regret in being able to add so little to the value or the interest of your forthcoming report.

Very respectfully,

JAMES C. BRUCE.

Hamilton, Butler County, Ohio.

Sir:—In answer to your request, I submit the following remarks:—

Wheat.—The Mediterranean is the best that we have in Butler. I raise from 40 to 50 acres per year; the average crop is about 30 bushels. I seed about the last of September. I sow about one and a half bushels to the acre. I let my field grow late for wheat in the spring, when it gets a good crop of weeds, and then plough it under and let it lie till seeding-time, and then harrow it, and sow and plough it in, and harrow it. I believe that the average price is about 80 cents.

The best plan for raising corn that I know, is, after harvest, when the weeds grow up, to plough them under, and let them lie till spring, about the 15th of April, and plough it and cross it out 3 feet each way, and put 3 grains in a hill. I have raised 105 bushels to the acre. Our average crop is about 60 bushels per acre.

Oats yield about 40 bushels per acre—barley about 50 bushels. Barley does not injure the land, but it will enrich the land.

Grass-seed.—Timothy is the only grass that I sow, and it yields me about 2 tons per acre. It is the best to fertilize the land. I sow one gallon per acre. The average price, $10.

The cost of raising cattle till 3 years old would be about $10, and they would bring about $25.

Sheep.—Wool-growing is a poor business. The land is better calculated for cultivation, and we don't raise many sheep. It wants poor, hilly land, to make it profitable to raise sheep. I should say the large sheep was the most profit.

Hogs.—The best breed that I know of is the grazier and Poland mixed. About 30 bushels of corn will make 350 lbs. of pork; the average $3, and corn weighs 60 lbs. per bushel.

Irish potatoes.—Average yield per acre, 100 bushels. I plant them about the first of May. The orange is the best that I know of. I plant them in new ground, or manure them well in the hill with stable manure, or plant them in straw.

Very respectfully yours, &c.

JOHN CARR.

Hon. Thomas Ewbank,
Commissioner of Patents.

Locustwood, Taylor's Island, Dorchester County, Md., Nov. 1850.

Sir:—Your "Agricultural Circular" was received some months since, but, from a multiplicity of professional and other engagements, I have failed to attempt a compliance with your request until the present time.

I must premise what I shall hereafter say with the remark, that I can-

not possibly follow, *ad seriatim*, in reply to your interrogations, from the fact, that much information could not be obtained in this county, as no agricultural societies, or clubs, are now in organization, and farmers not caring to take the trouble to ascertain accurate results, by or from experiment, in manuring and cropping. This county is one of the Eastern Shore counties of Maryland; and, from its easy access by water, and its contiguity with the flourishing city of Baltimore, and the consequent large demand for lumber and fuel, this demand has, for the last century, engrossed the attention of the people, to the almost entire neglect of agricultural pursuits, and to the manifest impoverishment of the county, from the inevitable result, in exhausting all the timber, and failing to add any thing to the virgin soil, admirably adapted to manuring, but naturally thin in soil.

But the last ten years, I am most pleased to say, has been marked by a decided reformation in the farming operations of the county. Ten years ago, the most *primitive* agricultural implements were used. The common, and now universally used "drag-harrow," was then almost a curiosity among our people. Manuring was looked upon as an idle loss of time, and loss of outlay of money.

But now, how changed! Every farmer is striving, with commendable spirit, to outstrip his neighbor in the largest yield of crops, and, of course, in manuring, and in all the improvements in farming utensils, machinery, and all that pertains to good farming; and the beautiful result is—

"The desert buds and blossoms like the rose!"

As an instance of the improvement and the result, I will but mention that of the farm of Samuel K. Travers, Esq., of this county. This farm contains about 100 acres in cultivation; the average yield of the wheat crop for the 50 years next preceding 1840 was about 150 bushels; since 1840, that gentleman has been a pioneer in manuring and improvement in farming; and the present, in last harvest, (1850,) the same farm has yielded 850 bushels of superior wheat—indeed, of such an excellent quality, that some 800 bushels were sold for seed, for all parts of our county. Many others are pushing on the race of improvement, with a like most cheering prospect; and really *we* cannot help but think, that failure in the *pine wood crop* has eventuated beneficially to the farmer, especially the lazy one, as it has driven him to better things.

And now of the WHEAT crop for 1850. The prospect in May and the early part of June was never equalled before in this country; the winter had been quite open, with unusual quantity of rain, and the wheat plant came out of the winter strong and flourishing: the spring was very favorable to the growth of wheat, and, like the winter, much rain fell: hence, the cheering prospect to the farmer. But, alas! like many human things, the hour of blight came. About the latter part of June, that one of the most malignant of all diseases to the wheat crop, *rust*, began to make its appearance, and, in a few days, thousands of acres were rendered almost a total failure, very few fields being entirely exempt from the blight. That which escaped most generally was, I believe, the "Wicker wheat," (a new species in this country, of which I will say something more,) and the "German," owing chiefly, I am of the opinion, to maturing some week or ten days before most other species. It is also worthy of remark, that fields open to the wind blowing off or from bodies of salt-water, (sea-water,) were much less injured; and the same fields, the farther they receded from the waters, the more baneful the effects of the rust. The result of our harvest has been a very large yield of straw, and a poor yield of indifferent, light grain. Of course, there are exceptions to this. And again, there are cases in which the crop was not cut, but left to the cattle. The price of wheat in Baltimore, our general market, has ranged for "family flour wheat," from $1.12 to $1.35 "per bushel," and inferior from 75 cts. to $1.12 per bushel, of 60 lbs. weight: the range of the Baltimore wheat market has been more uniform for 1850 than for many years preceding.

I regret to say, many adhere to the old and much-to-be-condemned rotation of seeding corn ground as the whole or principal crop: in this mode, wheat is badly put in; in ground already exhausted by the corn crop, the wheat, by this custom, is put in by sowing the wheat upon the ground, without previous fallowing, many times among weeds 2 and 3 feet high, and then an attempt made to plough, or, properly speaking, to scratch it in. This is generally done in October, the quantity sown about 1½ bushel per acre. The more improved way has been considerably brought into practice, and is increasing, of fallowing in August, and seeding in September, and with decided increase in yield; in many instances double. Our harvest commences sometimes as early as the middle of June. Upon the whole, I can congratulate our farmers on the decided and rapid improvement they have made. The wheat most common in use was known here by the name of "Lawler," a small but heavy white wheat, yielding but poorly; the "Taliaferro" has also been extensively sown. The "Thimble" is also quite popular with some. "Crate," another species, is celebrated for its large yield; but that now most sought after for seed is a species introduced by myself in this neighborhood, and now through the county, which I have named the "Wicker wheat;" it came originally from Virginia—the James River country, I believe—and is justly esteemed one of the best species ever known in this region. It is very large "grained," a plump, heavy, *and a rich white*, rated by wheat merchants in Baltimore, when thoroughly cleaned, and free from impurities, as "A. I. No. 1 family flour wheat;" it also has the great advantage of ripening early as any of the early species; and in the last crop, was decidedly more exempt from rust than any species, perhaps except the "German." I believe, in a few years, from present indications, it will supersede all other species in this county. I would but remark, it is beardless, and the chaff of a *red-brown* cast, and when machined, entirely clean of "white caps," a *desideratum*.

Corn is extensively grown, and, until the last ten years, the great staple with the farmers here, the mode of cultivation being decidedly better than for wheat, and the yield better per acre in comparison. Some idea of the importance of the corn crop may be formed, when it is a fact that it is the main article, and in many instances the only article, for subsistence, for master, slave, horse, cow, oxen, hogs-feed, poultry. Some portions of our county will not produce wheat. Then it must be the "staple." The provender is, in nine cases out of ten, the only dry food on which our horses or cattle are fed. Meadows we have none; and few, I believe, have yet cut clover for hay. I know, for myself, I have frequently been compelled to purchase hay in Baltimore for my horses and cattle, when my stock of corn-fodder was exhausted in the spring. By the way, I believe there is nothing superior for horses to well-cured corn "blades." We have the most improvident custom of feeding our corn. In nine cases out of ten, it is fed to horses and cattle whole, and on the ear; hogs are fed and fattened

in the same wasteful manner; the provender is fed in the same way, without any preparation, just as it comes from the field. The varieties planted are so mixed, that I know of no distinction but "white" and "yellow," except in a few cases of experiment, by *amateur* farmers. The mode of feeding corn in this region calls loudly for a change and economy; some day will demonstrate to our farmers this fact.

Oats in small quantities are sown, and appear to yield well; but most farmers have a prejudice that they are very exhausting to the ground. Yield, some 30 to 40 bushels per acre.

Clover is sown to some extent; and, where the ground has been limed, grows luxuriantly: producing most excellent pasture, and improving the crops, when *turned in green*. I believe there are few instances where it is cut for hay.

Dairy husbandry is at a low ebb; and nothing can prove this more conclusively, and not much to the praise of our farmers, than the fact that a large proportion of the butter for farmers' families is brought from Baltimore. This should not be in any farming district.

Neat Cattle.—The great objection to a large proportion of our cattle is, they are *too neat*, especially in March. This is a branch of husbandry that is shamefully neglected: arising mostly from the farmer attempting to keep too many, and in being then exposed in all weathers in the winter, with a short allowance of food.

Orchards and *fruits* of all kinds have been greatly neglected; very few persons or farmers producing even the common apple later in the season than Christmas—those used after that date being procured from Baltimore, the growth mostly of the Eastern States. There is, however, more interest felt on this subject, and of late years many have purchased from distant nurseries choice fruit-trees.

Manuring.—The most valuable article for improving our lands is of the *calcareous* kinds. Stone-lime is very largely employed of late years, and with the most satisfactory results. Oyster-shell lime is also in high favor, and by some yet preferred, when the shell can be procured large and thick. Beyond a cavil, this species of manure must be the basis of permanent improvement in our lands; then followed with the *high-pressure* manures, as guano, ammoniacal salts, and the results are truly wonderful. The mode of applying lime here is, to spread it broadcast, immediately after the corn is planted, averaging from 50 to 100 bushels per acre. This plan has the advantage of incorporating the lime thoroughly with the soil, in the cultivation of the corn crop. The first year after the application, very little can be realized in the crops. Another mode is to spread the lime broadcast upon the earth, at least one year before ploughing or cultivating, and thus permitting the lime to act upon what vegetable matter may be on the surface. Those who have tried this plan speak highly of its efficacy, and prefer it to the former mode.

Guano.—I have been using for several years this article on my wheat land, and, I think, with more profit in the yield than any other. I am of the opinion, Peruvian guano, at $40, or even $45 per ton, is the cheapest manure for our lands. In the autumn of 1849, I applied one thousand pounds of Peruvian guano upon four acres of ground, (previously in corn,) upon which I sowed four bushels of Wicker wheat. From this I harvested *one hundred* bushels *pure heavy wheat*. The last time previous, the same ground, when seeded in *wheat*, yielded some 5 bushels per acre by average. No other manure had been used between the crops of wheat and a crop of corn taken off. Here is a striking experiment that it will pay. Compare the results, and I am fully of the belief that my ground is at *this time* more benefited from the dressing of the guano than the original cost of the article. Just so far as the guano extended, so far a heavy coat of clover is now flourishing luxuriantly.

I must conclude these hasty, disjointed statements, with the remark, that I regret some more competent writer had not undertaken the task. They have been thrown together at various times, and are but a bare *statement of facts*—an attempt at nothing more. I hate apologies, but in looking over what I have written, I am compelled to say thus much.

Respectfully,

WASHINGTON A. SMITH, M.D.

Virginia, Buckingham County, December 10th, 1850.

Sir:—I now proceed to reply to your circular, and fear my limited information will not be satisfactory to the department, as it is not even to myself.

Wheat is seeded upon fallow land from 15th to 20th September, with about 5 pecks to the acre. At that time corn is safe to cut and put up in stooks, or hauled off upon the stalk to the granary, which is much the best management. Where the teams are adequate to harrow in, (which ought to be double,) plough and haul the corn. Our corn land is flushed with the barshares, seeded with one bushel to the acre, and double harrowed. Seeding our tobacco land is often delayed by a late crop of tobacco; as soon as that is off, the ground is ploughed with barshares, and seeded with six pecks to the acre; for the reason that the land is more fertile, and being later in the season; besides, we expect a better reward, as any and every crop grows well after tobacco. For several preceding years, tobacco brought a very low price. Pending that season, a much broader surface was laid down in wheat, but will be much curtailed by the advanced price of tobacco. This is the most general rust year perhaps ever known, and seems to silence a long entertained opinion that rust is produced by frequent showers alternating with a hot sun. We had no showers, and believe the drought was very general previous to and at harvest; therefore, the showers seem not a necessary element, and that it is fairly ascribable to a hot sun. The general weight is from 25 lbs. to 57 lbs. the bushel. The average crop of Middle Virginia has been given for several preceding years. It is now more uncertain, and would seem unfair to give an average of this very important crop. We are experimenting largely with Peruvian guano, ploughing it under 7 or 8 inches, seeding and harrowing in the wheat. This depth is thought necessary, for the rains and snows to reduce its caustic property before the roots of the wheat reached it. I applied, the last year, under wheat and oats, 100, 150, and 200 lbs. to the acre, and have decided in favor of the latter quantity, and applied that quantity the present year to my wheat, and will next spring apply that quantity to my oat crop, and two pennyweights under a hill of tobacco, which I tried last year with success. Under corn, it did not equal my expectation. Upon oats its action was better than wheat. Its durability in aiding a subsequent crop, I believe, is yet to be ascertained, other than a clover crop. It may give that a stand, which would not take upon exhausted land. At present prices, we cannot afford to buy and apply it to good land. A portion of the guano is carbonated, and requires pounding down; indeed, the finer particles, from dampness, has become clotted, and require rushing during the process of pounding and riddling; for there are small stones in it. I have seen them that would weigh 3 oz. The ammonia, a principal element of its fertility, is constantly escaping: also, when strewn before the plough, cover it in. To prevent this waste, I add plaster, measure for measure, when I pound it. Liebig informs us that plaster acts by combination. I also add top-soil, which damps the mass; but frequently sprinkle it with water, to prevent its dusting off when throwing it before the ploughs. This process of preparing and applying guano I deem important, as it prevents great waste. As to edible roots, their cultivation is limited to family supply. Our great reliance for bread, and food for stock, is corn, (maize,) which in good seasons yields from 15 to 40 bushels; say an average of 20 bushels the acre. We plant the first of April, upon lands well ploughed and well harrowed; planting deep, and covering about two inches—pressing the broken land above the planting, rather than under it. Corn is a hard drinker, and should be ploughed deep to get moisture in drought, and stands up in storms much better. When fairly up, we pass a single coulter each side of the corn, rather bearing the point under the corn. When 6 to 8 inches high, run a barshare, with the bar next to the corn, throwing the earth from it. When it begins to joint, plough well with the barshare, returning the earth to the corn, having previously thinned it, then weeding, pulling a small hill to the corn, as a large hill is no benefit to it, and very injurious in seeding wheat; after which, upon the appearance of a young crop of grass, run over with the cultivator, which will destroy the grass, leave a close level surface, retentive of moisture, and favorable to seeding wheat, preventing wash and a deleterious action from the sun. If these operations are well done, and at the right time, it is as much cultivation as corn requires. It is a question with many, whether suckers should be permitted to grow or be jerked off. I am in favor of the former. They will yield fodder, and, occasionally, a nubbin on the tassel. When taken off, the roots of the mother-stalk are often ruptured, and the wounds bleed much sap, until they heal up. A redundancy of nutrition produces suckers; to prevent them, plant your corn close.

In this section of Middle Virginia, tobacco is the primary crop, and we are rather to be estimated as planters than farmers, although we lay in largely for wheat, which rewards us well when exempt from all disasters. I estimate the tobacco crop at 800 pounds net to the acre of 4000 plants; the bottom leaves, and others imperfect, are called lugs, and worked up by the manufactories at about half-price. It is the most laborious crop in the whole vegetable kingdom, and, if its cultivation depended upon white labor, but little would be cultivated, and yet our slaves are fond of working in it; owning the labor, we find it the most profitable crop. The price depends much upon its quality, and that depends much upon capricious whim and fashion, to suit the various European markets. Sun-curing had its day, and commanded very high price, by the manufacturers being exempt from smoke, which was deemed offensive to the stomach of those with dyspepsia, now the prevailing disease of the country, from over-eating, late sleeping, and spending the balance of the day in idleness. That mode is now pursued by but few: curing by steam is entirely abandoned. I believe that a good rich tobacco cannot be made but by the direct application of fire under it, applying, at the right time, a proper degree of heat. Upon this process of curing tobacco it may be thought that I am too tedious, but believing that some information will be given to my brother planters in this and other tobacco-growing States, is my apology. First, be sure that your tobacco is ripe: to ascertain that, view the top leaf on the north side of the plant; if the yellow (the oil) is down to the point, it is ripe; cut sticks and scaffold, 8 large and 10 smaller plants to a stick; scaffold close and strong; sun will cure it green before it yellows; yellowing is a separation of the water and oil; the sun has opened the mouths of the leaf vessels; when the water weeps out imperceptibly, and the oil retained in large yellow spots, generally 5 to 6 days, (dependent upon a warm sun and a damp atmosphere,) it is ready for the house; give 8 inches space between your sticks; let it hang a day or a night before you apply fire; 3 fires are enough to a house 20 feet square—half-seasoned wood the best; tie a thermometer to the lower tier-pole, in the centre of the house—the heat draws to the centre; tie a thread at 85°; a negro can see when the mercury is up: the house being cool and damp, will bear that degree of heat if raised very gradually; in 24 hours, the tails will curl about 4 inches, when the heat may be forced a little, say 2 degrees, and kept up regular 3 days and nights. The leaf ought to be cured—be sure of that, by examining above joist—before you raise the heat to cure the stem; above joists (it does not cure as soon as below) the leaf must be thoroughly cured, before you raise your heat to 120°, to cure the stems: the water is evaporated, the oil retained, the the mouths of the vessels sealed up; there is no danger but by a blaze communicating with the bottom tier; you cannot burn a dry bundle of tobacco, enveloped in sparks of fire. If heat is rightly applied, the bottom tiers will be the best, because cured by a dry heat; as the heat ascends through the different tiers, it becomes vapor, warm enough to force out water, and not hot enough to dry it off, when it drips down on each side of the stem, scalds and kills the tobacco, and is what the planters call house-burn. And estimating the worth of the labor, from the seed-bed to the press of the tobacco, I put it at $20 per acre.

I received, from the Patent Office, 3 half-pints of wheat, called Chinese, Polish, and red-straw; the latter is a very early wheat; the Chinese, bearded, very lofty, with a fine large grain; the Polish, smooth head, white large grain. I hope to acclimate the latter. The next crop I will give you a more detailed result. I have about one bushel now flourishing under drill culture; also I raised some seed of the Osage orange, but none vegetated; supposed they were not of the preceding year, as I learn old seed will not come up.

Barley is not cultivated at all; having no breweries, there is no market for it. *Rye* is preferred, as giving the best yield; like all new and novel things, sold at $4 the bushel; now at $1, or even 75 cents.

Our fathers were careless as to good fruit. The old seedlings have died out, been cut down, and replaced with the best kinds of grafted apples, peaches, plums, pears, cherries, &c. This is a good climate for native grapes; some of the foreign kinds succeed tolerably well in good seasons. I have a little vineyard of one acre, containing 600 vines; have made some wine, which was esteemed good. I have been manuring with the vines from pruning, which is slow in decomposing; I am now applying guano in solu-

tion, from the wash of my guano bags. I am constrained to remark the neglect of our people in not raising the vine, the fine fruit of which adds greatly to the comfort and enjoyment of a family. I find it very uncertain propagating vines by cuttings, and wish to know whether two prunings, fall and spring, are best. I will thank any vine-trimmer for the information upon the two subjects.

We find mixed grasses succeed best in our meadows; timothy, herds, and red clover are most approved. The yield in hay, well saved, 1½ ton to the acre is about an average. The best top-dressing, applied in February, I think, is plaster and ashes, a bushel of each to the acre. Many of our farmers are experimenting with peas, mostly in our maritime counties, where the pea flourishes in a very sandy soil; they are sown broadcast in the corn-field, and harrowed in, 5 pecks to the acre, after the corn is laid by, and fallowed in in October as a green fallow, and wheat seeded; I learn it succeeds well: I have a little trial on hand, when I can speak more correctly, after the next wheat harvest. Peas, at 75 cents, and 5 pecks to the acre, are 90 cents. Clover, at $5.50, will sow 8 acres, say 68 cents the acre; a little the cheapest, and well-established as the great auxiliary to made manures, it must maintain its ground, and pea-fallow will be consigned to the tomb of the Capulets everywhere, except where clover cannot make a stand on sandy soil, which is where peas succeed best.

Your inquiries of raising neat cattle to 3 years old; the price, at that age; value of good dairy-cows, spring and fall; how many pounds of beef will 100 pounds of corn produce; will a given amount of food yield more meat in a Durham, Devon, a Hereford, than in a native animal?—Feeling an interest in these inquiries from their great importance, I will hazard opinions, with the view of eliciting information from others, better informed, and hope to see them in your next Report. First, to rear a calf till 3 years old, I estimate to cost $8, and, at that age, it would be worth $15. A good dairy-cow, with her calf, in the spring, is worth $25; in the fall, I would reduce her value to $17. The 100 pounds of corn, reduced to meal, with the like weight of provender, and that cooked, and fed to a grown animal, might give an increased weight of 5 pounds, say ⅘ of an ounce to a pound of the grain.* Lastly, I believe all the improved breeds take on fat more readily than our natives, and that the Durhams more kindly than either the Devons or Herefords, but they require more food.

Wool-growing has but recently commenced. We have two or three sheep-walks, to the extent of 4000 or 5000 head. Our climate and fine mountain-range are admirably adapted to the rearing of sheep. We farmers prefer the largest breeds, on account of mutton and wool, estimating quantity in preference to quality, it being manufactured into negro clothing. The price in our mart, Richmond, is about 30 cents.

To make good bacon, make your hogs really fat; the best food is corn-meal, cooked to the consistency of dough; if more liquid, and might be called swill, it would be better; but the waste is great; they are always fighting whilst eating, when the swill pours out at each side of their mouth. Make the dough up with red pepper-water twice a week—it is a fine condiment, especially after a gorge from over-eating, and they are very fond of it. After slaughter, let the animals cool, cut out, and salt; ground alum much the best to red pepper, pound it well in a mortar and mix with the

* Note.—Our correspondent should get 20 pounds of meat from 100 of corn or meal.—Ed.

salt; then rub it in well upon the skin side of the joints, when you will be astounded to see the quantity of salt and pepper that enters in through the pores; it requires hard rubbing, with the hog's ear in the hand—friction and heat open the pores. Pork derives but little benefit from salt on the flesh side; saltpetre makes the hams dry and hard, the pepper makes it red to the bone, sweet, and juicy; let it lie in a bulk to take salt, 4, 5, or 6 weeks, according to the weather, then shake off all the loose salt, clarify that by boiling and skimming—it will answer for stock; plaster well with ashes from seasoned hickory-wood—ashes made wet to stick; hang up, shank downwards; smoke with any sound wood except pine; reduce 100 lbs. of pork to 75 lbs. will be good bacon. If you smoke in wet weather, as is usual, it will give a black skin; in dry clear weather it will be a fine yellow skin. I never take down and pack away in corn, bran, and other things, as many do; my bacon hangs till I cut down the last piece to cook; and I have had it to hang 4 years, as sound as a roach, when you could chip it off and eat like dried venison—but much richer. To guard against the skipper-fly, I make a smoke 3 times a week either of red pepper or trash tobacco, which is offensive to them, through May to middle of June, which seems to be past their egging season. See that your door fits tight; if not, tack list around; they are not fond to enter dark places; when you open the door to give out for dinner, close the door after you. Now for cooking a ham: it requires soap to wash off the ashes; place the ham in cold water in the pot, to remain 30 minutes; when put over a slow fire, to commence boiling gradually with small blubbers; lid upon the pot to retain heat; force no more by increased fire—you have got the boiling-point, and can make the water no hotter; but a violent agitation from increased heat to make the pot boil over will drive the juice out and make the ham hard and dry; skim the pot often, and keep on the lid. Now for the time of boiling a ham: for every pound it weighs, boil it for so many 15 minutes.

I am glad to hear that Congress has directed 130,000 copies of your Report to be published—regarding it the most valuable document published by Congress—which is all they do in favor of the great agricultural interest, which is the base of every avocation in this life, and is more neglected and disregarded than any other avocation in the whole civilized world. This is not as it should be. All which is very respectfully submitted, and, from its great length, may require you to curtail it.

Very respectfully yours,

CHARLES YANCEY.

Spottsylvania County, Virginia, December 31st, 1850.

Dear Sir:—Your circular, dated August last, came duly to hand.

1st. In regard to the wheat crop, I will say that the soil through this region of country, about the head of tide-water, has been considered not well adapted to the growth of wheat; consequently our farmers have not turned their attention so much to the production of it until within a few years past. The quantity seeded has been gradually on the increase, and, from manuring and improved culture, the product per acre has gained from year to year, nearly to double that of former years; the last harvest particularly, and, in some instances, where guano was used at the rate of about 200 lbs. to the acre, the product trebled that from the same land raised in any year previous for the last 20.

The average product from improved land without the aid of guano was about 12 bushels per acre, and upon guanoed land the highest average per acre, through the field that I have heard of, was $17\frac{1}{2}$ bushels, and the lowest 13 bushels. I will add, that much the larger portion of the guanoed land seeded to wheat could not have produced much more than the quantity sown upon it without the aid of the guano; and again, the quality of the grain was so much superior that the merchants and millers of Fredericksburg have said that the wheat raised in this and one or two of the lower adjoining countries, principally from improved and guanoed land, was less injured by the rust, and of better quality in all respects, than any offered in their markets this year. Clover seeded upon guanoed land stands well, and presents a good appearance.

The usual mode of applying guano to the wheat crop with us is to sow it upon the land without mixing with any thing else, turn it under with a double plough from 4 to 6 inches deep, sow the grain immediately, harrow in well with a heavy harrow in the same manner as wheat put in without the guano, when it follows the corn crop; the cornstalk and all being removed from the field before the plough: this is done in all the month of October.

Fallow ground is ploughed generally in the month of August, and seeded about the last of September, and the average quantity sown in either case is about $1\frac{1}{4}$ bushel to the acre. The semi-bearded wheat is the principal favorite with our farmers. The Poland has been introduced, and was harvested in our last crop; it yields finely, probably exceeds any other variety we have had, but, from its exceedingly rank growth of stalk and blade, I think it will be very apt to take the rust, and consequently will not suit this lower country so well. Harvesting commenced with us this year about the 25th of June—this is rather later than usual. The best remedy against the weevil is to thrash as early after harvest as possible, and put your wheat up in the chaff. Pens made of rails, with the floor raised from the ground, so as to keep out the dampness and let the air pass underneath, and well lined at the bottom and sides with straw, are used for this purpose by some of the farmers; and, if covered so as to keep out the weather, will keep wheat in the chaff for months without the slightest injury.

The average price obtained for wheat at our nearest markets, this year, has been about $1.07 cents per bushel.

We are almost surrounded by railroads and water improvements; our own roads, are, however, naturally fine, and we have an easy access to markets.

Corn.—This is our best established crop—not so, however, from its great average yield or profit, but owing to the peculiarity of our soil. Its preparation for this crop is easy, and the culture simple; so far as experience teaches, deep ploughing, as well in the preparation of the land as in the cultivation of this crop, is in all respects the best.

The ordinary preparation for the corn crop, as practised by most of our farmers, of throwing their lands into narrow beds, I think injudicious; especially so, when it is to be followed, as is usually the case here, by a crop of small grain: it never produces as much, and the corn, although it grows off and makes a little better show in the early part of the season, when planted in this way, it is more liable to suffer from droughts, and never ears out so well. My last crop of corn was made upon land prepared by a fallow, from

6 to 8 inches deep, (without bedding, except the wet spots,) and at planting-time, a large harrow was run over it, to break the clods and close the furrow-seam, to keep the grass from coming up. The ground was then furrowed off horizontally, and about 4 inches deep; the corn was planted, and as soon as it was well up, I commenced culturing about 8 inches deep, running on either side, and as near the corn as practicable. This was followed by the hoe, brushing away the clods from the corn, and adding a little fine dust when necessary. Through with this operation, say about the 10th of June, the corn was large enough to thin, and receive the dirt which was thrown to it, and completed its cultivation.

The yield was about double that produced from the same field 4 years since, when the cultivation was about the same, but the land was prepared by throwing it into narrow beds, as spoken of above.

The small grain crop usually follows the corn crop immediately after, sowing oats upon the most indifferent parts. The land is then permitted to lie idle, or, as the common phrase is, turned out, for 2 or 3 years, when it is again brought into cultivation, and the same routine followed up. It may be well to observe that much land in this section of country has been "turned out" and abandoned as being worthless, rendered so by bad and often repeated cultivation, a good portion of which has grown up in broom-sedge and pine, and some of it is still being cultivated, or rather *teased to death*, to procure a subsistence from it, but the product is so small as not to be worthy of notice. The pine upon it, however, is an inexhaustible source for fuel, and is profitable as such when contiguous to market.

The average yield of corn per acre on good land with us is about 20 bushels, and some of the farmers bordering on watercourses, particularly those in the valley of the Rappahannock, produce a yearly average yield of 50 bushels to the acre. A white corn, known with us as the twin-corn, a species of the Baden, is mostly cultivated. I have known, from good land, when the season suited, as many as six good ears gathered from one stalk of this corn. Another kind, somewhat similar to the old-fashioned gourd-seed, is now being introduced; it yields extremely well. The cob of this corn is small, and the grain very long and deep, and some of the ears produced in this vicinity, the last crop, counted upwards of 1200 grains to the ear.

I know of no experiment made, by which I could give the quantity of corn produced from application of a given quantity of manure, over and above the ordinary yield from the same land without it. The average price of corn in our markets is about 60 cents per bushel.

Oats are also produced for horse-food; they usually command, when sold, about 30 cents per bushel.

Tobacco is also raised with us, and our soil is pretty well adapted to the production of the finer kinds; the Orinoco is mostly planted, and yields about from 1000 to 1200 pounds per acre.

Peas and *beans* are only produced for family use; occasionally a few bushels for market.

Our farmers grow neither flax nor hemp, but almost every one produces cotton in quantities sufficient for all the family purposes, and it is for the most part manufactured at home, during the inclement seasons, by the female servants, or else it is carried to the factory, after being seeded at the gin, and exchanged for the manufactured article. The cotton-patch is continued in the same place from year to year, and manured principally with ashes

in the hill before planting. About the 1st of May is the time for planting; and one of my old and experienced neighbors informs me that he has known as much as 250 pounds produced from an acre of clean-seeded cotton.

Wool-growing is only extended to the supply necessary for family use. Our sheep are of the native stock, and subsist through the winter (unless a great fall of snow) in good order, with but very little foddering. After supplying the table plentifully, we generally have muttons and some lambs for sale every year. This is not a grazing or a cattle-growing region, except for the necessary supply of the farm; some of our cows, though small, are fine milkers, and butter is produced for sale to some extent, by almost every family, and a good article usually commands about 20 cents per pound, the year round.

Pork is raised also for family use only, and the best hogs that I have seen have been produced by a cross of the Parkinson with Berkshire.

Orchards are not as well attended to now as formerly, when they were more profitable in the article of brandy distilled from the fruit. All kinds of apples, except the winter pippin, however, grow well here, and obtain a fine size and exquisite flavor. Very few are marketed, but merely fed to the stock, dried, and made into vinegar. I think the crab-apple would be profitable made into cider; our best article of crab-cider usually sells for 20 cents per gallon by the barrel, but I do not know that a large quantity could be sold at that price.

Yours, respectfully,

JAMES M. NALLE.

P. S.—I have usually kept a memorandum of the advance of the planting season, noting its forwardness or lateness, one year with another, and other matters connected with farming in that way, but have not time to add it now.

Yours, J. M. N.

Fort Madison, Lee County, Iowa, December 17th, 1850.

Sir:—I have received your Agricultural Circular, and herewith furnish some information in reply to the questions annexed to it.

Wheat.—Varieties in use for fall sowing are red-chaff, bearded, and smooth, red and white-chaff, velvet, and Siberian. Red-chaff bearded is best. Wheat is always a sure crop on sod. Average produce per acre is about 18 bushels. Time of seeding is from 1st September to 1st October, and time of harvest from 27th June to 15th July. A few farmers prepare their wheat for sowing by steeping it in strong brine, and then rolling it in lime. It is thought that wheat thus prepared is not so liable to be injured by the fly, and that the preparation acts as manure. Quantity of seed used per acre is 1 to 1½ bushel. Plough once on sod ground, and twice on stubble, 6 inches deep. No perceptible diminution of crops. There is generally no rotation of crops, but farmers endeavour to put in corn after small grain. They are beginning to use clover for the purpose of manure. No weevil in wheat here. Average price per bushel for 1850, about 63 cents. Yellow corn most esteemed, ripens soonest. White corn yields more, but ripens later. Yield of yellow, about 45 bushels; yield of white, 55 bushels per acre. Cost of corn, from the seeding to the crib, is about 7 cents per bushel. Best mode of cultivation is to plough well and deep. Best mode of feeding is to have the ear (corn and cob) crushed and fed raw. Average price here for 1850, about 25 cents per bushel. Oats yield about 40 bushels per acre. Quantity of seed per acre, 2 bushels. Barley yields about 15 bushels per acre. Quantity of seed, 2 bushels per acre. Rye, average yield, 25 bushels per acre. Seed sown, one bushel per acre. Barley is least exhausting to the soil. Beans and peas cultivated only as garden vegetables. There may be a few exceptions.

Clover and Grasses.—Quantity of hay per acre, about 3 tons. Some plaster used. Stable manure the only kind in general use. Kinds of grass used are timothy and clover. Quantity of seed per acre, about a peck of timothy and clover seed, (chaff.) Hay is the most profitable crop that a farmer living near the Mississippi can raise.

Dairy Husbandry.—Annual average produce of a good cow is about 200 lbs. cheese and about 200 lbs. butter. Average price of butter for 1850 is 10 cents per pound, and that of cheese, 7 cents. Old-fashioned churns generally used. Neat cattle cost but little till 3 years old; feed about barn and stack-yards. Usual price of native animal, 3 years old, $15 to $20; good milch-cows, from $12 to $24. Very few Durhams here, but the number is increasing. They will yield much more meat with same amount of food than the native animal.

Sheep and Wool.—Wool-growing is profitable; large sheep more profitable for fleeces and mutton than small ones. Costs but little more to grow Merino wool than native. The proportion of lambs annually raised to the number of ewes is about 1 to 5.

Hogs.—Best breed is the China and common, crossed. Berkshire not so highly esteemed as formerly. Only method of raising hogs here is by feeding them corn in pens and small fields.

Cotton, sugar-cane, rice, hemp, none raised. Tobacco, a little raised in gardens. Root-crops are on the increase. Potatoes, a few sweet raised, and do well, especially red ones. Of Irish potatoes, the Neshanic is the best kind for table and market. The red potatoes are most prolific. Average yield, 200 to 400 bushels per acre. Cost of production, not more than 10 cents per bushel. Best system of planting is in hills. Plough twice and hoe twice; about 10 bushels seed per acre. Rotted straw manure improves them. Not much used. Fruit culture is receiving great attention. Not enough apples grown at present for home consumption. A few grapes, grown in gardens, do well, and rapidly increasing.

Manures.—Lime and plaster but little used. Soil here new and rich. Guano not used. Wherever manure is applied, it increases the crop, especially grass.

Meteorology.—See accompanying abstract, prepared by Daniel McCready, Esq., to whom I am indebted for much of the information contained in the foregoing answers.

Very respectfully yours, &c.

EDWARD JOHNSTONE.

Abstract of Meteorological Observations, made near Fort Madison, Lee County, Iowa, for the Year ending November 30, 1850.

Months.	Monthly Means.	Highest Temperature.	Time of Highest Temperature.	Lowest Temperature.	Time of Lowest Temperature.	Range.	Quantity of Rain.	Quantity of Snow.	Prevailing Winds—Course from.	Days on which Rain or Snow fall.
	°	°		°		°				
December, 1849...	21.94	50	Noon, 19th	8	At sunrise, 17th	58	.10	6.00	S. E. and N. W.	December 18, rain; 7, 12, 16, 22, snow. Total snow in 1849, 20 in. Total rain, 56.70 in.
January, 1850.....	28.99	48	10th	4	4th	52	1.05	8.75	N. W. and S. E.	January 15, 20, 23, rain; 6, 7, 14, 17, snow.
February	29.83	58	27th	12	3d	70	.80	1.05	N. W.	February 7, 27, rain; 1, 17, snow. Ice broke up in river, 19th. First steamboat up, 25th.
March	37.28	66	13th	14	11th and 24th	52	1,65	1.00	N. W. and S.W.	March 5, 12, 16, 20, 22, rain; 2, 22, snow.
April	44.66	80	26th	24	13th and 14th	56	4,90	3.00	" "	April 1, 2, 3, 4, 5, 11, 17, 21, 27, 28, rain; 3, 4, 12, 16, snow.
May	58.66	86	13th and 16th	30	1st	56	4.70		" "	May 2, 3, 6, 7, 20, 22, 23, 24, 25, 26, 27, rain.
June..................	78.12	92	17th, 21st, 26th	44	1st	48	4.90		S. W.	June 3, 5, 6, 13, 20, 26, 27, 29, 30, rain.
July	77.29	100	9th	55	17th and 18th	45	6.55		S. and S. W.	July 1, 6, 11, 12, 19, 28, 30, rain. Wheat harvest commenced on the 4th, and finished 13th.
August	75.47	98	3d	52	26th and 28th	46	9.15		E. and S. E.	August 10, 11, 16, 19, 21, 23, 29, 30, rain.
September	64.60	86	25th	40	7th and 29th	46	6.95		N, E. and S, E.	September 6, 9, 11, 12, 14, 17, 26, 30, rain. First frost, morning of the 29th.
October...............	54.05	82	16th	24	26th	58	2.55		N. W. and S. W	October 1, 4, 9, 16, 17, 30, rain.
November...........	43.21	68	1st	21	19th	47	3.12	2.40	N, W.	November 1, 2, 4, 5, 10, 14, 25, 27, rain; 15, 16, 16, 21, snow.
Yearly mean....	50.75			Depth of rain and snow,			46.42	22.20		

The thermometer has a northern exposure, out of the direct rays of the sun. *Mean Temperature.*—This is the temperature as deduced from the daily observations during the year, at sunrise, noon, and sunset. The rain-gauge was a vessel of equal width at top and bottom, usually set upon the ground. N. B.—The thermometer is elevated about 6 feet from the ground. February 5th was the coldest day during the year; thermometer 12° below zero, and was not above zero all day. The greatest heat was on the 9th of July, from 12 till 2 o'clock; thermometer 100°. The 5th of July was the warmest day; thermometer, at sunrise 74°, at noon 94°, and at sunset 84°, being a mean of 84°.

DANIEL McCREADY.

Fruit Farm, Peoria County, Illinois, November 2[illegible]th, 1850.

Sir:—The postmaster at Peoria has handed me your circular of the 26th August, with a request that I would reply to the queries in regard to fruit culture.

1st. "Is the culture of fruit receiving increased attention?" Although this is a new district, settled principally within the last 12 years, yet the culture of good fruit, particularly of apples, peaches, and pears, is receiving very decided attention. The number of grafted trees, planted in orchards in this county, must be more than 75,000. A considerable share of these have commenced bearing, and the result, thus far, has been entirely satisfactory.

The demand for young fruit trees is rapidly increasing, and the time is close at hand when there is likely to be more good fruit in this and the adjoining counties than is now to be found in any district of equal extent in the United States. The supply of young trees in the nurseries has heretofore been nearly equal to the demand; and there are now on hand and for sale, at least 150,000 in the county of Peoria alone. I can, therefore, answer your first query in the affirmative.

2d. "Cannot apples enough be grown upon an acre to render the crop a very profitable one to the farmer?"

The disposition to plant orchards, so universal in this district, indicates a general belief, that they will become profitable. In no part of the world do trees grow better than on the table lands of Northern Illinois; and wherever they have attained sufficient age, they are very productive, and the fruit of most excellent quality. The specimens of apples and pears raised in this vicinity, and exhibited at the great fair at Syracuse, N. Y., in 1849, were at once pronounced to be the best and the most beautiful of the season; and the same remark will hold good in regard to those exhibited at the State Fair, held in Cincinnati, Ohio, in October last. The table lands of the region, comprising, as they do, more than three-fourths of the whole country, are entirely free from the visitation of untimely frosts; and this probably accounts for the great productiveness of our trees. This happy exemption may be attributed to the absence of every obstruction calculated to impede the full sweep of the winds, which come in immediate contact with the ground, and thereby retard vegetation in the spring until the whole atmosphere becomes warm. There is about ten days difference between the starting of vegetation on the table lands of the prairie and the timbered district in the same latitude east of us; hence, we often escape the effects of a late spring frost, which often makes sad havoc in the timbered districts. For the above reasons, the apple and pear crops are about as certain with us as any other crop, and so it has been ever since the first trees of the early settlers came into bearing, (now about 15 years.) Another consideration in favor of the extensive culture of the apple in this district, is the fact that good winter apples, fit for exportation to a warm climate, cannot be raised successfully south of latitude 39° or 40°. Whenever a surplus beyond the home demand shall be produced, we have the great Southern market as an outlet; and, by having the best article, we can always control that market. Our cultivators, instead of being influenced by a narrow, monopolizing spirit, are anxious to see their neighbors go into the business, being confident that the more good fruit there is to sell, the more profitable the cultivation of fruit will become. It is very difficult to make even an approximate estimate of the profits of an acre of orchard. The oldest plantation of apple-trees in this vicinity is now 22 years old from the seed. The best bearing varieties in it have averaged about 15 bushels per tree, or 600 bushels per acre, for the last 5 years. It is probable that for the next 10 years they will average 20 bushels per tree, or 800 bushels per acre. The present standard price for winter fruit is 50 cents per bushel at the orchard when gathered. With so large a market to the southward, where the apple never can be grown, we do not anticipate any material decrease in the price for a long series of years.

3d. We have no data upon which to make an estimate of the "comparative value of apples and potatoes, for feeding hogs and cattle." Indian corn is the universal article for feeding and fattening in this country, and where it can be produced so cheap, and in such profusion, nothing else is likely to supersede it for this purpose.

4th. "What varieties best to keep for winter use, and for exportation?" Being in the infancy of the apple culture in the West, the above are of necessity quite unsettled questions. There are some 200 varieties of late fall and winter apples now in the course of trial among us, many of which will be totally rejected, while a few only will meet the general approbation of cultivators. Among those which have been pretty fairly tried, and found well adapted to our soil and climate as winter apples, are the American Golden Russet, English Golden Russet, Flushing, Spitzenberg, Esopus Spitzenberg, Michael, Henry, Pippin, Milam, White Bellflower, White Winter Pearmain, Red Winter Pearmain, Wine-sap, and Fulton. Of such as are adapted to the spring market, the following have been well proved, viz. Green Newtown Pippin, Rowle's Jennet, Limber Twig, and Red Romanite, (Carthouse.) The celebrated Northern Spy has not yet fruited with us; the tree, however, grows well, and is hardy. The Fulton, above named, is a new variety, and is believed by many to be the best apple now cultivated in the West.

5th. "Do you know any preventive or remedy for the blight on pear and apple trees, or the yellows on peach-trees?"

The yellows has never made its appearance among our peach-trees, and of the blight we have had only two visitations since the settlement of the country. The first, in the summer of 1842; and the last, in 1850. In both cases, the disease commenced after a severe chill in the atmosphere, which had been preceded by very great heat and moisture. Its attacks were confined, in a great measure, if not entirely, to trees the branches of which were stimulated to the utmost, either by severe pruning, or high cultivation on a rich soil. Where the affected branches were removed soon after the attack, the disease did not spread over the tree; but, where they were suffered to remain, it spread from branch to branch, often doing great injury. Whatever may be the cause of the disease, it is certain that it will spread by infection unless the diseased parts be removed. I am confident that most of the injury done by the blight, in the years above named, was caused by a too free use of the pruning-knife before the malady commenced, and a too limited use of it afterwards.

6th. The transplanting of trees is an operation so simple, so easily performed, so free from mystery, it would seem that all the world might understand it. Yet, many who attempt it either fail in toto or in part. For the benefit of the inexperienced, we will venture to state some of the causes of failure: 1st. In taking up a tree. If it is small, it is often pulled up; this strains and lacerates the roots. A tree should always be dug up, not pulled up. 2d. The work is often done with a dull instrument, and the few roots which remain are often bruised and broken. 3d. There is often an unnecessary exposure of the roots to the atmosphere. If properly handled, the most tender tree may be taken up, transported a thousand miles, and reset with safety; when a few hours, and, in some cases, a few minutes of needless exposure will destroy it. By dipping the roots in diluted clay immediately after being taken up, then wrapping them in moss or some other substance which will not ferment, and will retain moisture, they may be kept out of the ground long enough to be carried any desirable distance. This work should be done in the spring or fall, when the temperature is above freezing and below the vegetating point. 4th. Another very common error in planting trees is a neglect to pare off all bruised and diseased roots at the time of transplanting. 5th. And last, though not least, the bungling manner in which the earth is placed about the roots, sometimes being shovelled in upon them, and then trodden down. No man can be a successful planter of trees if he is too proud or too lazy to get upon his knees and carefully pack the earth among the roots with his hands.

7th. *Budding.*—This operation we perform as early in July as it is practicable to obtain mature buds. The stocks should be cut off (above the bud) in seven or eight days after the insertion of the buds. In this way, if the stocks are thrifty, we are sure to obtain shoots from 10 to 30 inches long the first season. The best stocks for budding are seedlings, transplanted at one year old, and budded the second summer after.

Grafting.—Most of the grafting done here is what is called root-grafting. This is done in a warm room, in the winter season, upon the roots of one year's growth, taken up in the fall, and secured from the frost. The stock of the seedling should be cut off, leaving with the roots about 3 inches, upon which scions of the same size should be attached, and firmly tied with a moistened corn-husk. They should then be packed in earth, in boxes 8 inches deep, with the points of the scions left exposed about an inch above the earth. In this condition they should remain in the cellar until warm weather in the spring, when they should be exposed to the light and heat. After they begin to expand their leaves, and to throw out roots, they should be taken from the boxes and transferred to nursery rows, where they push up a shoot 3 or 4 feet high the first season. It is a very good practice to take up root grafts the next fall after planting, and bury them securely during the winter, as they are tender when the growth is very great, and often suffer during a severe winter. This, however, is seldom done.

Grapes.—The experience thus far acquired in grape culture in this newly-settled country is of course very limited, yet we are not without hope of a good time coming, when pure wine will supersede the poisonous beverages now too much in use. The Catawba grows well, is hardy and productive, so far as tried. I have a vine on my premises, said to have been brought from the Rhine, which has produced a full crop of delicious grapes every season for the last ten years. This variety has been spread considerably over the country, and will soon be tried for making wine. The Isabella has proved to be a failure with us, except when trained upon walls. We have, in this vicinity, some seedling grapes from the valley of the Connecticut, which bear prodigious crops, the quality not first-rate. From the experience

thus far had, we have good reason to believe that the bluffs of the Illinois are as well adapted to grape culture as the hills in the vicinity of Cincinnati, where so much wine is made.

Yours, &c.

EDSON HARKNESS.

IRRIGATION.

No country has greater natural advantages for irrigating all improved land than the United States; and the time approaches when these advantages will be turned to a useful account. To encourage improvements by the aid of running water, which is always charged with both the organic and inorganic food of plants, in a greater or less degree, we give an instructive and suggestive article, translated from *L'Echo Agricole* of a recent date:—

Drainage and irrigation are measures of the highest utility in agriculture. Indeed, it may be said that all our agricultural energies should be devoted to this object. But works of drainage and of irrigation are not within the easy reach of everybody. They require a pretty considerable outlay, and special information; without which the result would be almost always uncertain. A company, offering every necessary guarantee, and devoted especially to undertaking works of drainage and irrigation, would be of signal service to the interests of agriculture. We have frequently been the medium of recording the desires of the agricultural body, in their appeals for the formation of a company of this description. The Central Society of Agriculture, after hearing an excellent report by M. Batailler, on the irrigation effected by him on his estate of Portail, near Montargis, expressed, in 1849, the same opinion and desire.

Such a company is now established. For a long time past, several gentlemen, appreciating the excellence of M. Batailler's system of irrigation, and carefully weighing the advantages afforded by drainage, have been engaged in the formation of such a company. We are now in a position to announce its definitive establishment, and publish its programme and regulations.

The director of this great undertaking, M. de Liron d'Airolles, chevalier de la Legion d'Honneur, and formerly a practical agriculturist, has just favored us with all the documents and necessary information for the purpose of replying, through the medium of the *Echo Agricole*, to the numerous questions which have been addressed to him on this subject. We will now place these documents before our readers.

"The object of the company is to carry out, in France, works of irrigation, on the plan of those so much admired in the plains of Lombardy and in Piedmont, and which, wherever they have been skilfully carried, have secured large profits to the proprietor of the soil, and comfort and prosperity to the people. The company will extend its operations, limiting them, however, within the extent of its capital, to all districts which offer the most profitable investment; and advantageous proposals have been addressed to it from all sides. The Committee of Management feel convinced that whatever may be the amount of capital at disposal, it will, for very many years, be inadequate for the works which can be beneficially executed."

"*Data on the probable results of the operations.*—In many localities, the value of the soil has been increased tenfold by irrigation. But the company will ground its calculations on works executed under more ordinary circumstances, and under a climate which does not join the advantages of a high temperature to those of irrigation. Such an example presents itself in the works executed by M. Batailler, a landed proprietor, and formerly a pupil of the Polytechnic School, on his estate of Portail, near Montargis, where, by an expenditure of 600 francs the hectare,* (about £10 an acre,) he has transformed an arid and almost useless soil into rich meadow land.

"These results have been confirmed by numerous reports from the Inspector of Agriculture, and from commissions appointed by the agricultural committees, and by the administration of the department of Loiret.

"'The land on which M. Batailler has been operating,' say MM. de Sainville and de Montferrand, delegates from the Agricultural Society of Montargis, in their report of the 1st of September, 1847, 'was of very indifferent quality, and let at 10 francs the arpent metrique, or 20 francs the hectare,' (about seven shillings the acre.)

"This rental represents a capital of 700 francs; and it is notorious that these meadows, producing 1600 boottes† of hay, of the first quality, in two crops, are worth more than 4000 francs the hectare: being an increase of more than 3300 francs, a sum from five to six times greater than the capital expended.

"'To resume,' continue MM. de Sainville and de Montferrand, 'we think that the works executed by M. Batailler are well conceived and executed; and that the application of his system would be exceedingly advantageous in all situations where a sufficient supply of water and a suitable adaptation of the land are to be found. We do not, therefore, hesitate to propose that the gold medal offered for the best system of irrigation be awarded to M. Batailler.'

"The correctness of this example is further confirmed by the precisely similar results obtained, under a colder climate, in La Campine, the Sologne of Belgium, which have been published in a valuable work, by M. Mangen, engineer of bridges. 'The government works, and those of the Irrigation Society,' says M. Mangen, 'have already increased the value of some thousands of hectares of land, six or seven fold. There are also uncultivated downs in La Campine, which have been transformed into meadow land of the first quality, at an expenditure of 600 francs the hectare.' 'These are,' adds M. Mangen, 'remarkable instances of industrial companies engaging in agriculture. It is highly desirable that a large amount of capital should be employed in the same way in France.' We entertain no doubt of the success of this sort of undertaking, judiciously and honorably conducted.

"The above results are independent of those obtained by the aid of M. Batailler's system of liquid manure.

"MM. Dumas and Paine had long drawn the attention of cultivators to the advantages attending the application of copious irrigation with water, charged with some thousandth parts only of organic matter, as a means of

* The "hectare" is 11,960¼ square yards.
† The "bootte," weighs about 11 pounds English.

accelerating the progress of vegetation in an extraordinary manner. M. Batailler has responded to this appeal, and has succeeded in rendering these principles more thoroughly applicable than could have been possibly anticipated; for he not only makes practical use of all the fertilizing principles of *Flemish manure,* but he applies it to the land in irrigating streams in the exactly suitable proportions, without the expense of spreading; and, consequently, experiences no loss of gas and no offensive smell. This new process in irrigation has been unanimously approved by both practical and scientific men.

"1st. The Agricultural Committee of Montargis, which has inquired into M. Batailler's plan of irrigation on the estate of Portail, has awarded him a gold medal.

"2d. The Central Society of Agriculture, in its sitting of the 7th of February, 1849, recognised the special advantages secured by this method, and declared it deserving of serious attention. A member, M. Payen, cited the example of a similar system of irrigation, carried on in the plain of Issy, which produces four or five crops of hay, where, previously, only one was gathered.

"3d. The Society of Encouragement, in its second sitting of February, 1849, voted the publication of M. Batailler's paper, after a public and highly complimentary approval, pronounced by its president, M. Dumas.

"4th. The Jury of the Exposition has awarded two medals to M. Batailler; one from the report of the Commission on Chemical Arts, and the other on the proposition of the Agricultural Committee.

"5th, and lastly. The Council of Public Health, in its sitting of the 8th of March, 1850, impressed with the importance of the results obtained, recommended a grant to M. Batailler of the 30,000 metres of nightsoil reserved for such purposes by the city of Paris.

"The company, therefore, seconded by the most talented engineers and distinguished agriculturists, appeals confidently for the raising of its capital to the friends of agriculture, and to those who wish to employ their money in a manner most safe, the most beneficial to the country, the most productive of moral good, and its substantial advantages. M. Batailler has granted to the company the sole use of his system.

"We cannot do better here than to quote some extracts from modern writers who have treated on the subject of irrigation.

"*M. Mathieu de Dombastes.*—'Of all the improvements in the means by which the products of the soil may be permanently increased, there is, perhaps, none more important than irrigation; and yet the practice of this system has been, hitherto, confined to but a small number of the departments of France. It affords, in fact, a most striking instance of the slow progress made in agricultural arts of the most evident utility.'

"*M. Jaubert de Passa.*—'Who could venture to form a calculation of what the future has in store for France, if irrigation obtains a footing there, under the protection of the laws; if new and peaceful channels of labor be opened up for the poorer class; if a more perfect and diversified culture of the land, and an application of irrigating streams for improving waste lands, retain in their villages these numerous labourers, now congregated in populous towns, through want, neglect, and many other causes; if more extensive meadows and superior pasturage conduce to the improvement in the breed of cattle and horses; and if the food of the people become more wholesome and abundant?'

"*M. Hericart de Thury.*—'The law of Angeville is but the first instalment of a more complete legislation on this high and important question of irrigation. There is not perhaps, in other districts, a sufficient knowledge of all the advantage that can be rendered by irrigation and the influential part it may perform in the destinies of the people.'

"*M. Auguste de Gasparin.*—'At Orange, the fifth part of the land is submitted to irrigation. Meadows as beautiful as those of Milan are mowed three or four times a year, and are let as high as 450 francs the hectare. One-third of this sum is expended in the management of the land. These returns equal from three to ten times the revenue of identically similar soils under ordinary cultivation. At Avignon, the water triples the value of the excellent land which surrounds the town. At Vaison, and at Malancene, irrigation raises the value of the naturally inferior soils to 12,000 and 14,000 francs the hectare. At Cavaillon, the waters of the Durance have, in some places, increased the value of the soil tenfold. Lands, which hardly fetched 500 francs the hectare, are valued at 5000. At Sorgues, a sterile country, which was repulsive to the eye of the traveller, has improved a hundred-told through irrigation. The desert has been here changed, as it were, into the smiling plains of Lombardy.

"M. Taluyers, of Saint Laurent, (Rhêne,) has, with an outlay of only 20,000 francs, formed a meadow of 33 hectares, producing an income of 10,000 francs. The land brought in previously no more than 1200 francs. It is, moreover, with very small outlay that the riches of the soil have been thus opened up. At Cavaillon, close to the banks of the Durance, occurs almost the only instance in which the system has acquired a remarkable development. Everywhere else the operations have been mere experiments. An example is hereby, however, bequeathed to posterity, demonstrative of the course they ought to adopt, as well as of its practicability.'

"*M. Nadault de Buffon.*—'France alone requires the formation of at least 5,000,000 hectares of meadow land, to give it the proportion of one to two with land cultivated by the plough. An increase of riches would then ensue to the amount of more than 6000 millions, (£240,000,000,) equivalent to a revenue of more than 300 millions, (£12,000,000.) Thus, notwithstanding the expense incurred, irrigation is one of the most certain elements of wealth to the countries which employ it: a fact easily confirmed by the more outward aspect of general comfort among the population in irrigated countries, by the cleanliness and convenience of the rural habitations, and by the facility with which the various liabilities are discharged.'

"*M. de Maunay de Mornay*, in his 'Studies on the Irrigation of Upper Italy,' has given a description of the magnificent works executed in that country, with information as to the manner of their construction, and the changes requisite in French legislation necessary to get rid of the obstacles, now frequently invincible, which are opposed to the use of running waters. 'In the present state of things,' says M. de Mornay, 'the streams pursue their course to the sea without affording one-twentieth part of the advantages which might be secured from them.'

"It would be superfluous to enlarge here on the considerations of public interest which are now more strongly than ever connected with the subject of agricultural labor. Those who are anxious for the future prosperity of the country are bound to second the government in realizing the idea expressed by the Minister of Agriculture and Commerce, in his circular of the 3d March, 1850:—'The government wishes the lot of the agricultural laborers to be so enviable as to counteract the temptation to exchange it for a town-life. On the other hand, it is desirable that the artisan in town be induced to remove to the midst of the fields, where he will find health and prosperity for himself and his family.'

"All these motives amply prove that the moment has arrived for carrying into execution the long-meditated project of forming a company which shall raise the funds necessary for those great works of irrigation which do honor to some neighboring countries, and of which France has been hitherto deprived. It is with this object that the company whose title, constitution, powers, and regulations are given below, has just been definitively constituted. The company is entitled, 'The General Agricultural, Irrigation, and Drainage Company, with or without the use of Liquid Manure.'"

December 1st, 1850.

House of Representatives, Washington, December 13th, 1850.

Sir:—I have the honor to reply to your interrogatories of the 12th inst. on the subject of sheep husbandry in the South.

1st. In my congressional district, we have the Southdown, Bakewell, Merino, and other *blooded* sheep; but by far the greater quantity are mixed-blooded; and these last are the more healthy, and are consequently the favourite sheep.

2d. The clip of wool varies, of course, according to the quality of the sheep. Two pounds per head for the ordinary stock of the country is about an average. Flocks of the improved breed yield much better.

3d. They are remarkably healthy and very prolific in young, more so, perhaps, than in any country where they are so little cared for by their owners.

4th. *Sheep-rot* is the only disease to which they are very subject, and does not happen so often as in other countries.

5th. I do not think it an object with our planters to increase their flocks to a greater extent than to supply their family wants. The sheep is valued with us more for his flesh than his fleece. The mutton, we think, is quite equal to any *in the world*.

6th. We market our wool as we do our cotton, and ordinarily sell it to the same persons and in the same way. A good deal is worked up into cloth in the country.

7th. The cost of raising and keeping sheep is so near nothing, that I have never heard it computed. Our farmers sometimes have waste grounds, on which they pasture their sheep; but generally they run in the open woods; and here, I think, they do best. They have a little salt thrown them once a week, and besides this no attention is ordinarily given them.

8th. We do not ordinarily feed them at all. They generally subsist themselves in the woods or in the fields.

9th. We have no grasses or other esculents for the feed of sheep in summer. The ordinary grasses of the country, such as are indigenous to the soil, we find quite sufficient.

10th. We have neither grain nor dry food for them in the winter. If we have occasion to feed them, which seldom happens, we give them the blades of the Indian corn, which we call "fodder." Sometimes a little corn is given them, but I doubt if it does not more harm than good.

Our winters are mild, and it seldom happens that a sheep is not able to subsist himself without aid. If we find him lingering in January or February, we give him some assistance; but he gets along very well on the old grass until late in the winter; and by the 1st of March he can nip the new crop.

On the whole, I know of no country where the sheep prospers more than in South Mississippi. The fleece may not be so fine or so heavy as in more northern latitudes; but he yields it free of cost, and throws his flesh into the bargain. The flocks multiply with singular rapidity, and, as I have said before, the mutton is equal to any in the world.

Very truly, your obedient servant,

A. G. BROWN.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Lisbon Post Office, Union County, Arkansas, January 6th, 1851.

Sir:—The Patent Office Circular of 1850 having been placed in my hands by Colonel John R. Hampton, to whom it was sent for reply, I submit, after due reflection, the following observations, which are designed to have reference more especially to the southern upland counties of this state.

Wheat.—This crop is not generally cultivated in this region, the soil and climate not being well adapted to it. However, of a favourable season, the yield is, say 15 bushels per acre, and of very superior quality, weighing from 65 lbs. to 70 lbs. per bushel.

Corn is planted generally for home consumption, and as yet there has been seldom more made than the wants of the country called for, owing to its recent settlement and constant and rapidly increasing population. Kind most successful, large white. Average product, say 20 bushels per acre.

Oats, so far as tried, do well here. The large white, or Egyptian, for fall, and the little black for spring sowing. Our lands are, as yet, too fresh to enable us to judge with any degree of accuracy as to what extent this crop is an exhauster. This crop is much more generally cultivated than wheat, our light sandy lands being better adapted to it.

Sweet potatoes are largely cultivated and constitute our most valuable root crop. Product per acre, 200 to 400 bushels. Kind most cultivated, yellow yams.

Irish potatoes succeed well, and are generally planted for spring and early summer use. Time of planting, middle of January to middle of February for early crop. Average per acre, 30 to 40 bushels.

Cotton.—This is our staple crop; time of planting, middle of March to the middle of April—though fair crops are occasionally made, with a favorable season, planted as late as the middle of May; average product per acre, with fair cultivation, 200 pounds ginned cotton. We value cotton-seed very highly as a fertilizer either for corn or cotton; and, as a general thing, but little attention is given to any other kind of manure. A few of our planters, however, are now turning their attention to that subject, as well

as hill-side ditching and horizontal cultivation, which I feel assured will result in a great benefit both to themselves and the community.

With sentiments of the highest regard and respect,

I am very sincerely yours,

E. W. WRIGHT.

THOMAS EWBANK, Esq.
Commissioner of Patents.

Sir:—Through the kindness of Thos. C. Fletcher, Esq., of this place, I have been favored with a copy of your agricultural circular, and requested to reply to its inquiries so far as the productions of Jefferson county extend.

Wheat.—The varieties mostly cultivated are the red-chaff, bald, and May wheat; average product per acre, 8 bushels; time of seeding is from the 15th of September to the 15th of November; and the time of harvesting from the 20th of May to the last of June. It is usually sown without previous preparation of seed: one bushel per acre is the quantity usually sown. It is usually sown among corn or on oat stubble, and ploughed under. The yield per acre is not increasing. There is no system of crops practised; the ground is usually cultivated in corn till it will not produce a full crop, and then sown with wheat or oats "to rest it." Wheat was worth from 75 cents to $1.20 in St. Louis, in 1850.

Corn.—Common white and yellow are varieties sown; the average yield per acre is 30 bushels; the cost of production, about 15 cents per bushel. The manner of cultivation is to break up the ground in the spring; check off about 4 feet apart each way, having from 2 to 4 stalks in a hill; plough 3 or 4 times with shovel or Carey-plough, and by this time the weather is generally very warm. "Get up on the fence and lay it by." It is usually fed whole. Manure is not much used.

Oats.—We sow 2 bushels per acre, giving a yield of about 20 bushels per acre. In the opinion of your correspondent, oats are the most exhausting crop grown on our farms, (weeds excepted.)

Barley, rye, peas, and *beans* are not cultivated.

There are but few good meadows, notwithstanding much of our soil is well adapted to the growth of grass. The yield per acre is about one ton without manure.

Butter is worth 10 cents per pound. We have no pastures for our cattle. They live in the "range" in summer, and in the stalk-fields in winter. A good cow is worth from $10 to $12. We have no imported cattle; never stall feed, but allow our beef to fatten in the range. Flocks of sheep usually diminish in numbers on account of the depredations of wolves.

Wool-growing would be profitable with proper attention.

Our best *hogs* are a mixture of the Berkshire and the common breeds. They run at large; and get just corn enough to keep them alive until it is time to fatten them, when they are turned into a lot and fed on corn in the ear from 2 to 6 weeks.

Potatoes and *turnips* are grown only in small quantities for family use.

Fruit.—There are a few good orchards in the county. Fruit, especially apples, is one of the most profitable crops we raise. The large yield 50 bushels per acre; expense, from 20 to 30 cents per bushel, which sells from 62½ to 70 cents.

John Shoener raised, in the neighborhood of Orwigsburg, 270 bushels on 3 acres of land, of the red-gourd corn. On ordinary land, his mode of planting is by dropping a single grain in the drill 12 or 15 inches apart; distance between the drills 3 feet.

Rye and *oats* are raised here, of which rye is the least exhausting and the most profitable crop.

Buckwheat is an excellent and profitable article, if it succeeds; but it is a very precarious crop. It is used extensively in this county for fattening hogs and cattle. Lime, as a top-dressing, is an excellent manure for this grain. Land that will produce no other crop will bring buckwheat. Clover seed may be sown with buckwheat, and a good crop expected, if the land is previously limed.

A large crop of the common turnip and potato is raised in this county; and they generally find a good market. There is no particular mode practised in raising these crops. This county depends upon the north and northwestern parts of Pennsylvania for its supply of beef and mutton. The farmer has so good a market for his grain and hay, that he finds the raising of cattle a poor business. The great facility of procuring ready-burned lime from Berks County, via of Schuylkill canal, enables us to improve our lands rapidly and with reasonable expense. Lime is delivered on the canal at 9 cents per bushel; and 50 bushels to an acre are considered sufficient to produce a good crop of hay. Let the general government protect our coal trade, and enable our miners to pay us for our produce, is all the farmers of Schuylkill county ask. They want no foreign market. If we are to depend upon that, we shall soon be obliged to stop raising crops; but if the coal business flourishes, then we have an excellent market for all we can raise.

Respectfully yours,

JAC. HAMMER.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Statesville, Aredell County, N. C., December 28th, 1850.

Sir:—Your circular, soliciting information on the various branches of agriculture, was placed in my hands. I feel extreme reluctance in undertaking to answer any part of it. We have no systematic farming, except what may be done by a few isolated individuals; nor have we any agricultural society here. You will therefore perceive how difficult it is to collect information nearly approximating to the truth, of the kind you desire, as well as how important such returns must be. I have concluded, however, to answer, as well as I am able, with the means at my command, a few of the questions presented in your circular; and you can make what disposition of this you think proper.

Wheat.—We have the spring wheat, the red bearded, fly-proof, blue-straw, May, and Mediterranean: a number of other varieties have been tried within the last few years, and discarded. The two first named proved the best last season; and, in consequence, more than usual of both kinds have been seeded down this fall. Seeding of all the varieties, except May, usually in October. Early seeding would be greatly preferable, if it were not from danger of the fly, which is certain to attack the young wheat, in case of drought immediately succeeding sowing. The May wheat, to avoid the spring frost, to which we are subject, cannot be safely sown until November or December. The latter kind is harvested about the last of May, or first of June; the other varieties, from the 15th to 25th of June. One bushel of seed is sown per acre; and usually dispatched, whether on stalk or fallow land, with one ploughing. Wheat, owing to the Hessian-fly, late frost, and, I may add, to our indifferent farming, is here an uncertain crop. No remedy is known here for the Hessian-fly. Threshing as soon as the wheat is dry is an effectual remedy for the weevil.

Corn.—The white is most esteemed for bread, and on account of its deep and extended roots; in other words, standing a drought better than the yellow. The yellow, on account of its being a softer variety, is preferred for stock, and is supposed to yield better than the white on bottom land. The average yield, I think, must be about 15, or farthest, 20 bushels per acre. A bushel of corn cannot be grown here with profit, for less than 40 cents. Farmers seldom get that much for it; more frequently, 20 and 25 cents per bushel.

Oats are extensively grown in this county; 15 bushels is about the average yield per acre; 1 or 2 bushels, according to the land, sown per acre.

Peas are beginning to be extensively cultivated here; not, however, as a renovator of the soil; though, from experiments I have seen made, I have no doubt of their being a very renovating crop, and the most economical fertilizer of the soil of any crop we can grow upon it; for the beneficial effects of this are observed, whether turned under ground or left to decay on the surface. The pea is mostly planted here for hogs, and they easily repay for the labor bestowed upon their cultivation for that purpose. From experiments made in this county with clover, I am inclined to think it will not do to rely upon it as a renovator of the soil, as it requires a rich soil to produce it; yet, it is an excellent renovator, but liable to be cut short by early drought. Abundance of hay is made in this county on our swamps or wet bottoms, though not so much as formerly, as vast quantities of our swamps have been redeemed within the last few years, and converted into clover land. No attention is paid in this county to the growing of wool, except for domestic purposes; neither would it be worth while, on account of the dogs. The extermination of the whole canine race, I have no doubt, would result to the advantage of the people of this county; as there can be no doubt of the susceptibility of our soil and climate for the purposes of wool-growing. Our whole system of farming is gradually tending towards a change for the better. Increased attention is being paid to the subject of making manure; though we labor under great disadvantages in this respect. We have neither lime nor plaster in this county, but abundance of every other material, which, as experiments have proved, and are proving, can, with little cost, be converted into excellent manure; and even the small deposit of those matured upon the soil and turned regularly. When the plants are of a sufficient size, they should be thinned, so as to be 10 or 12 inches apart; and, by chopping over twice, and ploughing once, you may expect an abundant crop. I consider turnips are more profitable for a farmer than any other crop he could plant or sow on the same piece of ground. The kind of seed most sown or preferred in this section is the English white, which grows mostly out of the ground, and, for this reason, the turnips need hilling up before much cold weather comes on them. I cannot do the subject justice—so I will close.

Very respectfully, yours,
R. H. BENNET.

T. EWBANK.

Vermilion, Erie County, Ohio, December 10th, 1850.

Sir:—Your Agricultural Circular came to me in due season, and, although I cannot flatter myself with being able materially to add to the value of your report, still, as this report from the Patent Office is becoming more and more the means of extensive good to our wide-extended country, I cannot refuse my feeble efforts to increase its usefulness. My field of observation is confined chiefly to the eastern parts of Erie and Huron, and the west part of Lorain counties. This territory is on the extreme southern bend of Lake Erie, and comprises almost every variety of soil, and so intermingled that it is difficult finding 100 acres which do not embrace several varieties. The western parts of the above-named counties are upon the limestone formation; the eastern parts, and Lorain, on sandstone and clay. The drift forming the *superstrata* appears to have come from the west and northwest, so that considerable quantities of lime are intermingled with the soil of the eastern parts of the field of my observations. The climate is somewhat severe and open in winter, very little snow falling, which often winter-kills wheat, especially on clayey and wet soils. The spring is always cold, chilly, and backward, for this latitude, owing to the large quantities of ice and cold water in the lake. Summer is warm and pleasant, and the autumn very serene, mild, and pleasant, owing to the proximity of a large, shallow body of water, by the powerful rays of the summer sun. Hence we feel almost sure of sound corn, if planted by the 10th of June. It is a good fruit country, for the chills of spring keep back the buds, and, although disagreeable to the senses, are still above the freezing point, and prevent injury from late frosts. Apples scarcely ever fail; and peaches, along the lake, and 3 or 4 miles back, only fail once in 3 or 4 years.

These preliminary observations on our geographical and geological situations and meteorological peculiarities will enable the intelligent reader to comprehend the advantages and disadvantages of our location.

Wheat is our most important crop. In its cultivation, we often run on Charybdis in attempting to avoid Scylla; that is, by sowing late to avoid the fly, (for the Hessian-fly seldom injures wheat sown after the 24th of September,) we expose the too tender plants to the severe frosts and frequent thaws of winter, thus losing by winter-killing; or else the rust is liable to take it just before it ripens, on all but the warmest soils. The most successful way to avoid all these evils is to keep the land in high tilth; sow late, to avoid the fly; plough deep; and thoroughly drain, either by ditching or by throwing into narrow beds, to prevent heaving, and drowning out; and cultivate the earliest varieties, to avoid the rust. The Soules, bluestem, white, improved flint, and Hutchinson are all in good repute for this purpose: and those who practise the above seeds seldom fail of a good crop of wheat. There is no regular system of rotation which has obtained among us. Such is the diversity of soils, and so much do our farmers accommodate their operations to what they call their convenience or necessities, that few practise alike, or pursue any fixed plan. Fronting on the lake is a soil remarkably adapted to wheat culture. Here a system (if it may be called a system) of stubbling prevails—wheat succeeding wheat for a series of years, and without any material diminution of the yield. This year, 30 or 40 bushels per acre have been produced from lands from 3 to 6 years in wheat, without rest or any intervening crop—merely burning off or turning under the stubble. Generally, back from the lake, naked summer-fallows secure the best crops. Deep ploughing is found beneficial, as the subsoil is generally composed of all the materials for promoting the growth of vegetation, and only needs exposing to the action of the elements to fit it for that purpose.

Two ploughings are given in summer-fallowing, and generally one for stubbling, or when wheat succeeds corn or oats. From the 20th to the last of September is the best time to seed, though, the Hessian-fly out of the way, the first part of September would be much better. One and a half bushel per acre is about the average amount of seed used. This was a heavy-timbered country; and, as the stumps get out of the way, we can plough deeper and cleaner, and in every way manage it better than formerly. So that the crop is increased by the greater quantity in cultivation, and the larger yield per acre. I am satisfied the average yield is not far from 18 bushels per acre, for a series of years previous to this year, while, this year, the average is not less than 25 bushels—probably over. Taking all the wheat raised for 5 years, I estimate the average cost of production at 67 cents; and the average price during that time has been about 85 cents—this year, 75 cents.

Corn.—We cultivate several varieties of what is here called gourd-seed. They are all nearly a hybrid between the rough gourd-seed of the South and the flints of the North. Experiments have proved that the gourd-seed of the South, in a few years, accommodates itself to our climate, by becoming more flinty; while the flint corn of New England approximates towards the gourd by becoming dented, and increasing in size of ears and number of rows. Fifty bushels per acre are about the average product, and the cost of production not far from 25 cents per bushel. The best crops are raised with least labor (and those two words, *best* and *least*, are much in favor) by manuring from the stock-yard a clover sod, or an old meadow, thoroughly breaking it up just before planting; and, having rolled or bushed it, drag with a sharp harrow till it is mellow, then plant, and use a corn-cultivator and plough, particularly in keeping down the weeds. The best time for planting is the last of May, except on dry, sandy soils.

Clover and Grasses.—In good seasons, 2 tons per acre are the average. This year it was less, by half. The average for a series of years is about 1½ ton. Timothy and red-top for permanent meadows, and clover and timothy on arable lands, are preferred. From 4 to 8 quarts of seed per acre are usually sown; and in seeding marshy and wet lands, which produce weeds very abundantly, from one-half to one bushel of seed, sown in September, has proved very successful. The cost of production is about $3 per ton, and it is generally worth from $4 to $5.

Sheep and Wool.—We consider wool-growing profitable, when common or medium quality brings 25 cents per pound. I compute the cost as follows:

Dr.

To 100 sheep	$100.00	
" 30 acres, $15 per acre	450.00	
	$550.00	capital.
Interest for 1 year	$33.00	
Saving 5 tons of hay	10.00	
Salt, attention, shearing, &c.	50.00	
	$93.00	outlay.

Cr.

By 96 fleeces, (deducting 4 for casualties,) each of $3\frac{1}{2}$ lbs. in weight, at 25 cents per pound, would equal	$84.00	
By 60 lambs, more than keeping old stock good	30.00	
	$114.00	income.
	93.00	outlay.
	$21.00	profit.

This estimate is made upon good common sheep. The advocates for the coarse-woolled, and their opponents, for the fine, *figure much larger profits.* I doubt whether there is much difference in the amount of food necessary to produce a pound of either quality, or whether there is much difference in the profits. The superior bodies, for market, of the coarse-woolled, their hardiness, and superior nursing qualities, fully, if not more than balancing the higher priced fleeces of the fine-woolled. We need both kinds; and it is presumable that those who will give the *necessary attention* to raising a fine-woolled flock, will find it equally as profitable as those will who prefer to devote less attention to a coarser one. Our lands are rather wet, and the grass rank, which seems to indicate them as better suited to the coarser woolled sheep. Some few amateur breeders will, of course, command the market, and make much ado about the *enormous* profits and wonderful fleeces of their respective flocks; but, in general, we must content ourselves with ordinary fleeces, common prices, and moderate profits—not, however, neglecting any opportunity for improvement.

Hogs.—We consider the Berkshire, and crosses between that and the grass, the best breeds. The southern part of this State, Kentucky, Indiana, and Illinois can raise corn and, consequently, pork, so much cheaper than we can, that they have nearly driven us out of the market; and especially since corn has brought an advanced price at our lake markets, in consequence of its increased exportation to Europe. *Our* corn is worth more than the pork it will make. Very little is made for export. The cheapest way we can make pork is to fatten mostly on apples. They will increase in weight nearly or quite as fast on good ripe apples as they will on corn, and the pork is nearly as good, if fed on corn a few weeks before killing. A little grain should be given with the apples. Meal is much better than dry corn, and, if cooked, all the better; but grinding and cooking is very little practised.

Fruit Culture.—There is increased attention to the cultivation of good

fruit. I have no doubt but land put out to apple-trees, providing suitable pains is taken in selecting the best varieties, is as profitable to the farmer as almost any other crop. I am satisfied, from feeding them to various kinds of stock, that good sweet apples are worth nearly as much as potatoes. I tried them on a colt we were weaning this fall, and which had fallen away considerably, and he improved faster than I ever had one on oats. Probably, cooked potatoes are more nutritious than apples, but, taking the trouble and expense of cooking into account, we hardly doubt that apples are worth within from 50 to 75 per cent. as much as potatoes, for all kinds of stock.

Peaches, too, may be made profitable, to the extent of the demand, green and dried. Peaches, peeled and dried, bring from $3 to $3½ per bushel; unpealed, half price. It is said, by those pretending to know, that our climate and soil will not produce as fine peaches as New Jersey. I can see no good reason for this opinion, except that there has not been pains taken to cultivate them here. We have a better soil, and as good warm weather in summer and fall as they, and as much of it. What, then, is there to hinder? I have a small pioneer orchard growing, and just wish to notify our New Jersey friends that, if they can send peaches to our lake *now*, to look out for competition from this quarter, even as far as New York and Boston, before this generation has passed away.

Grapes.—I would suggest that those who wish to have a supply of delicious grapes for the table, fair and bright, will be much more likely to have their desires gratified by letting their vines climb some good-sized tree, instead of keeping them confined to a stake, near the ground. My Isabellas never fail of being fair and bright, and ripen a week or two earlier up in a tree-top; while, near the ground, on the arbor and trellis, they mildew and rot, nearly half the time. Very good wine is made here from the Isabella, by boiling the unfermented juice—about three barrels to one.

The year 1850 has been very remarkable on several accounts. By referring to my diary, I find January was cold up to the 7th, then warm, with some rain.

BENJAMIN SOMMERS.

Centreville, Wayne County, Indiana, December 24th, 1850.

Sir:—In answer to the interrogatories contained in your Agricultural Circular, a copy of which I have received, I will endeavour to give the information required, so far as my limited means will permit. As the nature and quality of the soil is connected with agriculture, I will merely state that a tenacious clay soil prevails in our county, with a subsoil of the same, except our creek bottoms, which are a black loam. A large proportion of the timber is beech and sugar-maple, with hickory, oak, ash, poplar, walnut, and cherry. In agriculture, we are in what might be termed a transition state: done making farms, and beginning to farm. Much interest is manifested by some in receiving and imparting knowledge on the subject and in procuring improved implements of husbandry. The result of this wholesome condition in the farming community was the organization of the Wayne County Agricultural Society.

Wheat.—The white and red-chaff bearded are the kinds generally cultivated. The velvet and Mediterranean are sown, but not extensively. The velvet is much esteemed, and more of it will be sown than formerly. The

Mediterranean yields more per acre and is the least liable to casualties; but it has a soft straw, which renders it liable to lodge. Probable average yield per acre, 19 bushels. Time of seeding, from the last of August to the 10th of October: from the 5th to the 15th September is preferred. Harvesting, the last week of June and first week of July. Quantity sown per acre, 1¼ to 1½ bushel, the latter quantity to be preferred on strong land. One ploughing, from 4 to 5 inches deep, is all the land usually gets. By means of a better method of farming, and our lands having been longer in cultivation, the quantity of straw is diminished and that of grain increased, while the number of acres sown has increased threefold in consequence of the improvements in roads and the building of mills, which afford a ready cash market. We have no established system of rotation in crops, but are governed by circumstances or the nature of the soil. The practice of sowing wheat on the same field one, two, and three years in succession is finding favour with some. Many sow after corn; but we do not get so good a crop as on fallow ground or stubble. The difficulties that the wheat-grower here has to contend with are the Hessian-fly, freezing out, and rust. Manure is considered a good remedy against all of them. Sowing on sward is the best preventive against freezing out. Average price for 1850, 60 cents per bushel.

Corn.—This great staple of the farmer is a crop of the first importance with us, and, whatever mishaps befall other crops, this always comes forward and takes us through. It is planted from the 24th of April to the 1st of June. From the 1st to the 10th of May is best, 4 quarts of seed to the acre. We have a white gourd-seed corn, with a red cob, much esteemed, and a large white variety that yields well; also the yellow gourd-seed, much in favour with some for feeding stock. Probable average product per acre, 40 bushels. It is difficult to make an accurate estimate of the cost per bushel for raising corn, for the difference in the quality of the soil would make a difference of 10 per cent. in raising. The following is an estimate for a medium quality of land:—For ploughing, 75 cents per acre; harrowing, 85 cents; marking, planting, and seed, 60 cents; one harrowing and three plantings, $1.50; interest for the land, $1.20; total cost for one acre, $4.40, or 11 cents per bushel. The great art of raising corn consists in keeping the ground free from weeds, and well pulverized about the roots while it is young, and stirring the soil deep.

Clover and Grasses.—Our meadows will average one ton per acre. Timothy is best, though, on land somewhat worn, equal parts of clover and timothy are sown, say from 4 to 6 quarts to the acre. Cost of growing hay, $2.60 per ton.

Dairy husbandry is not followed here as a business. Our surplus butter is sold in our towns at an average of 10 cents per pound.

Neat Cattle.—Some attempts have been made to introduce the Durhams among us, and, judging from the results produced by crossing them with our native stock, I feel assured that great good would result from having a full-blooded Durham bull in every neighbourhood. As regards the cost of rearing until 3 years old, the best answer I can give is, that it is not worth the price they would sell for at that age, which is from $16 to $18 per head. Pasturage is worth 50 cents per month, and wintering on corn fodder and straw, about the same. Good cows sell from $14 to $16 each the year round.

Sheep and Wool.—In a country like ours, where the land is nearly all adapted to agricultural purposes, the growing of wool cannot be profitable at present prices. The number of lambs annually raised is about two-thirds that of the ewes. Sheep do well here; and, if farmers would so arrange it as to have the lambs come in spring, there would be very few lost.

Hogs.—What the best breeds? This question reminds me of the farmer who was noted for his good-looking porkers, and, on being asked of what breed they were, answered by pointing to his corn-crib. Notwithstanding the old farmer's opinion of the potency of a large and well-filled corn-crib in making a good breed of hogs, there are some varieties that show fuller and more palpable evidence of the benefits of said crib than others. The Irish graziers are most esteemed here. While corn is so cheap and so easily raised as at present, feeding it to hogs in the ear is thought to be the best plan; but I have no doubt that cooking potatoes, pumpkins, and apples together, and adding corn meal, is a method worthy the attention of farmers. Root crops are only raised for family use.

Fruit culture is receiving increased attention, but it is not much used as food for stock.

Potatoes are considered preferable for that purpose. Orchards have suffered far more from the "fire-blight" during the past than in any previous year, which has been attributed to an exceedingly dry season. Those on dry localities have suffered most. All attempts to raise peach-trees have proved unavailing for the last eight or ten years, in consequence of the "yellows."

Manure.—When it accumulates about our barns and stables, so as to be in the way, we generally remove the nuisance to our fields, instead of pulling down our buildings. I am under obligations to you for a package of lucerne, or French clover seed. It came up, and grew well, but after it had attained 4 to 6 inches in height, it was mostly destroyed by an insect at the root. The Germans say it will grow there. Oats not sown as much as formerly; it is thought to be an exhausting crop. Average yield per acre, 25 bushels. Barley not much raised; is not so hard on the soil as oats; average per acre, 20 bushels. Rye, hardly any sown. Peas and beans raised only for family use.

Yours respectfully,

A. HOOVER.

Bethmont P. O., Orange Co., N. C., December 21st, 1850.

Sir:—I have this day received your Agricultural Circular, and proceed to answer, as well as I can, such of your questions as apply to this vicinity.

Wheat.—Varieties in use, golden chaff, Black Sea, white bearded, Mediterranean, occasionally red and early purple straw, and Pennsylvania blue-stem. Time of seeding, May, October, November, and December. October is best. Harvest about the 20th June. No preparation of seed generally, except to clear it from cockle and cheat. It is generally sown on corn land, and put in in a slovenly manner. Some do better, sowing on fallow ground broken up late in summer, or early in autumn, and ploughed or harrowed in. I think the yield per acre has been diminishing for many years, and hope, after falling to an average of 5 bushels per acre, it has reached its minimum, and is beginning to rise, by a gradually improved system of farming. A few of us have bought up old exhausted broom-straw fields to yield 8 to 10 bushels per acre. The rotation has too generally been corn, wheat, pasturing after harvest, for 8 or 10 years, till the ground refuses to bring wheat. Then, corn and oats alternately, till the poor returns compel the unthrifty farmer to turn out his fields to broom-straw, and clear more land to be destroyed by a similar process, or move to the West. The average price of wheat may be set down at 80 cents. I have introduced the early purple-straw, a red wheat, ripening June 10th, therefore not subject to rust, which is the greatest enemy to wheat in this section, but not attacking earlier than the 10th of June. I secure it from smut, the great enemy to early wheat, by soaking it in a solution of salt, from 12 to 48 hours, and drying in lime or ashes, so as to scatter. This I have found a perfect protection. I sold my crop this year for seed, at $1.25 per bushel. I have sowed this fall samples of Troy, Iturean, white Genesee, and Zimmerman's, besides the early purple-straw, and hope to report another year.

Corn.—Common gourd-seed and Collins's corn: I think the average per acre is 15 to 20 bushels. Some do much better. Others worse. Mostly cultivated with the plough—little hoeing done. Oats generally sown on the worst land, having been planted with corn the previous year: regarded an exhausting crop. Seed per acre, 4 to 5 pecks. Product in good ground, 30 to 40 bushels; common average, about 10 bushels. Barley and rye not cultivated. Beans and peas not much cultivated, except for the table. Clover found valuable by the few who have adopted it. Timothy mostly sown in meadows, though most meadows are not sown at all, but grow up to the coarse native grasses. I am experimenting with orchard grass, lucerne, Guinea grass, perennial rye grass, and herds grass, and may, hereafter, be able to report useful results. Neat cattle receive little attention here, cost little, and are worth little. What are called dairy-cows sell at from $10 to $14 each. A few Durhams were introduced a few years since, without profit. The Devons will probably succeed well. Sheep very little attended to, and sadly annoyed and destroyed by dogs.

Hogs.—The Berkshire, or rather half Berkshire, seems to be the favorite. A cross of the Berkshire with the long-sided Kentucky sow has proved a valuable hog. Tobacco, very little cultivated. Potatoes, Irish and sweet, cultivated for domestic use only.

Indications of the Thermometer, observed at sunrise only.

Average for JANUARY, 1850	39°34′
Coldest day, Tuesday, 1st	18
Warmest, Saturday, 26th	64
(Much rain, little or no snow.)	
FEBRUARY, average	35.34
Coldest day, Tuesday, 5th	14
Warmest, Saturday, 9th	54
12 days as low as 32°, a little snow once.	
11 days of rain.	
MARCH, average	42.86
Coldest day, Friday, 29th	27
Warmest, 1st	62.30
Falling weather, 15 days; snow, 27th and 28th.	
APRIL, average	50.14
Coldest day, Thursday, 18th	32
Warmest, Tuesday, 23d	66
Rain 12 days.	
MAY, average	59½
Coldest day, Sunday, 12th	42
Warmest, 5th	70
One good rain, and several light showers.	
JUNE, average	66⅔
Coldest day, Monday, 12th	49
Warmest, Thursday, 27th	74
Very little rain this month.	
JULY, average	71⅔
Coldest day, Friday 12th	67
Warmest, 31st	76½
Temperature uniform, much cloudy or foggy weather, little or no rain.	
AUGUST, average	71½
Coldest day, Wednesday, 28th	68
Warmest, Thursday, 1st	76¾
Uniformly warm, 5 slight showers, and 1 good rain, Wednesday, 14th.	

SEPTEMBER, average	65°
Coldest days, 18th and 30th	52
Warmest, 2d	74
First half cloudy; last half clear; rather dry on the whole.	
OCTOBER, average	49½
Coldest day, 21st	36
Warmest, 18th	67
Slight frost 7th and 8th, ther.	42
One rain, the 26th.	
NOVEMBER, average	48¼
Coldest day, 18th	26
Warmest, 28th and 29th	67
Rather a dry month.	
DECEMBER, average to the 23d	42⅔
Coldest day, 14th	20
Warmest, 4th	64
A dry month.	
From JANUARY to MAY, unusually wet.	
From MAY to DEC. unusually dry.	

I send the above hasty sketch, and hope to do better another time.

Very respectfully,

W. J. BINGHAM.

P. S.—The wheat crop much injured by rust, and in some cases ruined. Oat and corn crops cut short by drought.

W. J. B.

Litchfield, Connecticut, December, 1850.

Sir:—Having seen the notice of a circular from you, requesting information on various subjects relating to agriculture, I give such information as I have been able to collect.

Wheat.—Very little, if any, raised in this State; none in this part of it.

Corn.—Yellow eight-rowed most common; some other varieties cultivated; 40 to 45 bushels per acre a fair yield; sometimes 60 bushels, and even 100 bushels have been raised; cost of production not generally estimated; system of culture, the plough, cultivator, and hoe in general use. It is generally fed raw, and often without grinding.

Barley.—Very little raised in this part of the State.

Beans.—Not extensively cultivated. *Peas*, ditto.

Rye.—Average yield per acre, 20 to 25 bushels; quantity of seed sown, 1½ bushel per acre, and often much benefited by harrowing in the spring, when the ground is sufficiently dry.

Clover and Grasses.—Average quantity of hay per acre about 1 ton. Fertilizers, barn-yard manure, ashes, gypsum. Clover and timothy generally preferred for seeding down.

Dairy Husbandry.—I have had no opportunity to ascertain, except the prices of articles. Butter, in summer, 12½ to 14 cents; in winter, 18 to 20 cents per pound; cheese, 6 to 8 cents per pound.

Neat Cattle.—Cost of good cows, $25 to $45 each; working oxen sell from $80 to $100 per pair.

Cotton, sugar-cane, rice, and *tobacco* not cultivated.

Potatoes.—Irish formerly much raised: product 300 to 400 bushels per acre; this year nearly all rotted—a few favored pieces on sandy loam without manure, were the only exceptions. "Waterbury reds" the best—yield generally good—this year, hardly 100 bushels per acre.

Turnips are on the increase since the failure of potatoes; price per bushel, 15 to 20 cents.

Beets, Carrots, &c.—Few raised except for table use. Hemp not cultivated here. No extra attention is paid to fruit culture in this part of the

State. The subject of manures has scarcely begun to excite attention here; very little used except barn-yard and ashes.

I have thus given you a brief and very imperfect sketch of agricultural matters in this part of our State. Should the same be desired another year, I may, perhaps, be able to send you something more valuable.

Meteorological Table for 1850.

Months.	Mean.	Highest.	Day of month.	Lowest.	Day of month.	Range.	Remarks.
	° ′	°		°		°	
January	28.20	52	25	8	30	44	Wild month—sleighing good.
February	26.08	50	26	5	6	55	" " road dusty.
March	29.25	59	14	7	4	52	Great storm, night of Feb. 28th.
April	37.51	70	28	18	18	52	Cold, unpleasant month.
May	47.79	76	28	29	2	47	" " wet "
June	63.88	90	20	41	1	49	Warm, growing month.
July	69.	90	30	50	12 27	40	" " "
August	64.48	88	13	40	19	48	Distinguished for great rains.
September	57.71	80	6	31	30	49	Mild, pleasant month.
October	48.45	73	17	22	30	51	" " Indian summer.
November	39.87	63	4	19	23 4	44	" " month.
December	23.88	47	1	2	24	49	Mean of year, 44° 38′; range, 95°.

I am sorry to feel obliged to say that the agricultural resources of this part of the State are but feebly developed, owing to the stereotyped notions of the people, and there is but little prospect of immediate improvement. The agricultural society, however, is doing something, and may in time make an important change.

Respectfully yours,

J. L. HENDRICK.

Hoodlands, Perrysville P. O., Cecil County, Maryland,
December 25th, 1850.

Sir:—In reply to your circular, I would say that the varieties of wheat most esteemed by me, and in use in our neighborhood, lying on the navigable waters of the Susquehanna and Principio Creek, are the white and red blue-stem; the time of sowing with us ranges from the 15th of September to the 10th of October, and our harvest usually commences about the first of July. I have latterly used Pearson's improved wheat drill with good effect: as at present gauged, it sows about 1½ bushel to the acre. Where the ground is properly prepared, it is a neat and expeditious method of putting in wheat. One hand with two horses will drill in 8 acres in a day. I have been accustomed to immerse my seed-wheat in brine, principally for the purpose of cleansing it, stirring in, when partially dry, as much plaster as would adhere to it; but have ceased the practice since using the drill, as it interferes with the proper distribution of the grain in the drill-boxes. The best fertilizers I have tried are leached ashes and lime; the former is

used as a top-dressing, preceding the operation of the drill upon land cultivated the previous year in corn, at the rate of 100 bushels to the acre; the latter, after being slaked, is spread upon the land, after the ground is flushed and made ready for the crop, at the rate of 60 bushels per acre. Our method of cultivating green clover fallow for wheat has scarcely ever failed of success, even in the most disastrous seasons. We commence ploughing in the latter part of May, soon after the clover begins to blossom, using Davis's three-horse plough, set to run about 8 inches deep; it does its work very handsomely, turning the clover well under, if the stock has not been permitted to tangle it; this operation is followed by the harrow, which closes up the interstices, and in the month of August we stir the ground with small ploughs, which throws the decomposed vegetable matter near the surface, and, after a dressing with the harrow, the field is ready for the drill; but when the seed is to be sown broadcast, the harrowing should be omitted till after it is sown. Where the ground is well set in clover, a cultivation of this kind, without the aid of manure, is good for 20 bushels of wheat to the acre. It is usual with us to turn the clover in the second year, mowing the field in the mean time, and sowing it once with plaster, at the rate of 3 pecks to the acre. The price of wheat at our landings, for the last five years, has averaged about $1.10 per bushel. I do not cultivate oats as a crop, but merely for the use of the stock. I have found by experience that the kind known as the white brier corn (so called from the roughness of the ear to the touch) is the most prolific on our soil. We endeavour to break up the sod as deep as 9 inches, and plant the corn at a distance of 18 inches, in rows 4½ feet apart: for its cultivation we rely principally upon the plough, using the harrow only occasionally. The average product is about 10 barrels, or 50 bushels per acre. I am, very respectfully,

Your obedient servant,

JOSEPH COUDON.

South Hadley Falls, Hampshire County, Mass.,
December 22d, 1850.

Sir:—It is with pleasure I comply with your request to furnish some information in relation to a few of the questions proposed in your circular. The season past has been more than usually productive for grass. Other crops a fair average, except apples and potatoes, the latter of which have suffered more from the disease than ever before. The best variety here is the peach-blow or sand-lake, being productive, good for the table, and having thus far withstood the blight better than any other kind. The tobacco crop is becoming one of our staple commodities. The amount grown on the banks of the Connecticut the past season, say, from the vicinity of Hartford, Conn., to about 40 miles up the river, is about 800 tons, and has all been sold at prices ranging from 10 to 18 cents per pound, averaging about 12½ cents. The variety raised is known by the name of Connecticut Seed Leaf. It is used for segar-wrappers, being a large thin leaf, a single one often measuring more than 3 feet in length by 14 to 16 inches in width. A fair average, on good ground, is 1600 pounds to the acre, though much more is often produced. I raised, on 1¾ acre, the past season, 2662 pounds, and sold it at my door for 14 cents per pound, amounting to $368.90. The ground must be made rich, and much care is required while growing to keep it free from weeds and worms. When ripe, it is cut and hung in sheds (made for that purpose) to cure: it should hang till perfectly dry, which will take from 8 to 10 weeks; it is then taken down in a damp or rainy time, that the leaves may not be broken and stripped from the stalk, tied into bands of about half a pound each, and then it is ready for sale. It is bought up by dealers, who press it into boxes of about 400 lbs. each, and sent to market. They have received large profits on the last year's purchases. I consider that 10 cords of stable manure (worth $3 per cord) are sufficient for an acre, to produce a good crop. A fair compensation for carting manure and cultivating 1 acre would be $50; deduct one-half the cost of manure ($15) which remains in the ground, and the whole cost would be $65.

Neat Stock.—In reply to your inquiry, whether a given amount of food will produce more meat in a Durham, Devon, or Hereford, than in a native animal, I can best express my opinion and experience by quoting from the "American Herd Book," published by L. F. Allen, Esq. "Were the short-horns generally introduced into our great cattle districts upon the strong soils, and crossed upon our native stock, up to three-fourths and seven-eighths blood, there can be no question but 1 to 2 years in maturing would be gained, with increased weight of carcass; and, to say the least, an equal quantity of beef, with a diminished consumption of food. The market value of the flesh, too, would be enhanced; that is, a greater weight of mess beef can be cut from a short-horn than a native animal. The brisket, crop, plate, loin, and rump, in the one, being much heavier, relatively, than in the other. The peculiar mellow handling of the short-horn is also indicative of a superior quality in the flesh, adding to its selling price on foot, and rendering it easier of support, on a less quantity of food. So, too, with the milking qualities of the cow. The milk of the short-horn is proverbially rich; the quantity is also increased; and we have no hesitation in asserting that an average herd of high grade short-horns will yield, with a proportionate weight of carcass to the animal, and an equal consumption of food in the aggregate, at least 10 per cent. more butter and cheese, than a like herd of common cows. Many accurate judges estimate it higher; but we are content with this low scale of superiority, sufficient, at all events, to induce a reform in the entire dairy system of our country. With many, it may be considered a minor question; but the profitable disposition of the cow, after her dairy qualities shall have been exhausted, should not be disregarded. It is important that she be turned to good account always; and, having performed her whole duty at the pail, she should finally yield her full quota of profit in a valuable carcass. All this can be effected with the short-horn in a superior degree, as those powers of secretion which make her unrivalled at the pail, will, when turned in an opposite direction, equally prove her excellence in the shambles.

We do hope, that the day is not far distant, when our farmers themselves will, in their flocks and their herds, pay such attention to their breeding, and their quality, as shall make them objects of high interest, not only to themselves, but to their families; and to that degree, that such interest shall not abate, but increase, with age and experience. We indulge the anticipation, not altogether that our noble race of short-horns are to become the *universal* cattle of America, but that some of the improved races of neat cattle shall everywhere predominate, circumstances permitting; and this pleasing and important branch of agriculture shall receive the consideration to which it is so strongly entitled. So far as climate is concerned, they have flourished equally well in all the Northern, Middle, and upper Southern States. A good and productive soil, yielding an abundance of pasturage in summer, with a fair quantity of winter forage, will content them. True, short-horns are moderate consumers, compared with their capacity to yield both milk and flesh."

Yours, respectfully,

PAOLI LATHROP.

Lockington, Shelby County, Ohio, December 21st, 1850.

Sir:—A friend sent me, last winter, a work emanating from the Patent Office. I almost immediately lent it to a friend who has gone West, and wished to learn how to raise the Osage orange. I am anxious to obtain a copy of your next volume, and, though the statistics of our common country will soon be laid before you, (imperfect to some extent, of course,) yet there is much we must learn aside from them. 1st. Why do we not more frequently change our own acclimated wheat, say from Canada and New York or New England best varieties to our Ohio and Western soils? We lose every other crop, in some vicinities, by rust, fly, or wireworm; even this season, half of our fields here were ruined by a worm. 'Tis true, the grasshopper eat off the early sown: but that sown from 20th September to 10th October, was greatly injured by the worm. On pulling up stalks, a small worm was found, ½ to ¾ inch long, in the heart of the young shoot, striated, brown and yellow, having the general characteristics of the common wireworm, unknown before in wheat here. A good variety of spring wheat is much needed in N. W. Ohio. Can any one tell how to change a Southern winter into a Northern spring wheat? Two or three of us have tried and failed: but one variety exists in nature; climate and cultivation do the rest. Wheat is an annual in growth,—but seeding the ground after maturity, and, of course, can be brought back to its original state. There is no such thing in nature as spring wheat whose seed would perish if sown in the fall.

Information with regard to the cultivation of the Osage Orange.—Four times out of five, we fail here; some of our best farmers in the Miami valley have tried on all kinds of earth common to this country, and have failed. I tried in one year on heavy upland clay, side-hill gravel, and deep, sandy loam, in bottoms, and failed, while a few of the *same* seeds were taken to Rochester, New York, and did well, sowed dry in a garden. We sow, after laying out in the frost, dry, soaked in cold water, tepid, and boiling water; yet if any one succeeds, it is only with a few plants—an exception to the rule, *fail.* Fancy-gardeners may do better. We need the orange here, and in the Sciota valley, nearly as much as in Illinois. I hope the able correspondent of your office, Dr. ———, of Jacksonville, Illinois, will inform the public of his successful mode of cultivation, and whether the orange, like the Morus Nigri, Acacia, the Ailanthus, and Catalpa, will not send out new scions, if the plough comes near the roots; if so, your hedge will soon be a forest. Will not all these varieties bear grafting on each other? I think so; all but the orange, I know will. Any information relative to the above, would be of great value to our agriculturists, as this is the season when we prepare for spring labor. I trust the President's suggestion, with regard to a Bureau of Agriculture, may meet with favor. Science will do much, but practical knowledge is what our farmers want: they are not educated for fancy farming, or gardening, but are tillers of the *earth*—I wish I could, with propriety, say *soil*. You will pardon my troubling you; I trust and hope by another year to be able to give you some information in return.

Respectfully, your obedient servant,

JAMES COOK.

FRUIT CULTURE IN MICHIGAN.

Detroit, January 2d, 1851.

Sir:—In Oakland county, where I have resided for 11 years, the culture of fruit has received increased attention. Good apples have brought from \$1.25 to \$3.00 per barrel of 2½ bushels. At 50 cents per bushel, the lowest price for apples of the first quality, there has been realised more net profit per acre, from the land in orchards, than from any other crop our farmers have raised. A farmer living near me, who has only about 1½ acre in orchard of cultivated fruit, has sold, some years, over \$400 worth of apples. Unfortunately, the orchards first planted here were mostly of natural fruit; these have, in many instances, been grafted by persons who go from farm to farm every spring for that purpose, and the result has been that the fruit of a large portion of the trees thus grafted proves of little value for market. Some improvement, however, has been made in the fruit, but the trees have been very much disfigured, owing to the incompetency of those performing the operation, and an inconvenient mixing of fruit, by grafting several kinds of apples upon the same tree. A tree grafted or inoculated when small, is far preferable to one altered over when grown large, for several reasons, one of which is its increased length of limb, and another is, it cannot be so well shaped as while young, for then the head may be so formed as to produce more fruit and of better quality than trees of the same age and size altered over; and besides, what is of some importance, they will have symmetry, instead of being unsightly objects. Farmers have made a great mistake in grafting large varieties, without regard to quality. Apples of large size are invariably coarse and inferior for the table, and are liable to be blown from the tree, and the result is that three-fourths of them fall prematurely. This is a decided objection, as far as profit is concerned, even if they were of good quality. I have a decided objection to a great number of varieties. Suppose a farmer has 100 apple-trees, and 50 varieties of fruit: now, he cannot well have more than 3 or 4 trees of any one kind; and in 50 varieties he will of course have early, summer, fall, and winter fruit, and the result will be, he will have to keep running to market all summer and fall, and many times with half a load. Would it not be better to have, say, 80 trees of good winter apples, and 20 trees of other varieties, merely for family use; then the apples for market could be all gathered at one time, and marketed after the most important business of the farm is over. Let these 80 trees be of the best varieties, and those that bear well. The Rhode Island Greening, Swaar, Spitzenburg, Westfield, Seek-no-further, and Roxbury Russet, are good varieties, and bear well in this climate. If only two varieties were to be selected, I would prefer the Greening and Spitzenberg, as producing the most fruit and of the best quality. A farmer of my acquaintance put up last fall 120 barrels of apples from 20 trees, and they were worth in Detroit \$1.50 per barrel. I know of no farming products that would net as much, or any thing like it. An apple that originated at Kingston, New York, and introduced by Judge Buel, called the Jonathan, I find to be a very valuable variety. Out of 70 or 80 varieties I have fruited within the last 6 years, I think this is one of the best. It is a great annual bearer. This fruit is ripe in November, and keeps well till May. It is of medium size, good flavor, and invariably fair, and withal a very handsome apple. Skin thin and smooth, the ground clear light yellow, nearly covered by lively red stripes; stalk three-fourths of an inch long, and rather slender, and inserted in a deep, regular cavity; calyx set in a deep, broad basin; flesh, white, tender, and juicy. Much has been said and written upon the importance of picking fruit carefully, and of packing it properly. Full directions have been given at various times, in nearly all the agricultural journals. It is absolutely necessary that fruit, in order to have it keep well, should be picked by hand, and after being carefully picked, it should be placed in the barrels by hand, and when the barrel is full it should be shaken gently, that the fruit may settle together, so as not to move in the barrel by carriage. The barrel should be full, that the head may press firmly upon the fruit. The barrels should never be placed upon the head after they are filled, but should be carefully packed away upon the bilge, in a shed or other out-building, and kept dry till the weather becomes cool enough for the mercury to fall below 30°, when they may be placed in a cool, dry cellar. Apples will not injure at a temperature 2 or 3 degrees below freezing; but if they could be kept at freezing point, they would remain perfectly sound for almost any length of time, if kept dry.

I submit a few remarks upon grafting apple-trees. It is the usual practice to graft the extremities of the limbs, or to cut them where they are not more than 2 inches in diameter. Now, I consider it important to cut the limb near the main stock; no matter if it is 5 inches in diameter; it will do better, and make a more perfect tree, and produce more fruit. To graft small trees, cut them off below the surface of the ground, and graft in the usual way of cleft-grafting; then replace the earth around the stem, and the work is done. For grafting above-ground, a composition, made of three parts rosin, two parts beeswax, and one part tallow, melted together, and applied with a brush while warm, (it should not be hot,) is a good composition. Split the stock to be grafted in the centre with a knife and mallet, drive in a wooden wedge to open and hold till the scions are inserted. The scion should be of the last year's growth, and wedge-shaped at the end to be inserted; put one upon each side of the stock, so that the inner bark of both the limb and scion may come in contact; then take out the wedge, and the scions will be held firmly: now, to finish the operation, apply the composition as above directed. If both scions should live, let them grow till the next spring, when it would be well to cut out one of them. In preparing the ground for an orchard, it is important to have a deep rich soil. For manure, a compost is generally recommended, which, no doubt, would be preferable; but I am satisfied that almost any kind of manure will answer, if it is buried deep in the soil. I would recommend that as much manure should be spread upon the ground as can be turned under with a large plough; then have two good teams, and let the latter plough be set off so as to follow in the furrow of the first, that the subsoil may be brought up and turned upon the sod. I have had land ploughed 12 inches deep in this way, with a pair of horses, by changing the set of the plough every time of coming round. I am satisfied that this is a good operation. By having two teams of sufficient power, the ground may be broken to the depth of 16 inches. If the land be thus treated, the trees may be set without further preparation, and will succeed better than they will by merely digging large holes, as is often recommended. The usual distance is about 2 rods each way. Where peaches do well, and it is profitable to raise them, they can be planted between the rows of apple-trees, as they will die out before the space will be required for the apple-trees. It will require 40 trees to the acre, at the above distance.

Very respectfully, your ob't servant,

A. C. HUBBARD.

P. S.—The above remarks are respectfully submitted, which you are at liberty to use as you see fit. They have been written in haste, and without having been reviewed. A. C. H.

Washington, Macomb County, Michigan, December 16th, 1850.

Sir :—In reply to your circular of August 26, 1850, I would give you some hints for the benefit of professional men and mechanics, who never, or seldom keep but one cow and one hog. This practice is generally considered a matter of economy, is to keep one hog, as the milk of the cow, over and above what is used in a small family, together with other rejected morsels from the table, will keep the hog very well, without much extra expense.

Now, the idea I wish to suggest is, to dispense with the hog entirely, and feed to the cow all that is usually given to the hog. There is no difficulty in learning the cow to eat all the milk, &c. I will give you the result of the experience of a neighbor, a physician by profession and practice, as well as a rigid economist. My immediate neighbor, Dr. D. Cooley, has, for several years, pursued the above plan, and I will give you a brief sketch of the result.

In the year 1849, Mrs. C. kept an account of the butter made in 3 months, June, July, and August, as follows:

In June	$52\frac{4}{16}$	pounds.
July	$44\frac{13}{16}$	"
August	$46\frac{1}{16}$	"
	$143\frac{4}{16}$	"

In the summer of 1850, the same lady kept an account for six months, with the same treatment of the cow, beginning with May, and ending with October. The following is the result for 1850:

May	$34\frac{1}{16}$	pounds.
June	$38\frac{4}{16}$	"
July	$36\frac{4}{16}$	"
August	$35\frac{2}{16}$	"
September	$26\frac{8}{16}$	"
October	$36\frac{11}{16}$	"
Aggregate	$211\frac{5}{16}$	"

This cow was 6 years old in the spring of 1849, of good size, though not above the medium size. She grazed in a common pasture of timothy and clover, and was fed the slops of the house, as above stated.

The family consisted of three adult persons, and one child 10 years old. All the milk and cream was used that was wanted in the family, and the balance set for butter, which produced the above amount. You will see that the months of June, July, and August produced about 33 pounds more than the corresponding months in 1850. The deficiency in 1850 is readily accounted for, from the fact that the first season had been very dry and the pasture very poor.

I believe it is not generally expected of one cow to supply a family with butter, but only milk and cream for ordinary use. Now, this cow has done all that, and produced over 200 pounds of butter in 6 months, with only the extra feed that is ordinarily given to a hog. Butter is worth, on an average, 12½ cents per pound. Pork is worth from 3 to 37½ cents per pound. *Quere*—Would the slops of the house fed to a hog, instead of a cow, have produced $25 worth of pork in 6 months?

If the above hints are worth correcting and revising for use, you are at liberty to do so, and make such use of them as you please.

Very respectfully, your ob't,

G. W. KNAPP.

ROOT CROPS.

Having been engaged, for the past eighteen years, as one of the firm of E. Risley & Co., in horticultural pursuits, I have given considerable attention to the growing of roots, being forced to raise large quantities every year, that we might have good selections for the raising of seed, which has been the principal object. We have had many to feed, yearly, to our horses and cattle.

For feeding, we give carrots (the long orange) the preference over all roots. Beets, for cows giving milk, are rich, sweet food, and preferable to turnips; but for working oxen and horses, no food, for winter and spring feed, in my opinion, equals carrots. To feed them in the winter, a cellar, attached to the stable, is indispensable.

One and a half bushels of carrots about equals, in substance, one bushel oats. Horses, that have been stiffened by hard work and high feed on grain, can be much renovated by a change to carrots for a few weeks, and it is the next thing to a run in forest grass.

Having obtained the premium every year from the New York State Agricultural Society since its organization, perhaps it would not be amiss to give the statement of crops and expense of raising.

On one acre of land, in 1846, we raised 1590½ bushels of carrots, 56 lbs. to the bushel, at the following expense:

25 loads of manure, 62½ cents	$15.62
1½ days ploughing, $1.25	1.88
20 " raking and sowing, 62½ cents	12.50
30 " weeding and thinning, first time, 62½ cents	18.75
20 " " " second time, 62½ cents	12.50
12 " hoeing " third time, 62½ cents	7·50

36 days harvesting, 62½ cents	\$22.50
Improvement on land	10.50
6 lbs. seed, 50 cents	3.00
	\$104.75

Or a little more than 6½ cents per bushel. In 1847, on half acre, 498 bushels, on green-sward, turned over and harrowed after rolling down, at an expense of \$25.76, or a little over 5 cents per bushel. Same year, on ¾ acre of land, on which carrots had been raised the two preceding years, 826¼ bushels, at an expense of \$42.69, or a little less than 5 cents per bushel.

In 1848, on one acre, 966 bushels, at an expense of \$50.10, or a little over 5 cents per bushel.

In 1849, on 1¼ acres, 2318½ bushels, at an expense of \$54.37, only about 2½ cents per bushel.

In 1850, on 1 acre, 951½ bushels, at an expense of \$46.63, or a little less than 5 cents per bushel.

The aforesaid crops were all raised on land of about the same quality, and, on the same land, some for 3, and some for 4 years in succession. Rich green sward, turned over and sowed, produces good crops, and at less expense than land kept under the plough and hoe for years, as weeds are much less troublesome, which are the farmer's dread, and discourage many from trying a second crop; yet, but few crops pay better for a little pains and patience.

Sow in drills from 12 to 14 inches apart, and, as soon as they can be seen, hoe them through with a common hoe, to stir the ground between the rows, which prevents weeds from starting. As soon they are fairly up, hoe again, and then thin out to from 2 to 4 inches in the row. I have never known the crop injured by insect or worm. By soaking the seed before sowing, will forward the crop, and keep it ahead of weeds, and much labor will be saved. I raise sweet potatoes in this latitude, 42½°, by starting them in a hot-bed, for my family's use. Seed should be procured from farther south every season, to prevent degeneration. I raised, this season, over 20 bushels on 50 feet square.

I, last fall, fed two pigs, and as I think it is more healthy for a hog to grunt than squeal, I gave them all they would eat, and found that 4 quarts of meal, wet with cold water, was no more than they would eat at one time. I also found that 16 quarts would thicken 8 pails of boiling water to a pudding, which they would not eat at 6 times.

In this place, the warmest day in 1850 was July 16th; 11 o'clock, A. M. 94½°; average, 85¾°. Coldest day, December 31; 7 o'clock, A. M., 6 below zero; average, 17½° above.

The mean temperature for each month:

January	$34\frac{1}{31}$°	May	$56\frac{11}{31}$°	September	$66\frac{11}{30}$°
February	$31\frac{1}{4}$	June	$74\frac{1}{30}$	October	$55\frac{11}{31}$
March	$39\frac{1}{4}$	July	$77\frac{11}{31}$	November	$49\frac{1}{30}$
April	$48\frac{11}{30}$	August	$75\frac{4}{31}$	December	$29\frac{11}{31}$

Mean temperature for 1850, 53½°.

LEVI RISLEY.

Fredonia, Chautauque County, New York, December, 1850.

North Harpersfield, January 1*st*, 1851.

Sir:—The number of acres in this vicinity under the plough has been on the decrease for some number of seasons, perhaps towards twenty; and this for two reasons: one was, (and that might have been sufficient,) that the returns of ploughing, sowing, and harvesting, was generally a meagre pittance: another was, that the cheapness and fertility of Western land, with their easy means of transporting to market, rendering competition from this vicinity entirely abortive. It therefore requires no sophistry to prove that a wrong course has been pursued in the managing of farms; and, indeed, excessive ploughing has been followed by (almost equally ruinous) excessive feeding, or pasturing, and mowing; even meadows are allowed but a short season of rest, from the earth-treading hoof; grass lands are left in late autumn, without any covering to shield them from the severity of the wintry blast.

Now, I would propose the keeping of less stock: the stock would present a healthier appearance, would arrive at maturity much quicker, (which is an important item,) and, no doubt, would be more profitable. Another reason, and stronger still, is, the land would improve; the grass left on in the fall would keep the land warm in winter, and would hasten vegetation in the spring, by its decay. By these means, land would improve; but it is evident, it can be improved much faster by a judicious system of ploughing and manuring. There is but little manure made, saved, and applied, to what might be; as evidence of this, I can point to those who manufacture two loads for every acre they possess; and to others, who do not apply as much as one for every two acres; and this, too, of an inferior quality, being bleached and drenched by sun and rain. Of the different and scientific ways of obtaining fertilizers, I shall not speak—only of their application. To improve a piece of land which has been too much worn by the plough, and has lain in grass some time, I would prefer corn for the first crop: it will depend on the nature of the soil, and its locality, whether it should be broken up in the fall, which may be done to advantage where the soil is not light, sandy, or exposed to severe wind. After the land is ploughed, which should be done very nice, it may remain, with the exception of a slight harrowing occasionally, until near the time for planting, which is the middle of May. It should then be allowed a coat of coarse manure, which should, by harrowing and ploughing, be well mixed with the surface soil; then, if you would have a good growth of fodder, with ears of corn well filled, and ripe before the frost, furrow the ground, and manure in the hill, with a compost from the hog-pen and hen-house, with a mixture of ashes or plaster, or both; 12 or 15 good cart-loads to the acre will work wonders. The rows should be 3½ feet apart, running north and south, the hills 2½ feet in the row. Special pains must be taken in planting; 5 or 6 kernels to the hill should be allowed, which should be covered an inch and a half deep, the hill being left no higher than a level with the surrounding surface. If possible, each hill should have a small handful of ashes or plaster before the plants appear above the ground. The after-culture should be thorough, stirring the soil with the plough and hoe as often as possible, the more the better, not hilling the plants until the appearing of the tassle. No weeds or grass should be allowed to start, which they cannot do, if the ground is worked half as often as it should be. When about one-half of the corn on the ear is ripe and hard, and the other half well glazed, the corn should be cut from the ground, and stood up, in as small bundles as may be and have them stand up good. As soon as the stalks are thoroughly dried, the corn should be husked off, and the stalks put in a barn. They make good fodder.

By the opperation above described, if thoroughly performed, from 25 to 50 bushels of corn, and an amount of fodder equal in substance to at least a ton of good hay, may be obtained from an acre, while the land will be improved in quality, and in a condition easily prepared for another crop, which may be winter wheat or rye, if the ground does not heave too much by frosts; if sown with either of these, it should be done as soon as the corn can be taken from the ground. Wheat or rye should be sown at the rate of 1½ bushel per acre after the ground has been made mellow by ploughing, or smooth by harrowing. If the land is intended for meadow, it should have 6 or 8 quarts of timothy seed per acre, sown when the grain is with from 4 to 6 quarts of clover seed sown early in the spring. If spring grain is preferred to winter grain, wheat, barley, or oats are good crops, and good to seed, or stock down with; if these are sown, the ground should be ploughed as early in spring as possible, the land being free from frost, and not too wet; it should be cross-ploughed and harrowed smooth before sown, and well harrowed afterwards. Wheat should be sown 1½, and barley and oats 3 bushels to the acre; timothy and clover with 6 quarts of the former, and 4 of the latter; the acre should be sown on previous to the last harrowing.

Grain of all kinds, it is allowed, should be cut before it is what is called fully ripe, as the grain will make more and better flour, and the stalk will be more palatable and nourishing for animal food, which is very important in this latitude. The sooner any green fodder, calculated for animal food, is thoroughly hayed or dried, and put in the barn, the better, as it is very injurious to have it bleached by sun and rain, or dew. Immediately after the crop is taken off, it is a very common practice to allow the young grass and clover to be eaten off, or trodden down by stock, which should in no instance be allowed. If the land is intended for meadow, the less it is fed off the better; no hoof should be allowed to range over it until it has lain in grass one summer, when it will do to feed it off some. If it is wanted for pasturage, it should lie without being fed until the next June, when the grass will have acquired a good hold of the soil; and then it must not be eaten off close, leaving the ground naked.

If, by this manner, one field is improved, it may remain from 2 to 8 years, (but never until the grass runs out,) while another, or several fields in succession, may undergo the like, or a similar process, varying the manure, the manner of culture, the seed, &c., as circumstances seem to require or judgment dictate.

With regard to different breeds of cattle, I would remark, that a species of stock, suitable for a warm climate, a level (or not mountainous) country, and very rich grazing lands, might be poorly calculated for this region. For this rough, uneven part of the country, perhaps Devon cattle are the most suitable, as they combine the most of the qualities required in a species of stock. Considering the market value of land, the price of labor, the distance from market, together with the great length of winter, and shortness of summer, it is no easy matter to sell a hundred dollars' worth from a farm. Yet, with all these hindrances, a farmer, by thorough and judicious management, may realize a handsome profit from his expenditures.

As a general thing, taking one year with another, a calf can be raised or afforded at 6 months old for $3; a yearling, in the fall, at $7; a two-year old, in the fall, at $15; a good cow, in the fall of the year, for $18—in the spring, for from $25 to $30; 100 pounds of butter for $14; 100 pounds of pork for $5, made mostly from the proceeds of the dairy.

There are very few farmers who can afford to raise grain to sell; if they do, they must be governed by New York market prices.

Wool-growing, together with the rearing of lambs for market, will, perhaps, (counting all expenditures,) return the greatest profit. I have a flock of Merino sheep which average over 5 pounds of well-washed wool per head per annum, which wool costs me, one year with another, from 25 to 30 cts. per pound. Mine is as fine as any Merino wool that I am acquainted with. One more item, and I am done. There is but little irrigation practised in this country, and that little is generally in an imperfect manner; hence, I would urge those having experience in this branch of business to write upon the subject, publishing an account of their way and its effects.

With these remarks, I am yours,

N. M. DART.

New Harmony, Indiana, July 15th, 1850.

Dear Sir:—The object of the present communication is to relate the strange phenomenon which has occurred along our river—the cane Arundinaria Gigantea (*Michaux*) going to seed this year.

Michaux, in his description, states that it goes to seed once in from 20 to 25 years. I have been a resident of the Wabash upwards of 30 years, and it never having occurred before, has caused me to make some inquiries of those whose residence was many years in advance of me, and they state that it never has happened on this river before.

If my memory is correct, in the year 1830 or '31, in descending the Mississippi, I noticed a similar circumstance. The planters collected and used the seed for feeding to their stock. It must possess much nourishment, as I was informed that the stock on the Mississippi were that year remarkably fat. My son Charles informs me that the squirrels he killed a few days ago, in the cane, were literally covered with fat. Trusting that the seed herewith enclosed may add to the collection of the Patent Office, I subscribe myself

Yours very respectfully,

WM. AUG. TWIGG, P. M.

Hon. Commissioner of Patents, Washington.

Ashland, Ashland County, Ohio, January, 1850.

Sir:—The varieties of wheat in this portion of country are Asbridge, white blue-stem, Mediterranean, stubble, mountain sprout, valley, white flint, red-chaff bearded, three varieties of club wheat, and many others. Our soil and climate being congenial to the production of this important staple, our farmers have spared no pains in introducing the best varieties. The two first named have precedence over all others with which I am acquainted, either from experience or from inquiry. They exhibit a plump white berry, with thin bran and bald head, which last renders them far more pleasant to handle than bearded wheat. Under favorable culture and suffering no calamity, they will yield 30 bushels per acre. The Mediterranean is extensively sown on account of its enduring the winter better and being fly-proof, and thus escaping two great injuries. The objections to it by some are its reddish brown color, its light yield, and its liability to fall from slight winds. All the other kinds possess each some peculiarities which render them estimable or objectionable with the farmer. The club wheat has two high recommendations: 1st. That of enduring a storm that would prostrate all other varieties; 2d. It grows erect, and yields well on rich bottom lands. The Asbridge, white blue-stem, and white flint are the most highly esteemed. The Asbridge possesses the greatest number of important peculiarities. The average product per acre is 15 bushels. Time of seeding from the middle of September to the 1st of October; but more good crops are obtained by sowing as near the 20th of September as possible. If we sow before that time, we give license to the fly, because there is usually much warm weather about that time, and, if we sow much later, it is frequently winter-killed. The time of harvesting is from the 4th to the 10th of July. The quantity sown per acre is from 1¼ to 1½ bushel, without any preparation, with the exception, in a few instances, of having it clean. A vast quantity of wheat is sown upon inverted oat-stubble previously manured. The depth to which we usually plough is 9 inches. We plough fallows about the 1st of June, about 6 inches deep—manure just before sowing, then plough 10 inches deep. The yield has been increasing for the last 5 years, because there has been an improvement in the system of culture; the cause of which, in a great measure, must be credited to the influence of a good agricultural paper (The Ohio Cultivator) which circulates among us. If it would not be foreign to the object of this Report, I would here speak in high terms of that excellent paper.

The system of rotation upon uplands is first oats or corn, then wheat, then seed to clover or timothy. Those who cultivate only 50 or 60 acres, usually raise two crops of wheat upon the same field successively before seeding down. This will answer well, provided the soil is sufficiently fertile. The bottom lands are sometimes cultivated in corn for several years in succession, without any apparent exhaustion of the soil, provided the corn is husked upon the standing stalks, and fed in that way.

The best remedy for the Hessian-fly is to sow as near the 20th September as possible, for its depredations cease about the 23d, and the wheat becomes sufficiently rooted to withstand the winter. From special observation upon this matter, I can safely say that, by observing the above remedy, the wheat crop in the aggregate would be increased one-fifth. The weevil was destructive to the wheat crop of 1848, just before harvest, and for which I know of no remedy. The average price at our nearest market is 70 cents per bushel.

Corn.—The varieties are numerous. The most esteemed of which are the large yellow, white flint, and small yellow. The large yellow grows very tall, has long ears, ripens tolerably early, and is much esteemed by many. The white flint, so called because its grain is very hard, has a short thick ear, is hard to husk and hard to shell. It moulds in the husk easily in a wet time. It weighs 60 lbs. to the bushel, and makes excellent white meal. The small yellow possesses the greatest number of advantages: 1st. Its early maturity; 2d. Its small growth, which renders it susceptible of close planting; 3d. It is therefore more easily cultivated, easy to husk, not liable to damage by wet at husking-time, and yields more corn with less labor than any other with which I am acquainted. The average product of this variety upon good bottom land and with good culture is 100 bushels of shelled corn per acre. The average yield of corn in general is 50 bushels per acre. Cost of production is 8 cents per bushel. The best system of culture is to check, and plant corn of short growth 2 feet 10 inches apart, and pass once each way between the rows, at each time of hoeing, with a shovel-plough, and that will throw fresh ground against both rows. This method saves two-thirds of the expense of ploughing, and produces nearly double the quantity generally raised. Corn of tall growth must of necessity be planted about 4 feet apart, and it requires ploughing 3 or 4 times between the rows. Corn is in the best condition for feeding when ground. The difference in favor of cooking is not sufficient to warrant the expense. Corn meal, fed in the form of thick swill, is the most advantageous. The manure of 20 bushels of corn consumed by hogs, if carefully saved and well applied, will add about 2 bushels per acre.*

Oats.—The average yield is 30 bushels per acre. The quantity of seed sown per acre is two bushels. This crop is very exhausting to the soil.

Rye.—The average yield per acre is 20 bushels.

Peas are not cultivated to any extent as a field crop, either for profit or for renovating the land.

Clover and Grasses.—The quantity of hay cut per acre is one ton of clover and one and a half of timothy. The best fertilizers for meadows, so far as my experience goes, is to scatter the droppings of cattle and horses, which is done most easily by knocking them about with a 4-foot stick, shaped like a sled-runner, in the spring of the year, just before the vegetation starts. This kind of manure pulverizes very fine, if scattered in that way. I know by experience that if the soil is pretty well represented with droppings, and thus treated, the yield will be at least one-third more than if they were not scattered. Timothy is preferred for seeding down meadows. The quantity of seed sown is 4 quarts per acre. The cost of raising hay per ton is $1.50.

Dairy Husbandry.—The average yield of butter per week, for each cow, is 4 lbs., and of cheese 8 lbs. One of the best methods for treating milk for butter is to skim before the milk is sour, and churn immediately. This mode brings good butter in a short time, if the cream is at the right temperature, say 55 degrees. The modes of churning are various, but we generally use the barrel churn and dasher churn. A good improved churn, upon the atmospheric principle, would meet with general approbation here. The mode of putting down butter for exportation is to pack it in kegs containing about 180 lbs. The average price of butter is 9 cents, and that of cheese 5½ cents per lb.

Neat Cattle.—The cost of raising till 3 years old is about $15, which is about what they sell for at that age. So there is comparatively little attention paid to this department. They are only raised as a means of converting our pastures into cash, with little or no profit. The value of good dairy-cows in the spring is about $14, and in the fall about $12, at which time they usually go dry. They are generally wintered on good straw,

* Our correspondent is mistaken if he supposes that land in his county is generally so fertile that the manure made from 20 bushels of corn, all saved and properly applied, would add only 2 bushels per acre to the crop. Let the experiment be fairly made on a soil of medium quality, and we venture to predict that the gain will be at least 10 bushels.—Ed.

which is better than hay for them. The number of pounds of beef that 100 lbs. of corn will produce is about 20.

I can say nothing definite respecting the relative fattening qualities of the Durhams, Devons, or Herefords. The two latter are not raised as distinct breeds to any extent in this part of the State. The Durhams are mostly noted for their neat appearance, exhibiting a prominent disposition to fatten easily. The native breeds are distinguished for their good milking qualities. This county possesses some of the very best milkers.

Sheep and Wool.—Wool-growing is profitable. The cost of growing coarse wool here is 15 cents per lb., and for fine wool 12 cents. A ton of good hay, judiciously fed, will produce 35 lbs. of wool. Small or ordinary sized sheep, of fine wool, lengthy staple, are now generally acknowledged to be the most profitable, such as a cross of the French and Spanish Merino. I rejoice that this great and long-sought object has finally been attained—lengthy staple with fine wool. There are a great many native sheep in this county, which are improved in fineness by a cross with Merinos. They are hardy, grow large, and sell readily to the butcher. The proportion of lambs annually raised to the number of ewes, under good management, will be 5 lambs to 4 ewes, among the natives.

Hogs.—The best breeds, from what I have learned from experience and inquiry, are a cross of the Berkshire and China breeds, or of the Berkshire and grass breed. I would prefer the first named, as a hog the most docile and profitable. Of this kind I killed 4 pigs, at five months old, which dressed 89 lbs. each, without any other effort at feeding. They are very highly esteemed, because they fatten so easily, and at any age, with but little expense. If they are pigged in March, they may be butchered in November, and will weigh 200 lbs. If 100 lbs. of corn be fed to a pig of good quality, it will make 25 lbs. of pork. My method of putting up and curing pork for home consumption is, first to salt slightly in open casks, and let it stand one week, then pour off the brine, for it is generally bloody, and would taint the meat; then pour on strong fresh brine, and put on weight enough to keep every particle of meat perfectly submerged. Let it stand 4 or 6 weeks, according to the size of the pork, then hang it up and smoke with green hickory or sugar wood, until it shows a rich yellow color, then pack down in clean oats.

Hemp.—This article receives so little attention in this county, that I know nothing definite concerning it.

Potatoes.—The usual average yield is 40 bushels per acre. The cost of production is 10 cents per bushel. The most prolific varieties are the long red cudgels, pink-eyes, and peach-blow. The varieties for table use are the pink-eyes, and old, pure, blue Neshannocks. The best mode of culture is to plant on a loose, gravelly loam, ploughed 8 inches deep, and check for hills, 2 feet 10 inches apart, and 3 inches deep. This would leave a loose subsoil of 5 inches, which is highly necessary, that all superabundant water can readily filtrate. Lime alone is the best manure for potatoes. Lime and ashes have been used to prevent the rot, but without any effect.

Root Crops.—There is but little attention paid to these crops, except the turnip, which is mostly raised for table use. I do not believe this department will receive much attention, for it exhausts the soil incomparably faster than any other product. For example, I can raise but two root crops on rich bottom land, the first a good one, and the next a meagre one, which after that would yield a meagre crop of corn: whereas the same soil would

have produced 60 bushels of corn per acre, for 10 years in succession, without manure, which, of course, would be more profitable.

Fruit Culture.—Some farmers are paying quite a spirited attention to fruit, by way of grafting their seedlings. There can be enough raised on an acre to make it profitable. Mealy apples, having but little acidity, will compare well with potatoes for fattening pork. There is not enough attention paid to the culture of winter apples even for home consumption. Some of the best here are the Red Seek-no-further, Yellow Pippin, Vandevere, and Rambeau. The two last are extensively cultivated; the Rambeau for cider, and the latter for winter sauce and pies. No doubt a great variety of good winter fruit will be developed upon the great number of grafts which have been recently set upon the old seedlings.

Grapes.—I think the culture of the Isabella and Catawba could be made profitable here, for they both thrive and yield well.

Manure.—The plan regarded as the best for making and preserving manure from waste, is to keep all the stock enclosed in the barn-yard as much as possible, and all the feeding should be done in the yard. If there is a quantity of straw remaining in the spring, designed for manure in the fall, on wheat land, let it be thrown into the yard, and a half-bushel of lime to the ton of straw be scattered upon it. This, with the moisture of the yard, will decompose it in a short time. Neither lime nor plaster are used to any great extent. Lime is obtained at too great a distance from this for us to make a very extensive use of it, and plaster is only used occasionally on corn, but with signal benefit. Barnyard manure seems to answer all purposes for field crops. Lime is sometimes applied to potatoes, with good results. Guano has not yet been introduced here. This species of manure should be submitted to a chemical analysis to ascertain its properties, for it must possess the best combination of elements of any manure that has yet been tested. The time has come when the farmers of this portion of the State are beginning to feel the dignity of their station, and the independence of their position. Many an inconsiderate, repining farmer, with small income, if thrown upon other resources for a livelihood, it would cause him to reflect with pain upon his once exalted position.

HENRY MILLER, Jun.

At home, near Milledgeville, Georgia, December 1st, 1850.

Sir:—In reply to your circular of inquiries, I send you the following, which you may dispose of as you think best.

Wheat.—The varieties raised in this section are the big and little white, the red, and two or three kinds of bearded wheat. The little white has formerly had the preference over all others, until a few years since, when the fly began to be so troublesome, that farmers were compelled to seek for that variety which ripened earliest. The bearded wheat has been raised very extensively for the last year or two, on account of its early maturity, while the yield is thought to be greater than that of the little white. The big white is an excellent kind, but so uncertain that very few raise it. The average yield of wheat per acre is from 3 to 5 bushels; the time of seeding is from the middle of October to the last of November. Time of harvesting, the last of May or first of June. It is usually sown without any preparation, except sifting through a cockle sieve, to take out the cockle and the imperfect grains of wheat. If the wheat is inclined to blast, it is soaked 12 hours in a solution of blue-stone, which is a certain preventive against that disease. Wheat is generally sown on corn land, and put in very roughly, the land being ploughed but once, though I am satisfied it would pay well to break up the land good before sowing, and to harrow the seed well in. I am inclined to think the yield per acre of this crop is increasing, from the fact that farmers pay more attention to it than formerly. We have no remedy for the fly but late sowing. The best remedy for the weevil is to get out the wheat as early as possible, and spread it out in the sun, say 5 or 10 bushels at a time, and let it remain till it gets very hot, then take it up and put it immediately into boxes or barrels, and cover tight until it cools. In a short time after it is put up, it will be hot enough to kill every weevil or worm in it, though it will not injure the grain. I believe, if wheat thus served was put into clean, tight casks, it would keep several years. The average price of wheat this year has been $1.25 per bushel, and that of flour, from $8 to $9 per barrel.

Corn.—We have but two distinct varieties of corn, the white and the yellow, though there are different kinds of white, possessing different qualities. The yellow corn is thought to grow better on thin land than the white, and is generally believed to contain more nutriment. The average yield per acre is 5 bushels on poor land, and 15 to 20 on good land. The land should be well cleared and broke up before the corn is planted; then lay off the rows with a bull-tongue plough; drop the corn, and cover with the same kind of plough, making a ridge on the corn; and, before it comes up, scrape off the top of the ridge with a board attached to the foot of the plough-stock. If the season is favorable, the corn will be out of the ground in a few days, and in a week or ten days it will be high enough to admit the plough, when it is hoed out and replanted. In about three weeks, it is ploughed out with a shovel or turning-plough, the hoes following; and, three weeks after this, it is ploughed out with a sweep, and laid by with the hoes. The price of corn is $1 per bushel, and that of fodder $1 per 100 pounds.

Oats.—This crop was better than an average the past year, which may generally be put down at 15 to 20 bushels per acre, though 60 or 70 bushels are sometimes obtained. The quantity of seed varies from 3 pecks to a bushel per acre: price, 75 cents per bushel when cleaned, or the same price per hundred in the sheaf. Oats are generally considered to be an exhausting crop. Time of seeding, from the first of January to the last of February.

Barley is but little cultivated here, except in small lots, for feeding to stock while green, for which it excels every other grain. I believe that one acre of good land, sown in barley, would be worth $50 to any farmer; but it is useless to sow it on any other than rich land. The average yield of grain per acre is about 20 bushels. The quantity of seed per acre varies from 3 pecks to 3 bushels. Price, $1 per bushel.

Rye receives but little attention, as it yields but a small quantity of grain, though it will produce more straw, and exhaust land less, than any other grain we have. The quantity of seed used is 1 peck to the acre; the price per bushel is $1.

Peas are raised mostly between the corn, few fields being planted with them entire, though they improve the land very rapidly, when thus planted in the spring, and followed with rye in the fall.

Clover and Grasses.—Little or no attention paid to them.

Dairy Husbandry.—But little attention is paid to making butter and cheese for market. Every farmer tries to have as much milk and butter as he needs for his family; and as for cheese, there is none made in the county, to my knowledge.

Neat Cattle.—We have very few cattle, of any improved breed, among us. The usual price of beef is from 3 to 4 cents per pound. The price of milch-cows is about $10.

Sheep and Wool.—Wool-growing is a profitable business, but, owing to the depredations of dogs, no one seems willing to go into it on a large scale. Most farmers raise wool enough for their own use. The average yield of wool per head is 4 lbs., though perhaps large sheep might yield a little more, but of coarser quality. Wool is worth 25 cents per lb. in the fleece, or 50 cents when carded into rolls.

Cotton.—This crop has been rather below an average the past year. The storm in August injured it very much. The average yield of cotton in the seed is about 500 lbs. per acre. The crops which grow best with cotton are corn and wheat, or other small grain. The best preventive against rust and worms is lime, sowed in the drill at the time of planting, at the rate of one barrel to the acre. Cotton has commanded a higher price this winter than it has for several years, which has enabled a great many of our farmers to pay their debts, and get in a way to live; but others have gone in debt, and, should the price of cotton fall, they will be seriously injured.

Rice.—None raised, except in small patches, for home consumption, though it might be raised with profit, if the necessary attention was paid to it.

Root Crops.—The turnip crop was not so good the past year as formerly. Many farmers did not sow at all, but those who did, and succeeded in getting a stand, made good crops. The seed is usually sown broadcast, and raked or harrowed in, and the weeds and grass are pulled out by hand. Some, however, prefer to sow in ridges, about 18 inches apart, and work them. They can be chopped out to a stand, like cotton, which plan I prefer.

Potatoes have turned out rather sorry, owing to the dry weather in August and September, the principal months in which they grow.

Every farmer should, by all means, have his patch of fall cabbages. None but those who have tasted them can imagine how delicious they are. They are altogether different from those raised in spring. They are more tender to cook, and stand the freezes of winter when spring cabbages are all killed. They are much more easily raised, and should be sown the first of July; then the weeds will not grow much before the frost comes, but the cabbages will continue to grow every warm spell until Christmas.

Very respectfully yours,

WILLIAM C. DICKSON.

Springfield, Ohio, December 28th, 1850.

Sir:—The information called for by your circular of the 26th of August last is herewith submitted. I hope it will reach you in time for the purpose for which it is designed. Owing to a daily press of my official duties, I must necessarily be very succinct in my answers to the inquiries proposed. I have been compelled to rely mainly upon the practical experience of other gentlemen, who are more familiar with the walks of agriculture than myself.

The little I may say, however, I hope will contribute something to the great interests which you are now engaged in promoting.

Kinds of Wheat.—White and red chaff, bearded white, bald, Wabash, red-chaff, white Mediterranean, blue-stem, and several other varieties now on trial. Average yield per acre, 22 bushels; sown during the first weeks of September; harvested about the first in July. Fallow should be twice ploughed; ploughing should be from 5 to 8 inches deep. Yield increasing, as well as the mode of culture improving. Rotation in crops. Best remedy for the fly, good manure. Pasture fallow close, and sow after a sharp frost. Very little danger from weevil. Average price per bushel, 75 cents. Quantity raised in the county the past season, 600,000 bushels.

Corn.—Varieties obtained by mixing the large Southern corn with that of the North; and from the seed thus selected the yield is 85 bushels per acre. Cost of production, 15 cents per bushel. Best mode of culture: winter-ploughing, good manure, often stirring the soil, after planting, with cultivator and plough. It is fed both ground and whole. Too little attention is paid to manuring. Quantity raised in this county the past year, 700,000 to 800,000 bushels.

Oats, Barley, and *Rye* are largely cultivated. Yield per acre—oats, 80 bushels; barley, 30 bushels; rye, 25 bushels. Peas and beans are raised only for domestic use. Oats and spring barley are hard upon the soil; rye and fall barley least exhausting.

Clover and Grasses.—Season dry; average yield, 1 ton per acre. Best fertilizers, a light coat of stable manure, with a little lime or plaster. The mowing-land should not be pastured too short. Kinds used—clover and timothy on all lands dry enough to plough, and herdsgrass on wetter lands. Quantity of seed sown, 1 bushel to 8 or 10 acres.

Dairies.—Not carried on largely, as a business. Average quantity of butter per week, for each cow, is 4 pounds: cost, 10 cents per pound. Milk is generally placed in cellars, or spring-houses, and skimmed while sweet—churned once or twice a week, in the dash or barrel churn. The butter should be set where it is not too dry to mould, nor too damp for the salt to evaporate and settle upon the surface. Average price of butter, 12 to 15 cents per lb., and that of cheese, 5 to 7 cents per lb.

Neat Cattle.—Cost of rearing till 3 years old, $10 to $15 per head. Average price, $12 to $35. Price of good dairy-cows, in the fall, $10 to $15, and in spring, $15 to $20. Price of cows for the blood or stock, $80 to $300. Twenty-five bushels of corn will produce 150 lbs. of beef. The largest quantity of beef will be produced from the least amount of food when fed to pure short-horned Durhams.

Wool-growing.—Profitable. Cost of growing per lb., 18 cents for coarse, and 28 cents for fine wool. One ton of hay for half the year, and the cost for pasturing the other half is equal to another ton, which will produce 20 lbs. of wool. With care, large sheep are best for mutton, and small sheep are more profitable for wool. Two-thirds of the ewes raise lambs, if well cared for.

Hogs.—The Irish grazier, Russia and English white crossed, China and small Berkshire, best for quick maturity. The cheapest method for producing pork is by feeding the hogs with ground grains in slop. With clover pasturage in summer, and apples in the fall, 10 bushels of corn will produce 100 to 130 lbs. of pork. Sugar-curing, with a little saltpetre; and when cured and smoked, take ground pepper and mix with good molasses, and rub in well upon the soft or fleshy parts; then enclose in a canvas bag, and hang in a dry place.

Cotton, Sugar-cane, Rice, Hemp, Tobacco, and Roots.—Some of these are not raised at all—others very little. Turnips, carrots, and the French sugar-beet: a few experiments have been made with good success. Only for the scarcity of labor, and its high rate, experiments would oftener have been made. Potatoes grow well. They were cut short the past season by severe drought. Not more than 50 or 60 bushels to the acre were raised of either variety.

Fruit culture is attracting considerable attention, and is very much on the increase. The varieties are numerous, and of superior quality. Apples are better for hogs than for cattle. They contain too much acid for the latter. Potatoes, when boiled, and mixed with other food, are better for hogs than apples.

I am, very respectfully, your obedient servant,

J. HENDERSHOTT, P. M.

Urbana, Champaigne County, Ohio,
Black Creek Farm, December 26th, 1850.

Sir:—I will undertake to reply to a few of the questions contained in your Agricultural Circular, which I received some time since.

Wheat.—The most approved varieties of wheat are the Etrurian, reed-straw, and Kentucky smooth wheat, and the Mediterranean and old red-chaff, both bearded. There are also various other varieties grown. The average product of last harvest, I think, is about 20 bushels per acre. We prefer to plough but once for wheat, and then from 7 to 9 inches deep. We sow about the middle of September. I think the yield per acre is increasing. The last year's crop, I suppose, will average about 65 cents per bushel.

Corn.—The kind most extensively grown in this county is a large, yellow corn. The average product upon good land, well cultivated, I think, is about 50 bushels per acre.

Good meadows will yield about 2 tons of hay per acre. Timothy is the kind preferred.

Neat Cattle.—The cost of rearing till 3 years old, I think, is not less than $20 per head, and they are worth, at that age, about $25 each, if they are of good quality. The Durham cattle are preferred in this section of country.

Hogs.—The best breeds with which I am acquainted are the Byfield, Berkshire, Irish grazier, and the Calcutta; and I have learned, from actual experiment, that either of these breeds may be improved by crossing with another. I believe the cheapest method of raising pork is upon clover and corn; and I think that 100 lbs. of corn, fed to a thrifty hog, will make 25 lbs. of pork.

Among all the recent improvements in farming implements, I believe that the reaping and mowing machines will save the most labor. I have used, for the last 2 years, a mowing machine of Huzzy's patent, with some improvement by the manufacturers, (Messrs. Minturn and Allen,) with success and entire satisfaction.

Very respectfully yours,

SMITH MINTURN.

Greenwich, Cumberland County, New Jersey, 1850.

Sir:—In compliance with a request contained in your Agricultural Circular, I forward you some practical hints on the different crops which I cultivate.

Wheat.—Varieties sown, Mediterranean, and white, or blue-stem. My average crop is from 20 to 30 bushels per acre. I sow from the 10th of September to the middle of October. Quantity of seed per acre, 2 bushels. I plough 5 inches deep. The best preparation for a crop is a clover lea; second crop ploughed in by the middle of August, and the wheat should be well harrowed in, together with 200 pounds guano per acre, at the time of sowing the wheat. The best remedy for the fly is to pasture pretty close, early in the spring, with sheep. Average price, $1.10 per bushel.

Clover and Grasses.—Quantity per acre, 1½ tons. The best fertilizer is guano. Cost of growing, $5 per acre. Price in market is $10 per ton.

Hogs.—The best breed is the Berkshire. The best mode of raising is on clover pasture in summer, and corn-feeding in the fall. Ten bushels of corn, or 560 pounds, will make 100 pounds of pork.

Potatoes.—The best variety of Irish potatoes, for market, is the Mercer. Average yield, 150 bushels per acre. I plant in drills about 10 inches apart, with 2½ feet between the rows. I cut my seed, and plant in May. The best manure is barnyard manure, with 100 bushels oyster-shell lime per acre. Average price in our market, is 50 cents per bushel.

Manures.—That best adapted to our soil is vegetable manure and lime, which we consider the cheapest fertilizers we use. I have used guano very successfully, particularly on the wheat crop. The quantity I use is 200 pounds per acre, which will produce a good crop of wheat and grass before it is exhausted.

Yours, truly,

SAMUEL C. FITHIAN.

Fort Jessup, Louisiana, December 11th, 1850.

Sir:—I have recently had the honor and pleasure to receive your Agricultural Circular, and would now attempt a reply.

Corn.—The Spanish, or St. Antoine corn, I esteem far superior, in this climate, to any other. I have tried several different kinds, and, after eight years' experience with the St. Antoine, consider it the best. It grows much larger than any other variety, and is about two weeks longer in maturing than the gourd-seed varieties. It stands the severe droughts to which we are subject in this country much the best, and produces, on the same kind of soil, and with the same labor, from 25 per cent. to 33 per cent. more. The height to which it attains is from 16 to 18 feet. I send you a sample of it. It is what may be called a native of this country.

Cotton.—There has been so much said by men of high attainments and great experience upon this subject, that I fear to advance an opinion. I would say, however, with regard to bedding the land, which should be done the last of February, or first of March, I use a large shovel plough for opening the first furrow in the middle, then, with an old-fashioned coulter, run 2 or 3 furrows 8 or 10 inches deep in that before made, and fill up with

stalks of every kind which may be upon the ground; then, with turning-plough, finish the bed. Under this mode of treatment, the tap-root descends below the reach of drought, and the leaves will be green and the cotton growing when that on a hard foundation will turn yellow and drop its leaves. The quantity per acre we seldom estimate. I have raised the Sea Island cotton on our highest lands, where it produces nearly as well as the Petty Gulf, and of fine quality. I send you a sample both of the black and green seed. We have the prolific cluster variety, which is far superior to any other as to quantity per acre, and also for its picking qualities.

Sugar Cane.—We raise it here both on high and bottom land (provided it is rich) for our domestic use, but find it exhausts the soil more than any other crop. Our cultivation of it is limited.

Tobacco grows well here on any dry land. I have seen it growing and in blossom at Christmas. It is not raised here as a crop, though it might be to good advantage, if we were acquainted with the treatment of it.

Root Crops.—All kinds do well here.

Peas.—The cow pea is used for renovating the land, by turning under while green, and is considered the best variety. All kinds do well.

Cotton-seed, rotted, is the best manure we can use for our crops.

Meteorology.—I herewith send a sketch of a table from 1st June to the 10th of December.

Sheep and Wool.—The different breeds here are Merino, Saxon, and native. They are raised here without feed, either in winter or summer, except what they get in the pine woods. Their wool is very fine.

Respectfully,

G. W. THOMPSON.

Meteorological Table for Fort Jessup, Louisiana, latitude 31° 30′ *North; longitude* 16° 28′ *West. Elevation,* 1200 *feet.*

Months.	Thermometer.			Barometer.			Remarks.
	[illegible]	[illegible]	Average.	[illegible]	[illegible]	Average.	
June, 1850……	82°	61°	78°	29.95	29.10	29.52	Rained on 16 days; winds N. and S.
July……	85	71	76	29.70	28.90	29.35	Rained on 12 days; wind N.
August……	89	68	77	29.70	28.95	29.29	Rained on 9 days; wind N.
September……	86	62	74	29.90	28.90	29.41	Rained on 1 day; wind N.
October……	86	44	67	30.35	29.10	29.67	Rained on 3 days; wind N.
November……	75	50	61	30.33	29.20	29.91	Rained on 5 days; wind N. and W.
To 10th Dec……	67	9	38	30.50	30.05	30.27	Rained on 2 days; cold, sleet, and snow 2 days.

Please accept this table as above, and find in this box a sample of the Spanish or St. Antoine corn. Also, of the black and green seed varieties of the Sea Island cotton. Also, a sample of the bolls of the prolific cluster cotton.

Respectfully,

G. W. THOMPSON.

Dunlapsville, South Carolina, November 10th, 1850.

Sir:—In reply to your circular of the 26th of August, I will proceed to answer such points as come within my particular knowledge, in the order in which they are stated.

Wheat.—We have tried a great many varieties, but the kinds most generally in use are the big white, late, and the red spring wheat, early. The time of sowing big white, first of November; red spring wheat, all November. We sow late to avoid the Hessian-fly. But for the fly, either would do better sown early, say in September, for the late, and October for the early variety. Our late wheat is often damaged by the rust, for which we know no remedy, except early sowing. Preparation:—We soak in bluestone, 1 pound dissolved in water, for 5 or 6 bushels of wheat, to prevent smut, which it does effectually. Sow from 3 pecks to a bushel to the acre, after corn or cotton. We generally plough but once, about 3 inches deep; two ploughings are said to do better. Yield per acre, about 8 bushels; when manured with compost or cotton-seed, it is increased to 15 or 20 bushels. A day's sunning in hot weather is our remedy for the weevil. Average price about \$1 per bushel. Owing to the cheapness of land here, the small quantity of seed sown, and the little cost of labor in our mode of putting in, we can grow wheat as cheaply, perhaps, as in any part of the United States. But cotton engrosses our attention, and but little more than will supply our inland towns is sold. Our time of harvest is from the 1st to 15th of June.

Corn.—The most esteemed varieties are the gourd-seed, or between that and flint; the Oregon succeeds well. We have all the shades of white, yellow, red, speckled, &c. The small Northern varieties do not answer so well here; they come in two or three weeks earlier than the Southern corn. Average product per acre, on upland, is 15 or 20 bushels, and on bottoms or lowlands it is 40 or 50 bushels.

By high manuring and good culture, these products can be greatly exceeded. Cost of production per bushel varies under different circumstances, say 33 cents. The best system of culture:—Planters have different methods: I prefer the following. Plant on wheat or oat stubble; break up deep and thoroughly, early in the winter, the earlier the better. About the middle of March lay off furrows with a shovel plough, about 5 feet apart, taking care to run them as nearly straight as may be, throughout the whole field. In these furrows drop 2 or 3 grains every 3 feet, to be thinned to one stalk, when secure from birds, &c. If manure or cotton seed is to go in, drop it on one or both sides, close to these grains; cover lightly with one shovel or two small scooter furrows, or with a harrow. When it is fairly up, run round with a scooter or small cultivator, and follow with the hoe a few days after, taking care to kill all the weeds and grass on the ridge, and earth the corn lightly. This operation should be finished by the first of May, when the cotton will call for our attention. Some 15 days afterwards give the corn a deep, close ploughing, and at intervals of about 20 days two more ploughings, both of which should be more shallow, especially the last. It is now supposed to be "laid by," unless the ridges are foul, in which case they must be cleaned with the hoe. This is our principal cereal crop, forming two-thirds or three-fourths of the bread eaten by our people, and the principal food of our horses, mules, and hogs. Enough is generally

raised for the home supply, and little or none is sent to a distant market. For feeding to our stock, it is rarely ground or cooked, except in years of scarcity. The common opinion is, that it will go farther when ground or cooked.

Oats are more extensively cultivated than any other small grain. Average yield per acre, 10 to 20 bushels.

Barley and *Rye* are but little sown, except for grazing-lots and pasture.

Beans are only raised for the table.

Peas are cultivated for the double purpose of pasturing our stock in the fall and early part of winter, and for renovating our lands. For this last purpose they are estimated by many very highly; so much so, that they have been called the clover of the South. Whether they are more valuable than the same amount of other vegetable matter, I have never been able to determine: true, the authority in favor of the opinion is very respectable. They are generally drilled in between the corn rows at the second or last ploughing.

Clover and *grasses* receive too little attention. Our summers, I think, are too dry and hot for them. With high manuring and seasonable rains, I have seen fine lots of clover. We depend upon the native grasses.

Neat cattle are raised for the home supply of beef, milk, and butter; but little is sent to a distant market. The smaller breeds are thought to suit our short pastures best.

Sheep and Wool.—Almost every farmer has a small flock of sheep, to supply wool for winter clothing. For any other purpose they are not raised, but the opinion begins to prevail that wool-growing might be as profitably conducted here as anywhere else.

Hogs.—The best breed is a mixture of the Berkshire and our native stock. The best method of raising:—Feed with corn except when they have the run of the harvest and pea-fields. One hundred pounds of corn will yield about 25 pounds of meat; if cooked, perhaps more.

Cotton.—This is the great crop of the region. Upon it the planter mainly depends for his moneyed profits. It gives character to, or marks with its impress, every system of culture adopted here. No other crop can be permanently introduced, that intrudes upon or displaces this. It throws every other into the background. No other attains to that perfection among us which it otherwise might do. As now generally managed, it is unfavorable to any system for improving our lands. Indeed, many of our farmers aim at nothing else than to crop with cotton until they run down their land, and then throw it out. Such a practice is becoming less and less common, and must soon cease from necessity. There is no doubt that a rotation might be adopted which would preserve and even improve our lands. There is no more cleansing crop than cotton, nor none after which other crops succeed so well; none, therefore, can better be made the basis of a good rotation. I have adopted the following, with great benefit to the soil, viz. 1st, cotton, manured with compost in the drills; 2d, cotton; 3d, oats or wheat; then cotton, manured as before, &c.; resting once in 8 or 10 years. But no doubt a better system, when the fields lie sufficiently near the stables and cattle-yard, is that of Dr. Cloud, of Alabama. His course is, 1st, cotton; 2d, corn; 3d, small grain, and so on continuously. He manures every cotton crop with compost, both broadcast and in the hill. The product, he reports, almost exceeds belief. (For a full account, see the back volumes of the Albany Cultivator; also, I believe, the Southern Cultivator.) It is evident, then, that an improving rotation can be adopted, but further experiments must decide what it shall be. Perhaps no one course will suit every locality and every condition. Average yield of clear cotton per acre, 290 pounds, and of ginned cotton-extremes, 100 to 600 pounds. (I should have said before, that my remarks are intended to apply only to the granitic region of South Carolina.) Cost of production, per pound, 6 to 8 cents: it varies greatly. Best preventives against rust, army and boll worms:—Except in newly cleared lands, the rust does not often appear, and the army and boll worms rarely visit us. The cotton-louse is more troublesome than either. I know of no certain remedy. The best, I presume, is not to repeat cotton too often, successively, on the same land; thus starving out these insects for want of proper food. Owing to our comparative exemption from these plagues, notwithstanding our soils and climate do not suit cotton as well as in the South-west, our crops are more uniform and certain. Cold springs, too much wet, and drought are the evils we most dread.

"Your experience with cotton-seed as a fertilizer."—It is excellent for every crop to which I have seen it applied, as we would infer from their analysis. They are as valuable in the garden as in the field. I know of no exception. The greater part of mine are scattered over the wheat and oat crop, at the rate of 20 or 30 bushels to the acre, but sometimes they are applied to the corn and cotton also; but I have found it difficult to get a stand of the last, owing to its dying out. For potatoes and beets, nothing can excel them.

Potatoes.—Irish potatoes highly manured and planted early, say in February, if the spring is wet or seasonable, succeed very well—coming in for table use often in May. If planted later, they are more uncertain. I have never heard of the potato disease in this region. Sweet potatoes, on sandy soils, succeed admirably. We are too far from market to raise them for any other than home use.

Manures.—A greatly increased attention is beginning to be bestowed upon the making and applying compost manures. We are too far from the seaboard to import fertilizers. Lime is to be had only in two or three localities. I know of no instance of its having been extensively spread over the land. Whether it would do good on our soil remains an open question. I have thus touched imperfectly on some of the points in your Agricultural Circular. As I have been able to communicate nothing new, I fear I have been tedious. If any part of this communication will serve your purpose, it is freely submitted to your disposal.

Very respectfully yours,

JOHN H. DAVIS.

Magnolia, Putnam County, Illinois, December 10th, 1850.

Sir:—Your circular of the 26th of August was duly received, in answer to which are subjoined the following impressions upon certain agricultural branches in this portion of our State. Having had very little practical experience in these matters, should I depart from practical observers in some of my estimates, it will be only a matter of conscientious opinion, not presumed to be entirely correct, and therefore will not alter the fact.

Our State occupies a space between 37° and 42½° north latitude, and here, near the 41st, we have a beautiful prairie country, subject to all the

varieties and changes of season peculiar to the same latitude in States lying east of this, and with a fertility of soil unsurpassed by any other State in the Union. Perhaps not more than one-tenth part of our land in its native condition is found covered with wood, and this generally borders on the rivers and small streams. From this circumstance, you will readily perceive that the first settlement of such a country will take place at or near the junction of prairie and timber, thence generally extending into the prairies, the central portions of which, in our State, will, at no very distant period, be teeming with the rich productions of a wealthy agricultural community. The abundance of mineral coal found to be so generally diffused will supply the place of fuel. Then, again, the practicability of growing different kinds of wood in a few years, to supply the natural deficiency, and likewise a reference to that branch of agricultural interest which so naturally suggests itself in the interior of an extensive prairie—the production of hedges, which later enterprise, under the investigations of Professor Turner, of Jacksonville, Illinois, seems very flattering, even beyond our former most favorable anticipations in making a living fence. The kind which he prefers, and in which he has every confidence, is the Osage orange, and if its permanence or ability to endure the severity of our latitude, becomes established beyond a doubt, all difficulties in fencing will disappear, as I have been informed that a good hedge of this material can be grown at an expense of 25 cents per rod. However, should this article fail to sustain the reputation which it has already obtained, we have several varieties of the common thorn, of spontaneous production, some of which, I have no doubt, may be converted profitably to hedging purposes. The above advantages being so confidently available, seems to justify the opinion that it will be but a few years when the prairies in Illinois will be densely settled.

The cultivated proportion of our country is yet relatively but fractional, and the fertility of the soil has enabled the farmer to procure abundant crops by a very easy mode of farming. Many early settlers have cultivated the lands for the last 20 years, and still obtain very good crops, without ever having manured them—say from 50 to 80 bushels of corn to the acre. The largest amount above specified is procured from bottom land, and the least from the table or prairie land, at a cost of about 15 cents per bushel, and has been selling at from 25 to 45 cents per bushel during the past season.

The production of wheat on new land as a first crop, after breaking up the prairie in May or June, then sowing in August, 1½ bushel per acre, is the most common rule adopted by farmers; and in this way they generally succeed in getting good crops of from 20 to 30 bushels to the acre. The above I refer to as being the most successful mode, although very good crops are frequently obtained from old lands with but quite indifferent cultivation. I have no doubt our old lands will yield most abundant crops of wheat with a good system of agricultural preparation—as much, perhaps, to the acre as when first broken. Very little exertion has yet been made to increase the natural fertility of our prairie lands—seeming rather to question the propriety of urging the old dame, already so profuse.

Those machines of modern invention, constructed for cutting grass and grain by horse-power, are regarded as truly labor-saving inventions, and will enable our farmers to engage more extensively in the grass and grain-growing business. From actual observation, I should speak in high commendation of their utility. Two hands and 4 horses can cut, in a very neat and saving manner, from 12 to 20 acres a day with one of these machines, and with them, under their present degree of perfection, we are enabled to cut and save one-third more than under former modes of harvesting. And yet I apprehend that the genius of invention will still simplify, improve, and render them even more desirable.

The cultivation of fruit is receiving increased attention, with no risk of overrating its true importance. This is not saying too much, when from one who believes that half the value of life is lost in the absence of the finer varieties of fruit, so far, at least, as luxurious eating constitutes the value of life. Our nursery-men seem to be striving to excel in the production of thrifty, healthy trees, with the accomplishment of which they express themselves most highly gratified.

The wool-growing business, under existing circumstances of our country, is regarded as not particularly profitable, other investments of industrial capital producing better compensation. Those gentlemen who have entertained a favorable opinion, and who are engaged in this business, have generally driven in good flocks from the East; but have had the misfortune to lose largely of their numbers during the first and second years, either by injury sustained from driving, or otherwise by acclimation. It is, however, proper to say that those raised here are healthy and large, even above the size of those generally raised in other portions of our country, with like care and attention. I am not able to determine the expense of rearing cattle until they are 3 years old. I am well assured that a succession of mild winters will produce very essential differences in the true expense of rearing. Some winters are so mild that cattle have wintered very well without foddering, by having their range in corn ground and timothy meadows. Other seasons, much more unfavorable, require a period of foddering of from 3 to 5 months. A very common price for wintering 2 and 3 years old cattle is from $2 to $2½ per head, and, under the present condition of the settlement of the country, the summer range costs but very little, except the expense of salting and keeping them within a range of observation, just to prevent their straying; and, with access to this wide range, extremely fine beef is produced, better than I have ever seen grown upon pastures of tame grass.

I have the honor to remain, very respectfully yours, &c.,

J. B. ASHLEY, M. D.

Hamptonburgh, Orange County, N. Y., December 26th, 1850.

Sir:—In reply to your circular of the 26th of August, I will briefly mention a few things pertaining to agriculture, of which I have some practical knowledge; and first of *Wheat*. This most valuable product is with us a rather uncertain crop. There are several varieties in use, but the one known as the Mediterranean is most esteemed. If sown early, say from the 1st to the 15th September, it generally escapes the attacks of the fly and weevil, or worm, in the head. We usually sow wheat after oats, and many of our best farmers prefer once ploughing to more. Our rotation of crops is corn on sward land, well manured, succeeded by oats, and then wheat or rye. The average yield of wheat in this county may be set down at 12, or possibly 15 bushels per acre, occasionally going as high as 35 bushels. The average price of wheat for the last five years has been about $1.20 per bushel.

Corn.—This with us is a much more important and certain crop than wheat. The kinds usually planted are the 8 and 12-rowed white and yellow, which ripen early. We usually plant from the 10th of May to the 1st of June, and generally harvest or cut up at the root as early as the 10th September, and place it in shocks, and let it remain till we husk it in October. The average yield per acre is about 50 bushels, though some of our premium crops have exceeded 100 bushels. The cost of culture I am unable to state, but on rich soil the stalks will nearly pay the expense. They make a most valuable food for milch-cows; the milk and butter being of the richest kind and of the finest flavor. Corn is mostly fed whole, but I think it would be much more profitable if ground and cooked for hogs. We usually grind the ear for cattle, and feed raw. Price from 50 to 63 cents per bushel.

Oats we consider a good crop, and sow mostly after corn. Yield per acre, from 30 to 70 bushels. Seed sown, 2 to 2½ bushels. Price, 30 to 45 cents per bushel of 32 lbs.

Rye is sown after oats, from 1st September to 10th October. Seed sown, 1½ bushels per acre. Average yield, 15 bushels per acre. Price, 60 cents.

Clover and Grasses.—In this section, the two most esteemed grasses are clover and timothy; the latter sown in the fall, with wheat or rye, at the rate of 4 to 8 quarts per acre, and the clover is sown in the spring, about 6 lbs. per acre. Yield from 1½ to 2½ tons per acre.

Dairy Husbandry.—Since the construction of the New York and Erie Railroad through this county, large quantities of milk are sent to New York, though those only who live near the line of the road can avail themselves of this source of profit; so butter is the main dependence of the dairyman. The annual yield per cow is from 150 to 200 lbs. I know of one or two small dairies, of 10 or 12 cows, where the average is 240 lbs. The average price of butter with us is from 18 to 21 cents per lb. In this county we churn the milk, using large churns, which hold one or two barrels. We use horse, sheep, or dog-power, and water-power where we can. In large dairies the horse is preferred, but in very many a sheep will perform all the labor, and fatten, while churning the milk of 15 or 20 cows. Being convenient to the New York market, our butter is sent off weekly, as a general thing, in tubs of from 13 to 50 lbs., though many pack down in large firkins, and keep till fall. A very important item in the profits of the dairy is the pork made on the buttermilk, averaging, say $4 the cow; also the calves, which are sold, at four weeks old, at $3.50 to $5 each. Some of our most successful farmers will make their cows pay, from all sources, from $40 to $52 per head.

Neat Cattle.—Very few are raised in this county. Good dairy-cows are worth, in the fall, from $18 to $25, and, in spring, from $25 to $35.

Sheep and Wool.—Our lands bear too high a price to make the growing of wool a principal business: still there are many sheep kept. The coarse-woolled are generally preferred for mutton and lambs. As a general thing, the lambs will equal the number of ewes annually. I could name a farmer who last year kept 50 ewes, which cost $1.75 each, and raised 71 lambs, which sold at $2.25 each per head. The ewes averaged 3 lbs. wool, worth 28 cents per lb., and they were worth this fall, $2.50 each.

Hogs.—The cheapest, and of course the most profitable method of producing pork is on the buttermilk of the dairy, and corn-meal cooked, upon which they thrive rapidly, and make the best kind of pork.

Potatoes.—This crop proved almost an entire failure the past season, scarcely enough having been saved for family use. The average yield formerly was 200 to 300 bushels per acre.

Very respectfully yours,

W. W. JACKSON.

Wheeler, Steuben County, New York, December, 1850.

Sir:—Your Agricultural Circular has been received, and, in reply, I will transmit such information as I have been able to obtain. This county contains about 1600 square miles, situated in lat. 42° 36′ N. Its principal products are, wheat, corn, oats, barley, wool, &c. The land is well adapted to all kinds of farming common in this part of the State, and our agricultural interests are receiving increased attention.

Wheat.—Our wheat crops are generally good on the high lands, and in lower situations it is subject to rust. We are somewhat troubled with the Hessian-fly, but not with weevil so far as my knowledge extends. The best means of avoiding the ravages of the former is to sow late. In some sections of the county, wheat has been much injured by the wireworm, which can generally be exterminated by cultivating the land for several years. Varieties of wheat, Hutchinson, Soules, white flint, blue-stem, and the red-chaff. The Hutchinson variety is not so highly esteemed as formerly, on account of its liability to shell so soon as ripe. The Soule variety is liable to the same objection. Both are early, and should be cut before fully ripe. The white flint is an excellent variety, for the reason that it will not shell if it stands several days after it is fit to cut. The Ohio flint is much esteemed by some, because it will admit of being sown later than any other variety that I am acquainted with. Our crop, last season, was probably an average one, though the quality is not so good, owing to the wet weather at the time of harvest, which caused much wheat to grow in the straw. Average yield, 12 to 18 bushels per acre. Time of seeding, from 1st September to 1st October. Harvest, about 20th July. Quantity of seed per acre, from 1 to 2 bushels, though, according to my experience, 1½ bushel is enough. After sowing, we sometimes use the cultivator to cover the grain, which, by the way, is one of the best modes of putting in wheat. I consider the cultivator next to the plough in point of utility. The yield per acre is generally on the increase. Preparation of seed:—Some soak in brine, and others in vitriol-water, and dry with lime; though, perhaps, the majority sow without any preparation. One of the best preventives against smut is to soak the seed in lime-water from 24 to 36 hours, and dry with fine lime in order to sow. Wheat prepared in this way always looks strong and healthy when it comes up, and, I think, pays well for the trouble. Two seed-drills were last fall introduced into this county, and were used only to a small extent. I used one of them to put in about 20 acres of wheat, and think that, where the land is not rough, these machines will prove very valuable to the farmer. By using them there is quite a saving of seed. Price of wheat, last fall, $1 per bushel. Spring wheat is grown here to some extent, though not much where we can raise good winter wheat.

Corn.—This important crop proved to be unusually good the past season, notwithstanding the cold and wet weather at the time of planting. Varieties, the large and small 8-rowed yellow, the 8-rowed white, also 10 and 12-rowed yellow. Each variety has its patrons. After an experience of 40

years in growing corn, I consider the 8-rowed white to be the best variety I have ever tried, though it may not look quite so rich. Average yield per acre, about 40 bushels. The cost of production depends much upon location and soil; for some land can be cultivated much cheaper than other. The average, however, may be set down at 31 cents per bushel, exclusive of interest on land. My method of cultivating corn is to spread upon sward land a good coat of manure, and plough in as deep as the strength of the team will admit of; harrow thoroughly, and mark off the rows 3½ feet distant each way. I use the cultivator to work among my corn, running it both ways at each time of hoeing. I think it pays well to grind all grain the farmer may wish to feed out to his stock. As to cooking, I do not know, but presume it would be a good plan.

Oats are extensively cultivated in some parts of this county, where wheat is liable to be winter-killed. Average yield, about 40 or 50 bushels per acre; price per bushel, 37 to 40 cents. It is thought to be a more exhausting crop than any other. Quantity sown per acre, about 3 bushels.

Barley.—More sown the past season than usual. The 2-rowed variety is now preferred on many accounts. It weighs more, has less beard, consequently pleasanter to handle; also a longer and stronger straw, so that we can cradle it and bind it in bundles. Price, the past season, about 70 cents per bushel. Seed, per acre, from 2 to 3 bushels.

Rye not much raised. Beans raised only in small quantities. Peas are grown somewhat extensively in sections where corn does not succeed well. The value of peas for making pork is nearly equal to that of corn. Average yield per acre, about 30 bushels. I have no knowledge of their being sown as a renovating crop. Quantity sown per acre, 3 to 4 bushels. Buckwheat is grown to some extent. Yield per acre, about 20 bushels. Quantity of seed, ½ to ¾ bushel. I am inclined to believe that barley, peas, and buckwheat are the least exhausting crops.

Clover and Grasses.—The hay crop is a good one with us. Average yield per acre, 1½ to 2 tons. Plaster is the best fertilizer for meadows. I sow about 4 quarts each of clover and timothy for meadows, and, for pasture, rather more clover. The cost of growing hay depends so much upon circumstances, that I am not able to estimate it.

Dairy Husbandry.—There is considerable attention paid to this branch of industry, though I am unable to enter into particulars on the subject. The price of butter is from 12 to 15 cents; and that of cheese, 6½. Those who have large dairies use horse-power for churning, and the smaller ones, dog-power.

Neat Cattle.—The cost of rearing till 3 years old is more than they will sell for; usual price at that age, from $16 to $24. Good dairy-cows are worth from $20 to $30 in spring, and in fall from $15 to $20. The only advantage to farmers generally in rearing neat cattle is, that they can use their coarse fodder in this way that would otherwise be lost. More attention is paid to improving the breed of cattle than formerly, though not so much as in the neighboring counties.

Sheep and Wool.—Most wool-growers do not think it a profitable business at the present prices; but as they have arranged matters expressly for that purpose, they continue it, hoping for better prices. I have conversed with a number of those engaged in the business of wool-growing, relative to its cost per pound; and all agree that it cost 40 cents. We are of the opinion also, that it costs as much to grow coarse wool as fine, though, if we had a good market for mutton, it might be preferable to grow coarse wool, as these varieties have larger carcasses. Nine-tenths of all the wool grown in this county is what may be termed fine wool, and, according to the testimony of wool-buyers, is of superior quality. Average yield per head, about 3 lbs. The average consumption of hay per head, during the winter, is about 300 lbs. The proportion of lambs annually reared to that of ewes, is as 7 to 10.

Hogs.—The Berkshire were formerly much esteemed; but we have another breed, which I cannot designate by any particular name, more popular than any other. They are of a red or sandy colour; no bristles, but fine hair, and small bones, and will fatten at any age. The pigs, (if pure blood,) when about two weeks old, will shed their tails. Cannot say how much meat 100 pounds of corn will make.

Sugar.—There are considerable quantities of maple-sugar made in this county.

Root culture is on the increase. Carrots are excellent to feed to horses and cattle, and grow best on light, sandy soil.

Potatoes have, during the past season, suffered much from rot. Many pieces were not worth digging. I planted 18 different kinds, all of which (except the "Mountain Junes") were more or less affected with rot: these were not. They are very early, and are fine for the table, and yield very well. Know of no remedy for the potato disease.

Fruit culture is receiving increased attention. We have many excellent varieties of apples, pears, peaches, plums, cherries, and grapes. Peaches do not flourish well but in a few localities. Apples are thought to be worth as much for feeding to hogs and cattle as potatoes.

Manures.—There is not as much attention paid to this subject as there should be. Some farmers heap up their manure in spring and let it remain till fall. I have no knowledge of plaster or lime having been used with manure as a compost. No guano used here to my knowledge.

Respectfully yours, &c.

O. F. MARSHALL.

Hancock, N. H., December 20th, 1850.

Sir:—It is believed that a very considerable portion of the agricultural statistics contained in former reports from the Patent Office, may be far beyond the common average products. This may be accounted for on the ground that none but the most favorable are furnished. Concerning the products of the dairy, there are but few accounts that may not be considered as very extraordinary. Having kept an accurate account with our small dairy the past season, we have thought that it might not be amiss to forward to you the result. On a farm of about 100 acres, divided as usual into mowing, tillage, pasture, and woodland, we have kept 4 cows of the native breed, from which 4 calves have been reared, principally on skimmed milk, and 268 lbs. of butter have been made, from May to November inclusive. This is but 67 lbs. to each cow, and is probably not far short of the ordinary quantity made from cows generally in this section.

Respectfully, yours,

REED CUMMINGS.

Keene, Cheshire County, New Hampshire, January 13th, 1851.

Sir:—Please receive what follows as an answer to your circular of the 26th August, 1850.

Wheat.—None raised in this town, and but little in the county.

Corn.—There are two varieties much used here, though, perhaps, not extensively known—one of which, if not both, originated in Canada. The kind referred to has short ears, eight rows, and is very compact on the cob. It grows larger from year to year, and may, in time, become less valuable. It is thought to be the best variety for flat land. It has yielded, with good culture, 75 bushels to the acre. The other variety has 12 rows; the kernel long and slim, the yield good, and is best adapted to hills which are not exposed to early and late frosts. I do not know how it is at the South, but here the varieties of corn are numerous and evanescent. In my opinion, they originate in the peculiarities of soil, cultivation, and locality, and disappear when not fostered under these peculiarities. Average product, in Keene, 40 bushels; in the county, 30 bushels. Time of seeding, about the 20th of May; and harvesting takes place in October. An intelligent, aged, and successful farmer has given me the following account of his mode of raising corn, its cost, product, &c. He ploughs his land (always sward) in the spring, about 7 inches deep, turning it well over, then harrows and furrows it. He then puts on 20 cart-loads of dung to the acre, all into the hills. The dung used, say in 1850, was made in the winter of 1848–49, remained in the yard during the summer of 1849, was hauled into the field in the fall, placed in large heaps, and shovelled over once or twice during the next spring. He uses great care in covering the corn and dung; hoes the corn twice, and harvests in October. He is never troubled with the wireworm, and attributes his exemption to planting on sward land.

The cost he estimates as follows:

Ploughing, per acre			$2.00
Harrowing "			75
Furrowing "			25
Twenty loads of dung			20.00
Putting dung in hills			2.00
Planting corn			1.00
Hoeing corn twice			4.00
Cutting up corn			1.00
Husking corn			4.00
Harvesting corn			1.00
Total			$36.00
Corn fodder	$10.00		
Manure left in soil	10.00		20.00 deduct.
Net cost			$16.00
Product, 75 bushels, at 70 cents			52.50
Income per acre			$36.50

The above product was unusual, but was obtained in the year he had in view. The next spring, he spread upon one acre 15 loads of dung, and sowed oats and grass-seed, and the product was more than 90 bushels of oats. He sowed 10 qts. of timothy, and 5 or 6 lbs. of clover-seed. This is his usual quantity. He keeps his land in tillage two years, and in grass from four to six; and on the whole of his grass land (about 70 acres) he averages one ton, or more, of hay per acre.

Dairy.—The above-mentioned farmer keeps 6 cows, and has kept the same cows for 12 years past. For the last 10 years, he has made 100 lbs. of butter and 100 lbs. cheese, annually, to each cow. He has generally reared 10 calves each year.

Neat Cattle.—The extreme prices, at 3 years old, are $15 and $30; the average price for the county, $23.

Hogs.—The Suffolk breed is considered the best. An intelligent farmer, who speaks from his account-book, says that a bushel of corn will make 15 pounds of pork, and that his pork costs 5½ cents per pound. The most approved practice of feeding hogs here is to feed with potatoes and cornmeal, boiling the potatoes, and, while hot, mix in the meal. Such food, whether for hogs or cattle, is much more valuable for being cooked. To bake bread for horses would not be without precedent.

Respectfully yours,

S. HALE.

Hudson, Lenawee County, Michigan, January 6th, 1851.

Sir:—I have taken considerable pains to inform myself, both by observation and inquiry, on the subject of agriculture, and I think you may put implicit confidence in my statements, as I have not only advanced my own opinions, formed from experience and observation, but have compared them with the concurring judgment of the best farmers in this part of the country. This county is blessed with every description of soil, and all of the most fertile character; so that our remotest backwoods can boast of as fine farms as any part of the West. Agriculture is yet in its infancy, comparatively, but much interest is taken in its improvement; also in an annual fair. The prospect of an agricultural work, of real merit, is hailed with unfeigned pleasure.

Our staple product is wheat, of which too much is grown for the good of the soil and the best economy of the farmer—a fact which many begin to appreciate. The most common varieties are white, as they do as well as any other, and bring a higher price. Soules, Hutchinson, and white-flint are the most esteemed. Some of the red-chaff bald is raised, and some Mediterranean. In Monroe, the red varieties only are raised, on account of the ill success of the white. The average product, this year, is about 20 bushels per acre. The yield appears to be rather on the increase, owing, probably, to the improvements in culture. Time of seeding, from the 1st to the 20th of September. The most of it is done during the first and second weeks. Harvest commences about the 1st of July. There seems to be but little necessity for any preparation of seed, as we are almost entirely free from smut, weevil, and fly. Our best system of farming is winter fallowing, with some early spring crop as a renovator; though, perhaps, the most common is the summer fallow, with two or three ploughings of about 6 inches deep. One and a half bushel of seed is generally used to the acre. The average price is 75 cents per bushel.

Our next most important crop is corn, of which the large, eight-rowed yellow, the red-cob, and dent are the most esteemed varieties. The average product is 40 bushels per acre. Cost of production, taken from several

careful estimates, by different men, is 17 cents per bushel. The best method of feeding is, certainly, in the form of meal, cooked and mixed with something less hearty, such as apples and potatoes. Time of planting, from the 1st to the 20th of May.

Oats are much cultivated here. Yield per acre, about 35 bushels; quantity of seed sown, from 2½ to 4 bushels per acre.

Rye, Peas, and Barley.—But little raised.

Beans are grown to some extent, and are thought to be a profitable crop. Average product, not known. These latter crops are sometimes planted to good advantage as renovators.

Grasses.—The small red clover, timothy, and red-top are the varieties raised here. Average product, about 1 to 1½ ton per acre. Timothy and red-top are used on the low lands, and clover on the high lands. The large red clover is used as a fertilizer.

Dairy Husbandry.—This is a profitable branch of farming. The product of 4 cows, during the past 10 months, has been the rearing of 4 fine calves, nearly 600 pounds of butter, and 200 pounds of cheese, which may be taken as about the average. Butter is worth 10 cents, and cheese 6 cents per pound.

Neat Cattle.—Some of the foreign breeds seem better adapted to the climate than the native.

Wool-growing is becoming better understood than formerly, and meets with better success. The coarse-woolled sheep are gradually going out of use, and the fine-woolled are supplying their place, as it costs no more to raise them.

The rearing of hogs has received some attention, but I have had no opportunity, as yet, to ascertain which are the best breeds. I believe Byfield and Leicester to be among them.

The only root crop raised, to any extent, is potatoes. Product, about 200 bushels per acre.

Fruit culture is rapidly increasing, and no doubt is entertained as regards the comparative value of this crop above all others. All our fruits thrive well, and none of the diseases mentioned are known.

I have had neither time nor opportunity to observe the indications of the thermometer, but shall keep an accurate account of its range during the coming year; also of other meteorological observations which may be convenient.

If these remarks meet with your approbation, I hope, in future, to be able to communicate something of more value.

GEORGE W. BOWLSBY.

P. S.—Please forward your Patent Office Reports to this place. Any seeds which may be for distribution I shall receive with extreme pleasure. I shall send a new variety of wheat, which seems about to supersede all others in this section, as soon as I can obtain a pure article.

G. W. B.

Union Mills, Carroll County, Maryland, December 23d, 1850.

Sir:—Your circular has been duly received, and I have hesitated whether I should reply or not, because of my limited information upon the subject, and want of practical knowledge in farming operations. I have concluded, however, to state what has come within my observation, and you are at liberty to make what use of it you may think proper.

The section of the county in which I reside has mostly a thin and barren soil, and in many parts gone to waste from neglect and a want of means to renovate it, though in many other instances (and such cases are increasing) farms of the same nature of soil present quite a different appearance, owing chiefly to the use of lime and careful tillage, which have so changed the nature and productiveness of the soil as to show plainly that some powerful agent has been used. You will find then, upon those farms which are in a more flourishing condition, that lime has been used with more or less advantage, according to the care and skill of the farmer. There are many farms in this section that, fifteen or twenty years ago, might have been bought at from five to ten dollars per acre, which would now readily command thirty to forty dollars per acre, and some even higher than this. This difference arises in a great degree from the improvements that have been made upon them, and will without doubt be still further improved, when they may with propriety be classed with some of the better limestone lands as to value; for it is generally admitted that the grain produced upon this soil is of the best quality, and superior to that which is raised upon limestone land, which is naturally of a better quality. Farming in our section has not been reduced to any thing like system. Industry and close application, with the use of lime, have effected more than science: how far this may aid is yet to be tested. No doubt *it* will also much advance the interest of the husbandman when properly directed. It is, therefore, for the want of proper care, that lime has been and still is used without any definite quantity per acre, or particular time for application. In fact, it is not considered of so much importance as it once was. The quantity varies from 40 to 100 bushels per acre. Mostly applied in the spring to corn ground. It is supposed to continue its virtue according to the quantity used, which may be set down at from five to ten years. The cost is from 10 to 15 cents per bushel on the ground: this difference of cost arises from the difference in the distance of transportation. The first cost may be set down at 8 cents per bushel. It is carried, at most, some eight to ten miles. One gentleman in our neighborhood, who occupies as thin land as any in the county, has been in the habit for some years past of housing his stable and other manure. I have not heard his opinion as to whether he derives essential benefit from this practice or not; but the appearance of his farm and his success in raising crops would seem to indicate and justify an impression in favor of this mode of preserving manure.

I have thus made a few general remarks relative to our section of the county. I may probably be able at another time to give some more satisfactory information; but as it is my impression that none should be given unless it can be relied upon, I forbear saying any thing more at this time, as any thing short of this is calculated to defeat the great object of your Report.

I am, very respectfully, &c.

A. K. SHRIVER.

Franklin, Warren County, Ohio, December 21st, 1850.

Sir:—In attempting to answer some of your agricultural queries applicable to this region, where the soil of almost every farm differs from the neighboring one, consequently requiring different modes of culture, I can only give approximate answers. The variety of wheat principally sown for some years past is the Mediterranean, a red wheat of inferior quality, but ripening earlier than most other varieties, and not so liable to rust—therefore a surer crop. I procured seed of the improved white flint from Ira Cook, of Byron, New York, some years ago, and have sown of it each year since, as have some of my neighbors. Though a very excellent variety, yet, in consequence of its late ripening, it is liable to fail from rust. The only preparation we give our seed is to free it from chess and cockle. A large majority of our farmers plough but once; the usual depth is four to eight inches. We sow from one and a half to two bushels per acre, and harrow in, though a few cover their seed with a small plough; the result is about the same either way, if well put in. The time of sowing is from the last of August to the first of October, though the greater part is sown between the 5th and 15th of September. Our harvest commences the last week in June, or the first of July. The yield varies according to the season and culture, from 5 to 35 bushels per acre. The usual average is about 18 bushels, and has been for the last fifteen years. Not often troubled with fly or weevil. Average price for the year, 87 cents.

The varieties of corn are as numerous as those of the soil we cultivate, but generally known by sectional names, as Honey Creek, Keever, bullskin, &c. Average crop for upland, 40, and for bottom lands, 60 bushels per acre. I can raise the best crop by ploughing deep (say ten inches) and thoroughly before planting, plant in squares, four feet each way, and work with the harrow and cultivator till the corn is knee high; then plough to the rows once with a small plough, and lay by with the cultivator. So long as the price for farm hands is so high, ($220 a year each,) the difference in product will not justify grinding or cooking grain for feeding stock, without an increase in the price of grain and meat. Broom-corn is becoming a crop of considerable importance in this vicinity, large quantities being raised annually for shipment, and still more that is worked into brooms at home. The usual method of growing it is to plant in drills three feet apart, and cultivate the same as Indian corn. Product from 600 to 800 lbs. of clean brush per acre, worth from $90 to $100 per ton; besides from 20 to 40 bushels of seed, which makes a good feed for hogs. I cannot state the increase of grain by feeding hogs on the ground, but I know many fields which have been planted in corn for twenty years successively, without any diminution of crop by turning on hogs to feed off the crop in the fall. The cost of raising Indian corn is about 9 cents per bushel, exclusive of land rent. Average price, the last year, 31 cents.

Oats turn out about 40 bushels per acre, average price 28 cents.

Timothy meadows yield from one and a half to two tons per acre. Grass-seed sown on wheat land immediately after the harrow, use some 10 lbs. of timothy, and 6 of clover. I save about a pound of seed per acre, by sowing it with a machine of my own construction, with which I can sow eighteen acres a day, perfectly even on the ground.

But little attention is paid to the dairy or the raising of cattle. Average price at 3 years old, $10 per head. Our county has been celebrated as producing the best hogs in the State; and I know of no better stock than the old Warren county breed, which was produced by crossing the Russia and China breeds; they have good size, fine bone, feed well, and will fatten at any age. As to how many pounds of pork 100 pounds of corn will make, I can say, from my own experience, that after hogs have been put up to fatten, every 100 pounds of corn fed to a fair lot of hogs will increase their weight 10 pounds. Tobacco culture is on the increase; yield per acre, 1500 to 1800 pounds. Potatoes are the most uncertain of all our crops, their product varying from 50 to 500 bushels per acre, according to the season; this year it was less than 50 bushels per acre, owing to excessive drought, which has lessened our corn and oat crop fully one-third. Of fruits, if we may be allowed to judge from the exhibition at the horticultural fair, held at Cincinnati in October last, our county bids fair to rival any other part of the Union, both as regards variety, quality, and quantity. In our own county, almost every farm has an orchard, generally of select apples, with a few pear and peach trees. The latter is an uncertain crop, liable to be winter-killed. We know of no effectual remedy for the blight in pear-trees; and, as a consequence, are losing our trees. Apple-trees are not seriously affected by blight, though, for some years past, the bitter rot has rendered some of our best varieties worthless. I have found a palliation of this evil by digging off the top soil down to the roots, and manuring well with chip-manure, or with rotten wood and leaves. Some of the Newtown pippin trees, which I treated in this way last year, bore sound fruit this year, while that on trees of the same kind in an adjoining row was all rotten. We use what manure our barnyards afford, putting it upon the thinnest part of our fields, either for corn or wheat, doing no more than what has been done in this vicinity within the present generation, viz. to pull down our barns to get them out of the manure which had accumulated around them.

Respectfully, yours,

J. P. SCHENCK.

West Springfield, Mass., December 24th, 1850.

Sir:—The following table will show the quantity of rain which fell at Springfield during the year ending October 31st, 1850, as indicated by the rain-gauge in the care of Mr. Lucius Allen, at the United States Armory.

Nov. 1849	2.56 in.	March, 1850	2.94 in.	July, 1850	5.28 in.
Dec. "	2.04 "	April "	4.29 "	Aug. "	5.94 "
Jan. 1850	4.18 "	May "	8.21 "	Sept. "	5.78 "
Feb. "	3.67 "	June "	8.55 "	Oct. "	4.03 "

Coldest day, February 6th, 5° below zero.
Warmest day, June 19th, 90° above zero.
Thermometer hanging on the north side of a tree.

The census returns will probably give you all the necessary information relative to crops, &c. There is little change from last year worthy of note, except that more broom-corn and tobacco has been raised than usual. Tobacco has been a profitable crop, yielding 1800 or 2000 pounds per acre, and selling at 12¼ cents per pound. Potatoes have yielded a light crop, and have rotted worse than ever before. The cultivation of fruit is receiving increased attention; and the best varieties of apples for winter use are the Baldwin, Rhode Island Greening, and Roxbury Russet. I usually transplant my apple-trees in the fall; I dig a hole large enough to accommodate the roots, and about a foot deep, then fill it with rich earth.

Cellars under barns and stables are coming into use, and are undoubtedly good for preserving manure from waste. Lime is used but little as a fertilizer. Plaster is sown on grass land at the rate of 1 to 2 bushels per acre, and put upon corn and potatoes with good effect, generally about a spoonful to each hill.

Respectfully yours,

AARON BAGG.

Floral Retreat, near Columbia, Lancaster County, Pa.

Sir:—Having been favored with a copy of your circular, soliciting information relative to agriculture, crops, modes of farming, &c. &c., I cheerfully comply, so far as my limited experience may enable to aid in imparting the desired information. I shall reply in the order designated in the circular.

Wheat.—This grain is the staple of Lancaster county. The varieties cultivated generally are Mediterranean, red blue-stem, white blue-stem, red-chaff, smooth and bearded, Hershey's white, Oregon, white flint, besides others designated by local names. The Mediterranean seems to take precedence of all others as a *sure* crop. It does not produce the finest quality of flour, nor perhaps quite so large a yield as some others; on a medium quality of ground, it will yield from 20 to 30—and we have known it to reach 42 bushels per acre; is far less subject to casualties, such as fly, mildew, rust, &c. It is not fly-proof, as was supposed, but *recovers* after being attacked by fly, much better than any other variety. Rich, strong soils do not suit it so well, as it is then likely to lodge, and is generally sown on wheat stubble as a second wheat crop, instead of rye. The average product of wheat of all kinds, I should judge to be about 20 bushels per acre, say for the last 10 years.

Our system of farming, or rotation of crops, is generally in the following order: 1st. We commence on a clover lay or sod that has been in grass for 2, 3, or 4 years, having during this time produced annually from 2 to 3 tons of hay per acre, or been pastured a part of this time: this is well ploughed in the fall, say 8 inches deep, (subsoiling will soon be introduced,) and sometimes limed at the rate of 80 bushels per acre, and well mixed with the soil by harrowing; the next spring it is well pulverized by going over with the harrow or cultivator, or both, and is then furrowed out 3 to 4 feet apart, and planted in corn, about the first week in May, sooner or later, according to the season. Some plant in hills, 3 or 4 grains in each, and work with the cultivator both ways—others plant the grains single, 10 to 12 inches apart. The crop is then well worked during its growth with the cultivator, and, when the corn is from 8 to 12 inches high, the double mould-board plough is drawn between the rows by a span of horses, throwing up a light furrow on each side. The cornfield is then left without further attention (except pulling off the suckers, if any appear) until the corn is nearly ripe, when it is cut off at the roots, put in small shocks till perfectly dry; it is then husked, and the fodder stacked and fed out to stock during the winter.

The varieties generally cultivated are the different kinds of gourd-seed; and the average product per acre I suppose to be about 50 bushels, though 80 and even 100 are not uncommon. The cost of production per bushel I am not able to give accurately, as the difference in cost of raising 100 bushels per acre is very little over that of raising 20. The ploughing, planting, tending, &c. is nearly the same for a small crop as for a large one. Ten dollars per acre I believe to be near the cost of labor for a crop of corn; consequently, if we raise 20 bushels to the acre, the cost of production will be 50 cents per bushel; or, if the yield should be 100 bushels per acre, the cost may be a little over 10 cents per bushel. The true answer will be intermediate, according to the quantity produced.

The best method of feeding:—The corn is ground into meal: sometimes the corn and cob are ground together, and those who have fed in that way say they do not believe the cob to contain much nutriment, nevertheless think there is a great saving of corn. To explain the *rationale* would, however, extend this paper to too great length. Steaming or cooking would be preferable; but whether more economical, I am not prepared to say.

Oats, Barley, Rye, Peas, and Beans.—Average yield of oats I should suppose to be about 50 bushels per acre; 2 or 3 bushels of seed sown to the acre. This crop is a great exhauster of the soil, yet it is almost universally sown after corn; the ground is well manured with stable-dung, partially decomposed, as soon as the oats are removed, preparatory to sowing the ground in wheat. Barley is not so much cultivated, owing to a limited demand; the crop is uncertain, and the price fluctuating. This grain is much less exhausting than oats; 2½ to 3 bushels is the quantity sown per acre. Peas and beans are not cultivated in Lancaster county, to my knowledge, as a field crop. After the oat crop is removed, stable-manure is spread on the ground, and ploughed under as soon as convenient; about the middle of September, the ground is again ploughed and sown with wheat, generally with the drill, of late. After this crop of wheat is removed, the ground is ploughed once more, and Mediterranean wheat or rye sown with grass-seed, to remain in grass 3 or 4 years, when the same rotation is again commenced—1st, corn; 2d, oats; 3d, wheat; 4th, wheat.

Clover and Grasses.—The quantity of hay cut per acre varies from 1 to 4 tons, and the quantity of seed sown per acre from 3 to 6 quarts. For laying down pastures or mowing-lands, red clover and timothy are the only grasses used; sometimes a lot is sown with orchard grass, but is not much approved. Lucerne, saintfoin, Italian rye-grass, tall meadow-oat, Gama grass, and others have been tried, but are not likely to displace clover and timothy. There are no permanent meadows, properly so called, except such as can command a stream of water; these seldom receive any fertilizers but what is contained in the water used in overflowing them: with a sufficiency of this element to irrigate them at proper times, 3 or 4 tons of excellent hay may be taken from each acre at two mowings, besides the aftermath fed on the ground in the fall by stock. Such meadows are a valuable appendage to a farm.

Dairy Husbandry.—I have no data from which to give any thing like a correct estimate of the average yearly produce of butter or cheese per cow. Farmers here keep from 4 to 12 cows each; milk twice a day, and keep the milk in a cool spring-house in summer, and, during cold weather, in a heated room; the cream is taken off as soon as it becomes sour, and kept in large crocks from 3 to 6 days; it is then churned, and the butter washed in cold water till the buttermilk is all out; it is then lightly salted for immediate use, or more salt is used if intended for preservation. The farmers' wives usually take it to market or exchange it for groceries as soon as made, and the country storekeepers resalt and pack it in small firkins, to send to other markets. Lancaster county butter "can't be beat."

The cost of rearing neat cattle till 3 years old is quite as much as they are worth; consequently few are reared except for cows, and occasionally a bull-calf. All the stock fattened in this section is brought from the Western States—it is cheaper to buy than to raise it. The cost of a 3 year old is from $15 to $30, according to size.

Sheep and Wool.—The keeping of sheep is not much attended to here, owing mainly, I think, to the risk of losing them by vicious dogs. Some farmers keep a few long-woolled sheep for their own wants. Were it not for this danger of loss from dogs, the raising of sheep might be made a very lucrative business.

Hogs.—The Chester county breed is considered more valuable than any other, from their large size, early maturity, easy keep, and peculiar aptitude to take on fat. The only objection that can be brought against them is, they are poor breeders; a mixture with our common hog is by many considered desirable: they become more prolific, and, though smaller, are equally valuable. Hogs are here allowed to range over the pasture fields, orchards, &c., during the summer, and, with the spare milk and refuse from the kitchen and garden, they thrive well. In the fall they are confined in pens, and fed on corn for a few weeks, till killing time. The pork is cured with ground alum and salt, and smoked with green hickory wood, or, what is preferred by many, corncobs.

Cotton, rice, and *sugar-cane,* not cultivated.

It is only a few years since that *tobacco* began to be cultivated in this vicinity. It is now largely on the increase, and, should the present high price continue, it will soon take a place in our regular rotation of crops. The price is now from $10 to $16 per 100 pounds. At these prices, it is the most profitable crop that can be raised in this section of country. The average product per acre may be near 1000 pounds; still, twice this quantity is not uncommon on strong land, with a favorable season and good attendance. Yet it is thought to be very exhausting to the soil, requiring much manure to produce a large crop. I entertain the belief that it is not more exhausting than wheat or oats, provided it is not grown upon the same ground year after year, but changed from one field to another, the same as grain and grass, giving the soil an interval of six or seven years before it is again raised on the same ground, taking a regular course in the rotation. Tobacco is a good feeder, and all kinds of manure seem acceptable and beneficial; coarse stable-manure, lime, ashes, plaster, even anthracite coal-ashes have been used with manifest advantage. Guano, bone-dust, poudrette, or any kind of artificial compost would undoubtedly fully compensate for its application in the increase of the crop. The variety termed *seed-leaf* is the most esteemed here. Lancaster county tobacco is considered a very superior article.

Hemp.—Twenty years since, almost every farmer had his hemp patch, of one-fourth or one-half an acre; now there is none cultivated. The low price of cotton fabrics has superseded this article.

Root Crops.—Turnips, carrots, beets, &c. These are not cultivated as field crops.

Potatoes.—The common potato has of late become a very uncertain crop; sometimes the rot destroys them, and generally the plant seems to have lost that vigor and health it formerly had: the best success seems to attend early planting, and on moderately dry soil.

The cultivation of fruit does not receive that attention which its importance demands. As a matter of course, every farm has its apple orchard, producing a full crop every second year, unless cut off by frost, or some other casualty. There are many causes operating to produce this state of things, among which is the want of a market. When the trees produce a full crop, the price of fruit will not compensate the fruit-grower for his trouble in picking and hauling to market. Another is the depredations committed by lawless bipeds, who prowl about the country and appropriate to their own use the best fruit. The pear is so generally destroyed by the blight, that very few trees are to be found. We know of no remedy when the trees are once affected. In a soil that is not disturbed by the plough, of a tenacious nature, and deep, with a sod of grass over the roots, and not too dry, the trees will then grow more slow, become hardier, and much less subject to blight than in a rich and cultivated soil, but the fruit will not be so fine. Peaches succeed admirably on elevated ground, where they are less subject to late spring frosts. The worms are easily prevented from doing damage, by protecting the stems of the trees about one foot from the ground. A few shovels full of leached ashes, heaped around the trunks early in the spring, and left there during the summer, are as good a preventive against the fly as any thing else. The yellows are now well known to be contagious, and during the time of inflorescence, the wind, bees, and other insects, in search of honey, convey the diseased pollen from tree to tree—thus in a short time infecting a large number of trees. The only remedy for this disease is *to lay the axe to the root*, and remove it without loss of time.

Plums, apricots, and *nectarines* are annually destroyed by the curculio—consequently not much cultivated. There is, however, a much stronger interest felt towards cultivating good fruit than formerly, and we trust that ere long horticulture will be more generally appreciated.

With great respect, I remain, &c.

J. B. GARBER.

Sir:—Your circular of August last having been received, desiring information from all practical men having had experience in the various matters therein set forth, I take the liberty of making a few suggestions on the raising and management of neat cattle. First, you wish to know the expense of raising till 3 years old, usual price at that age, value of good dairy-cows in spring and fall. In reply to these inquiries, I would say it depends very much on the animal, its kind. The Devon is undoubtedly raised and kept till that age at the least expense, being a small animal, and of gentle disposition. The Durham, being larger, will cost more. The grade, being a mixture of Devon or Durham and native, &c., will probably equal the expense of the Durham; and the native, being of such variety, it would depend much upon its kind to determine its cost. The Holderness will probably equal the cost of the Durham. The Hereford not having been raised much in this section, I am not prepared to decide upon its merits, or the expense of raising, or value of the animal. To have cattle valuable, at any age, much depends upon their keeping. The better they are kept, the more profitable the return. Calves should never want suitable food until they are at least one year old. Being kept well and in first-rate condition at that age, they will then provide for themselves, good pasture and water being accessible to them. The expense of raising is, in Western New York, $15 per head, and their average value $20; although I have raised some that cost more, and their value at that age much more. To make the greatest profit, I should prefer the grade. Good dairy-cows are worth, and have been for years past, in the fall, $15; in the spring, $22 per head; and some extras, above this price. A volume might be written on the raising and management of neat cattle; but experience will teach more. Sheep, like cattle, when well cared for, are very profitable: perhaps, at the present time, more so than cattle. Much, however, depends upon their management and the attention paid them.

Yours respectfully,

AARON RILEY.

To THOMAS EWBANK, Esq.,
Commissioner of Patents, &c.

East Aurora, Erie County, New York, December 18th, 1850.

Woodland, North Manheim Township, Schuylkill County, Pa.
October 23d, 1850.

Dear Sir:—In responding to the circular from the Patent Office, dated Washington, August 26th, 1850, I have prepared a few remarks on the agricultural productions of this county.

The neighborhood was early settled by the Germans, who took up lands to cultivate, the greater part of which being mountainous and rough, a small portion only fit to cultivate, was worked so hard by the sturdy farmer, that long since they have been in some measure abandoned for richer soils in the West. But, since the discovery and working of the anthracite as a fuel, it has brought thousands of hardy, working miners to this region, thus erecting a good market for all productions of the farm, and giving a stimulus to the farmer to manure and lime his worn-out land. Aided by a rotation of crops and better tillage, they have brought those worn-out fields to a high state of cultivation, producing good crops of wheat, rye, barley, buckwheat, Indian corn, potatoes, turnips, and all the hardy vegetables and fruits of our northern climate.

The meadow land produces the finest crops of timothy, say from one and a half to two and a half tons of hay to the acre. I am in the habit of sowing from six to eight pounds of seed to the acre.

Indian corn grows most luxuriantly, and produces large ears and grains. I have cultivated the common yellow, white flint, gourd-seed, Black Hawk, Tuscarora, and sweet or sugar corn, besides other varieties. The sample of white corn received last spring from your office, through the politeness of the Hon. C. W. Pitman, came so late in the season that it did not come to perfection before the frost overtook it.

The general yield, on good land, is about 40 bushels to the acre.

Wheat.—The blue-stem, red-top, bearded, and the Mediterranean are mostly grown in this neighborhood. The product is about 30 bushels to the acre. We sow the first week in October, and harvest from the 8th to the 10th of July, and plough twice.

Oats grow well. I have raised the common, but give the preference to the black oat. The average yield is 40 to 50 bushels to the acre. Two bushels of seed are sown to the acre.

Rye grows well and tall, yielding 20 bushels to the acre. Sow 1½ bushel to the acre.

Potatoes.—Red, white, and pink-eye are generally preferred, as the most profitable, yielding 200 bushels to the acre in sod. In low and wet places, the rot has shortened the crops for the last few years. The variety of hogs mostly esteemed are the Berkshire and Chester county. A cross of the two produces a good variety, and easily fatted.

Very respectfully yours, &c.

RUBENS PEALE.

Hon. THOMAS EWBANK,
Commissioner of Patents.

New Steubenville, Brooke County, Virginia,
December 15th, 1850.

Wheat.—Varieties in use are red-chaff bearded, club, white and red smooth, blue-stem, and Mediterranean; the last is not much in favor, it being about the poorest yield of any. Average product, about 20 bushels per acre. Best yield on limestone land. Seeding generally done about the last of September and first of October. Harvesting done first of July. No preparation of seed other than having it clean. Quantity sown per acre, from a bushel and a peck to a bushel and a half. Hard land is sometimes ploughed twice, but generally but one good ploughing of from eight to ten inches deep. The ground should be ploughed several weeks before sowing, and well pulverized before sowing. Never sow too wet; better to sow in the dust than too wet. The yield is rather on the increase. The practice here is to sow wheat one season, and then let the field lie in grass one season, and also to plant corn, and the next spring to sow the same ground in oats; then sow the oats stubble in wheat, which answers very well. There is very little difference in the yield on one or two ploughings, provided it is well done. I know of no remedy for either the Hessian-fly or weevil. The average price so far, in Steubenville, has been about 72 cents per bushel.

Corn.—The best variety for this section of country is the common yellow corn, not too deep in the grain. The product per acre will average somewhere between 50 and 75 bushels. Cost of production, about seven or eight cents per bushel. Plough your ground deep, and never when wet; harrow well before planting. It is a very good plan to harrow the ground over several days after planting, taking care to straddle each row. This helps to pulverize the ground, and also to keep back the weeds until the corn is up. After the corn is up, my plan is to take a one-horse barshare plough, and go through my corn and throw the dirt from the corn; the next week, to go through with a one-horse harrow, once or twice in a row, according as it may seem to require; next, with a double shovel plough, or cultivator, as may seem best; and so on, until harvest time, keeping the ground well stirred, each time following with hoes, more or less, as the case may require, taking good care not to work the ground too wet. Some of the questions you ask are too hard for me. I must, therefore, leave them for more scientific heads to cipher out.

Oats and Barley.—Not very extensively raised.

Fruit culture is receiving increased attention in this part of the country; particularly apples. Great care is taken to plant none but the best grafted fruit. A good orchard here will average about $50 per acre. Our principal market for apples is the river. I never have found apples of any consequence as food for stock. Some of the best for keeping are, the Newtown pippins, Russets, Romanites, Lopsides, and Spitzenburg. The Gates are among the best fall apples we have.

The peach-trees have mostly died here, although, I think, they might be preserved, with care and attention to apply hot soapsuds to the roots about the months of May and June. The "yellows" I believe to be produced by the worms at the root; destroy them, and the tree becomes healthy. To bind refuse tobacco about the body, near the ground, the first of June, is also a preventive of the worm. I might write more, but suppose you will receive a great number of communications from persons better calculated to give information than I am.

I remain yours, &c.

LEWIS BROWNING, JR.

Mr. THOMAS EWBANK.

Somerset, Hillsdale County, Michigan.

Sir:—In reply to your Agricultural Circular of August 26th, I shall make but a few limited remarks.

1st. WHEAT.—There are a great many varieties grown in this section. The best varieties are the Siberian, Soules, Indiana, and white-flint; the first is commonly called the choicest kind. At present, however, the Indiana and flint are both extensively grown, with good success. It is too generally the case here that *any thing* is sown for seed, instead of procuring a choice article. The difference in our markets between superior and inferior wheat is so trifling that the farmer is but poorly paid for his trouble in procuring a good article for seed. My opinion is, that if all wheat-growers here would adopt the plan of sowing none but the choicest varieties for two years, the result would be, at the end of that time, an advance of 10 per cent. on Michigan flour in the New York market. The average product per acre is about 15 bushels; the present year, a great many fields have averaged 20, 30, and even as high as 40 bushels per acre.

Time of Seeding.—The month of September, from 10th to 15th, is the best time.

Harvesting.—From 10th to 25th of July. Seed per acre, from one to one and a half bushels. If ground is well prepared, and sown early, one bushel is sufficient, but one and a half bushel is generally used.

Ploughing.—Plough twice, about seven inches deep. The yield per acre is not diminishing; on the contrary, if the crop is threshed on the field, and the straw ploughed in the next year, and a flock of sheep kept on the ground, to prevent the weeds from seeding, the crop will *increase.*

Average price, at our nearest markets, 65 cts.; last year, 80 to 85 cts.

2d. CORN.—The most esteemed varieties are the yellow and white dent. Average product per acre, 35 to 40 bushels; in some instances, the yield reaches as high as 80 per acre. Cost per bushel, 20 to 25 cents. Best method of *feeding* is to have it ground, and, for swine, to have it cooked.

3d. OATS.—Average yield per acre, 33 bushels; quantity of seed per acre, 2 bushels.

4th. SHEEP AND WOOL.—Wool-growing is profitable. Fine wool at 30 to 33 cents per pound, coarse and medium at 25 to 27 cents per pound, are considered fair market prices here. Fine, long Merino wool can be produced, at the above rates, with more profit than coarse wool, at the corresponding rates.

5th. FRUIT.—The culture of fruit is receiving a marked attention, although the country is yet in its infancy in regard to that important item. Apples have been sent from this State to Europe, at a good profit to the grower.

With due respect, yours, etc.

CHESTER HUNT.

Jonesborough, Washington County, Maine, December 18th, 1850.

Sir:—I acknowledge the receipt of your "Agricultural Circular" of inquiries relating to the farming interest, particularly confining myself to this vicinity. I proceed to answer such of your queries as have fallen under my observation and experience.

Maine is not an agricultural State: her people, relying on different resources for a subsistence, turn their attention to the development and improvement of these resources, leaving the cultivation of mother Earth, as though of insufficient importance and utility to expend their industry upon. The manufacture of lumber has so deeply engaged our people, it may be considered as constituting the principal branch of labor; in fact, it forms a striking characteristic of the inhabitants of the eastern and newly-settled counties of Maine. Our grandfathers and fathers were lumbermen, and we seem strongly inclined to follow in their footsteps. Hence, the boy of twelve thinks as much of cutting and drawing his "timber stick" or his "saw-log" from the forest as the man of forty; and the first start of the young man, when he sets up for himself in life, drifts naturally towards some branch of this great "State advantage." Now, it is easily perceived why so little attention is given to agricultural labor, it heretofore having been neglected; and the people seem quite unwilling to quit old pursuits, and engage in what they consider uncertain and unprofitable. But this unfavorable impression begins to slacken its hold upon the public mind; and as causes multiply to lessen the productiveness of lumber manufacture, the same causes produce a more favorable inclination towards agriculture. It may be said, and in truth, that our climate is not such as to encourage the farmer in the attempt to effect the productions of milder and more southern latitudes; yet, it is well adapted to the cultivation of oats, barley, peas, beans, potatoes, root-crops, the grasses; and, in the older settled and western counties, corn and wheat are raised with no inconsiderable success. Many of the farmers in the Kennebec valley are turning their attention to raising stock: their lands being well adapted to grazing, renders it profitable in furnishing beef cattle for the Western markets, and working-oxen for lumbermen in our own State.

The past season has been rather unfavorable to farmers, from a variety of causes. Snow lay on late in the spring, there being a fall of two feet on the level, 16th April, and disappeared only through the agency of the sun: cold and heavy rains succeeded, rendering May, our month of seed-time, cold and unpleasant. June gave beautiful weather, while July and August were extremely dry, vegetation suffering much. 25th August, frost in low land, scorching pumpkins, beans, &c., stopping their growth for the season. 1st September, heavy rain; 10th, the potato-tops showed signs of the plague, universally complained of as killing the stalks, and in most cases affecting the tubes. Our hottest weather was in July, when the thermometer ranged above 90° in the shade. It may be proper here to remark, that the past winter was unusually mild and open. The 10th of February, we had a warm rain, and the weather, for three weeks in succession, was spring-like, even inducing the robins to quit their winter quarters, and appear in flocks in the open land!

Wheat.—A field of wheat is now seldom seen in our vicinity. Its cultivation has been very nearly abandoned within the last five years, and unless something now unanticipated should occur to encourage its restoration, and give it the productiveness of former days, it will be lost entirely, and quite forgotten. The rust and mildew have been the great enemies of wheat, so much so, that that once staple crop of our county has been completely subjugated and driven from the soil.

Corn.—Heretofore, this article has not been much cultivated; but since the failure of wheat, our farmers feel disposed to plant a little corn: not enough, however, is raised at present to justify an attempt to enumerate cost of raising, or quantity procured from the acre. It is encouraging to know that the impression obtains very generally among farmers, that it might be raised to advantage; and there is but little doubt, if seasons continue favorable, considerable quantities will be raised in Washington county. Of the varieties used, the Canadian (eight-rowed) is preferable, better suited to soil and climate, yields more, and of superior quality to other kinds now used. When used as feed for cattle or hogs, should be ground and scalded; so agree all who are practical experimenters in the matter. When fed to poultry, is better "round."

Barley.—This grain is raised quite extensively in this county—is found profitable feed for hogs and poultry, always commanding a price equal to corn, varying from 80 cents to $1 per bushel. Loamy soil is preferable for barley: pasture-lands, or old cultivated grass-lands, with a fall ploughing, will yield a good crop. 20 bushels is considered about an average crop per acre; it is considered less draining to soil than wheat or oats. Quantity sown per acre, 2 bushels; time of sowing, from 20th May till 10th of June.

Oats.—All our farmers raise more or less of this grain. It is peculiarly adapted to our soil and climate, commands a good price as feed for horses, cattle, hogs, and poultry; and then the straw (which is better for cattle than the coarse grasses of the meadow) pays for all expense of cultivation. Three bushels to an acre is light seed enough, taking seasons together; dry weather is injurious; hence, if thick sown, will stand it better, thereby retaining the dews and moisture of the soil. 25 bushels per acre probably an average crop, though some would place it higher. Without extra labor, 40, sometimes 50 bushels are obtained from the acre. Time of sowing, the first week in May. Earlier sown, earlier ripe, and fuller and heavier grain. In the fall and winter are worth 50 cents per bushel; in spring, 60 and 75 cents. Previous to the failure of wheat and potatoes, oats were not much cultivated, the opinion generally prevailing that they were exhausting to the soil, but now a very different impression prevails, and are often used in stocking lands.

Peas are not raised in large quantities, though nearly all our farmers raise enough for home consumption. They constitute a valuable dish when green, and during winter months a healthy soup is ofttimes served up from them. Are considered renovating to soil: when mixed and ground with oats and barley, are a valuable feed for hogs and cattle. One and a half bushel to an acre for seed. Average crop, 20 bushels; generally worth $1 per bushel. Haulms of little use, except to strew in the hog-yard, where they are readily converted into dressing, again to be spread upon the fields.

Beans.—Nearly every farm has its patch of beans. I have known them raised for 10 years in succession, giving a fair crop on the same piece of ground. Our farmers are beginning to learn that it is cheaper to raise their beans than to buy them; hence an increased attention is very manifest in their culture. Time of ploughing, 15th to 20th May; price, $2 per bushel. Some plant corn, beans, and pumpkins in the same hill; but this is injurious, and prevents the growth of all; beans in particular should be planted by themselves.

Hay.—The last two years have been unfavorable for raising hay. An increase, however, of 25 per cent. for the crop of 1850 over 1849 may safely be allowed, and then not have more than 75 per cent. of what we formerly obtained. Quantity per acre this season, including highlands and intervales, (what some would term meadows, being the low lands on the banks of rivers,) 1¼ ton. Intervale mowing lands need no fertilizers other than what the flow of the rivers in spring and fall spread upon them. By the agency of the water in its coursing over them, they become as smooth as if wrought upon by man. After once cleared, they require no other attention than a day of labor, (on a patch of 3 acres,) in the spring, removing the drift stuff carried on by the freshets. These lands seldom fail of producing two tons to the acre, principally "brown-top," which commands a price in the market little inferior to best highland hay. *No fertilizer* is better for English grass fields than stable manure, either ploughed in previous to stocking, or spread on the sward of old fields in the fall, say October: the latter mode is much practised, and is thought as profitable as the former. Average price of hay $12 per ton, some seasons as high as $18. I think the cost of growing hay is about $3 per ton. This may seem low at first, but, by correct estimation, I think it an average cost.

Cattle.—Good dairy-cows, in spring, are worth $30; in fall, about $18. To the question, "Cost of raising cattle till 3 years old?" I find various opinions are entertained. All seem to think that they cost more than they are worth in the market; but their reckoning is this wise: allowing 3 tons of hay (little enough) to each animal till 3 years old, and that hay worth no more than $10 per ton, we have $30 as cost of raising, while the average price of the animal is only $15! Another method of reckoning, and in my opinion the correct one, is to put the hay at actual cost of raising, (which is about $3 per ton,) allowing the manure to pay for pasturing and care bestowed through winters, and we have fair profits in raising the animal. Were all our stock raised attendant with the cost estimate of the former method, it would cost triple its value at any age, or in any condition.

Many are induced thus to consider the matter; but when we take into consideration that we could raise but little hay without stock, that stock on the farm is what *makes the farm*, we shall be inclined to more liberal calculations. Upwards of 14,000 cattle were received at Cambridge market, (Massachusetts,) from the western and central counties of Maine, during the year ending November 1st, 1850. This business has sprung up very recently, and, by the great increase of last year over former years, it is inferred that the farmers of these counties find it profitable in furnishing beef cattle for that and other western markets. Working oxen vary in price from $50 to $100.

Sheep.—There are no animals kept on the farm more profitable than sheep. In summer they provide for themselves, and the expense of keeping through winter is more than doubly exceeded by the income. In the first place, the lamb raised by the old sheep at six months old is worth $1.50, and then the fleece, say 4 pounds, (which is an average,) at 25 cents, $1, leaving still the carcass of the old one, worth $2, which amply pays all expense of keeping. About 17,000 sheep have been driven from Maine to Cambridge, (Massachusetts,) where a good market is always found, within the present year. Our flocks are mostly a mixture of Saxony and Merinos, and we find that the larger the sheep, the more and better wool, and the same with regard to increase. The proportion of lambs raised to ewes is about 80 per cent.

Root Crops.—Not extensively cultivated as a field crop, yet nearly every homestead has its garden; average worth, about 12 cents per bushel.

Potatoes.—Our farmers have become almost discouraged in the attempt to raise potatoes, by the return of the "plague," the past season, more destructive than ever before. Potatoes generally, were planted in May, came up and grew well till 1st of September, when, after a smart rain, the cry commenced at the same time all round, "The plague's come," and, sure enough, it had. Nowhere, in a day's travel, could you see a field without the darkish hue upon it. Some dug and put them in their cellars before the tubers were affected, and were wise in so doing, while others concluded to let them rot it out, and they did so pretty effectually. The only means practised successfully to avoid the rot is early planting and digging. Some individual had notions of *experimenting*, which they boasted of as being sure preventives, but, the present season, it showed no respect of persons, performing its mission trustworthily and well. Crop of 1850 about half of 1849. Price, 50 to 75 cents per bushel.

Orcharding, like many other branches of the agricultural interest, is gaining increased attention in this county. It is not deemed of sufficient interest to give it a minute description in this Report. Price of apples, seldom less than 50 cents.

It is found exceedingly difficult to collect accurate and satisfactory information, as answers to many of the questions in your circular. Farming here is generally carried on without any particular system, each annually pursuing such a course as seems best calculated to insure success; hence a variety of systems are practised. Our farmers universally give more attention to growing hay than any other crop, and seldom yet has the supply equalled the demand. No other crop pays so well as this, and few are better adapted to soil and climate. Prices, too, are such as would seem inviting enough to hay-growers, to produce enough for home consumption. It is a cash article generally, and times are hard indeed when it cannot be exchanged for flour, corn, &c. So long as lumbering is prosecuted to the extent that it now is, hay will always be in good demand, whether produced in our own county or imported from abroad.

If the above will be of any service in making up your Annual Report to Congress, you are at liberty to arrange it to your convenience. The package of seed forwarded me last spring, I sowed and cultivated on choice grounds, many of which produced well. In future, if my services will be of any utility, I shall be pleased to render all due assistance. I think your labors are deserving of the highest success, comprising, as your Reports do, a volume of agricultural information, not surpassed by any other, and, when once known only, will be appreciated and admired.

Yours, with high respect,

GEORGE W. DRISKO.

Hon. THOMAS EWBANK,
Commissioner of Patents.

New Lebanon, New York, December 11th, 1850.

Friend:—I received your circular in due season, and now attempt a reply.

Wheat.—Very little is grown in our township, because of its tendency to winter-kill. Our soil being generally what might be termed an argillaceous mould, resting upon a firm hard pan, which renders it so retentive of a superabundance of moisture, that winter grains, unless a slight coating of litter be thrown over them, are very apt to be thrown out by frosts in early spring. Some wheat, however, is grown; average per acre, about 15 bushels. It is badly injured by the fly. Late sown, best—effete lime, sown upon it while wet with dew, is beneficial to prevent the fly.

Corn.—The kinds mostly cultivated in our neighborhood are early Canada, ninety days, and eight-rowed yellow. Dutton has been grown some—is not admired. Best method of culture with us is to put green manure upon the sward early in the spring; turn carefully under, and pretty flat; roll down; harrow up a tilth, also harrow in a few loads per acre of well-rotted manure, with about 4 bushels of salt; as soon as corn is large enough to weed, dress it with a hoe, and add to each hill a handful of unleached ashes and plaster. Average product per acre, 50 to 75 bushels. We never feed whole corn; think it enough better when ground to quadruple the cost of grinding. We greatly prefer cooked feed.

Oats.—Largely cultivated; average yield per acre, 25 to 60 bushels; about 3 bushels seed to the acre; sown on green sward, inverted and harrowed.

Barley always succeeds well in a rotation after a hoed crop; for seeding down, is preferred before any other grain, because it is of quick growth, thus furnishing shade for the germinating grasses, and comes off early, thus giving them a chance to grow when started. It is extensively used with oats and corn for feeding. Average per acre, 40 to 60 bushels.

Peas are but little cultivated as a field crop; neither are *beans.*

Rye is extensively raised on certain locations, being generally a sure crop. Average per acre, about 15 bushels. Barley, with us, is considered the least exhausting to the soil.

About an average quantity of English hay per acre, on newly-seeded land—2 to 3 tons; old meadow, about 1 ton. We prefer herds-grass or timothy, with Southern red clover for meadows; about 8 quarts of timothy and 4 of clover is generally sown to the acre. Best fertilizers for our meadows and pastures generally are plaster and ashes, about 25 bushels per acre. Cost of hay per ton, say $9 to $12.

About an average yield of butter and cheese per cow, in our neighborhood, is 120 pounds butter, 100 pounds cheese. Our method of treating the milk for butter is to strain immediately from the cow and put into tin pans about 8 inches deep, filling about 2 inches deep, and set upon shelves exposed in warm weather to a free circulation of air, in such way as not to ruffle the cream. In very warm weather we set our milk in refrigerating sinks, made of stone or cement, exposed to a spring or passing current of cold water. In very cold weather, fire is made in our dairies, so as to keep the temperature about 60 degrees. We endeavor, by the means of refrigeration in warm weather and warmth in very cold weather, to keep the cream at nearly a uniform temperature. If the cream is cold, warm it to about 60 degrees, and if very warm, cool it with ice before putting into the churn. Modes of churning are various; both dasher and revolving churns are used. All churning by hand is done with the revolving churns; some of these will frequently churn 30 pounds of butter in 15 minutes, in the fall and spring. We do not perceive so much difference in the mode of churning as in the state of the cream, as to the time it takes. Mode of putting down butter for market is, in substance, as follows:—Clean oaken firkins, or earthen pots, are prepared by scalding in brine and wheat-bran water, or by soaking in it 12 hours previous to using, then wipe dry. A layer of fine rock salt, washed before being ground, is then spread upon the bottom, and between each layer till the vessel is full; the layers about 3 inches thick. The butter is thoroughly worked with a butter-ladle, or a fluted concentric butter-roller, until all the buttermilk is extracted, and then about 12 ounces of clean rock salt, 4 ounces saltpetre, and 4 ounces sugar are worked into 16 pounds butter: it is then packed down, and has been pronounced, by the best judges, to be new butter at nearly a year old, and has been sold in New York at 20 cents per pound, when the common price was 16 to 18 cents. Made in one dairy of 20 cows, the past year, 2000 pounds butter, 1200 pounds cheese; besides furnishing new milk for about 75 persons to use at table as drink, and about 4 times per week as food. In another dairy, of 40 cows, about 5200 pounds of butter and 3044 pounds cheese have been made; in another, of 40 cows, 4000 pounds butter, and 3000 pounds cheese; and, in a fourth, of 18 cows, 2410 pounds butter, and 2040 pounds cheese—in 1850. Thus making an

Average to each cow in dairy	No. 1,	of 100 lbs.	butter and	60 lbs.	cheese,
"	"	"	No. 2,	130	"	76	"
"	"	"	No. 3,	100	"	75	"
"	"	"	No. 4,	134	"	113	"

It should be observed, that each of these dairies has furnished milk for food and drink for about the same number of persons, in proportion, as dairy No. 1. The manner in which cheese is made by the society of Shakers is simply as follows:—The milk at night is set in a large tub, the morning milking is put in with it, and then warmed to 60 or 65 degrees; add about 1 gill of rennet to 12 gallons of milk; it is then allowed to set until curded, say 2 hours, and then gently cut through and through in the tub with a long wooden knife, to let out the whey; after a few minutes it is carefully broken with the hands and the whey dipped off; this operation is repeated at short intervals, until sufficiently drained to put into a strainer, and, after remaining half an hour, it is cut into slices and put in a cloth, with a little weight upon it; this operation is 8 times repeated, at intervals of half an hour, increasing the weight each time; it is then cut in pieces of about half an inch square, and put in a cloth, and thence into the curb and press; after pressing until thoroughly drained, it is taken out, cut up a little finer than before, and scalded about 5 minutes in sweet whey and water; then dripped, and about half a pound of clean fine rock-salt is added to the curd of 12 gallons of milk, and again put into the hoop for a final pressing. Our cheese has sometimes sold for 20 cents per pound; but we do not manufacture for sale. An average price would be 8 cents per pound for new cheese, and 16 to 18 cents for that a year old.

Neat Cattle.—Very few young cattle are raised for sale in our neighborhood. Average price of milch-cows, in fall, $30 to $50 each, and in spring, $40 to $60. It is generally believed, among us, that a given amount of food will produce more meat in a Durham than in either Devon, Hereford, or native; but we prefer a cross of the Holderness and native, both for beef, working-cattle, and milch-cows, though some prefer the Ayrshire for milk.

Sheep and *wool-growing* are considered profitable on mountainous locations. Cost of growing fine wool is about 42 cents per pound; cost of coarse wool, about 30 cents: large sheep are considered more profitable, both for mutton and fleece, but some wool-growers of our town give the preference to the small Merino. We have had very fine-woolled sheep that sheared from 6 to 7 lbs. each—I mean yearlings. The comparative cost of Merino and common coarse wool, is about one-third more for Merino. The number of lambs annually reared very nearly equals the number of ewes. Merinoes fall short about one-third.

The culture of roots as a field crop is extensively increasing, especially the carrot; and in our seed-markets we probably sell a hundred pounds of carrot-seed where we formerly sold one. Our report on roots must be much the same as last year. We generally raise our roots on an old tilth, as one of a rotation of crops; the land is subsoiled, heavily manured, say 45 to 50 loads well-rotted manure to the acre. Potatoes have almost entirely failed us, under all circumstances, on various soils, and under every variety of treatment.

Manures.—Our yards are constantly kept littered with straw, swamp-muck, or other refuse. Beyond all doubt, the most economical plan, and one extensively adopted for manufacturing manure, is to compost the droppings of the yard and cleanings of the stable with muck, leached ashes, or, better, unleached ashes, (as our soils, and old soils generally, are deficient in alkali,) adding plaster to fix the ammonia; but never use lime in compost with animal manures, as it sets free the ammonia, which is the life of manures —*this*, plaster fixes: to this salt should be added, the soapsuds from the wash-house, and chamber-lie from every quarter.

It is the general opinion in this section that apples are fully equal to potatoes for stock, especially for milch-cows, and we are in the habit of feeding all our apple-parings, windfalls, and most of our cider apples, to our cows, reserving only enough to make our vinegar.

The foregoing is, as near as we can come at it, a cursory statement of the statistical condition of our agricultural interests. The minutiæ of detail in the management of various crops must necessarily be much abridged in a

report of this nature. Crude as it is, we submit it to you, desiring a charitable overlooking of blunders and incongruities.

GILES B. AVERY.

Shaker Village, Columbia County, New York.

Hatfield, Hampshire County, Mass., December 18th, 1850.

Sir:—Having received one of your Agricultural Circulars, I shall endeavor to give what information I can upon the cultivation of winter wheat.

Winter wheat is cultivated only to a limited extent in New England, and especially in Massachusetts.

I believe it can be cultivated with profit on the "alluvial bottoms" of the Connecticut and other large rivers. In this town, 20 bushels per acre are considered an ordinary crop—25 and 30 quite common—and, in favorable seasons, we sometimes have 40 and 50 bushels per acre, which, being in the market, readily commands $1.25 per bushel.

Our mode of cultivation is as follows:—

After land has been cultivated for a number of years, it is frequently seeded down to clover, for the purpose of renovating it. After lying thus for one or two years, the second growth is ploughed under, generally in the month of September, and is immediately sown. It is also sown to a considerable extent after broom-corn. The broom is cut as early as possible in autumn, and the stalks, making a great quantity of vegetable matter, are buried in the soil with a plough adapted for the purpose; then, previous to sowing, the ground is rolled and harrowed, in order to make the soil as finely pulverised and compact as possible.

Seed wheat is prepared by soaking 1 or 2 days in strong solution of saltpetre, then the water is drained off, and the seed is rolled and dried with lime. This is a very effectual remedy against smut.

S. G. HUBBARD.

East Salisbury, Essex County, Mass., December, 1850.

Sir:—Agreeably to your request, by circular from the U. S. Patent Office, of 26th August, 1850, I shall try to contribute my mite.

One of our most profitable crops is hay, which, on our best fields, yields 2 tons per acre. Timothy, with a little clover, is preferred for seeding, and not more than half a bushel per acre. The cost of raising, with interest or rent of land, is $8 per ton.

Good cows are worth $30 each in the spring, and from $15 to $18 in the fall.

We consider our best breed of hogs to be the Suffolk and McKay.

Fruit culture is receiving increased attention here. Many have been planting orchards. My plan is to have plenty of roots to the trees; then dig a large hole, and, if on clayey land, fill in with sandy loam, or, if sandy, fill with well-pulverized clay-loam. I believe it is generally admitted that every tree is naturally suited to a particular soil, and in new countries we can tell what the soil is by the timber. We all know the soil of the bur-oak, the pitch-pine, beech and maple and hickory, the cedar and spruce, chestnut, hemlock, &c.; but we plant pear and apple trees wherever we like, and, if they show any symptoms of dislike to the soil, instead of applying a remedy to the roots, we begin to doctor the branches, bark, and sap. All these, in turn, have been the subjects of treatment, but without effect. Now, let cultivators give their trees half the choice of soil that nature does her forest-trees, and the pear-blight and peach-yellows will be among the diseases of the past.

Transplanting.—Land to be set with fruit-trees should be ploughed in the fall, or very early in the spring; it should be ploughed very deep or subsoiled. When the ground is quite ready, get your trees, and set them the same day, if you can: never buy trees that have been dug over winter, and "lain by the heel;" nor plant so late in the season, as when the leaves have started: trees of this kind may live, but you lose the growth of them the first season, whereas, by the right kind of management, transplanting will hardly put them back at all. I have often planted trees which grew 4 feet the first year. Holes should be dug of sufficient width and depth to extend the roots to their original capacity. When the trees are placed in the holes, spread out the lower roots and cover them with fine earth, as also all the rest in like manner: get the roots into the earth so that they will stand interspersed, in regular system, with the soil, as the roots of a growing tree always do. The practice of thrusting the roots of a tree all in a heap, then piling on hard earth, manure, &c., and stamping it down hard, is sometimes successful, but no scientific cultivator would recommend it. After trees are set, the ground should be stirred around them while the heat of the season lasts, as often as once in 2 or 3 weeks; and if great drought should prevail, they should be occasionally watered; this should be done by making holes with a stick among the roots, and then pour on a pail of water.

Budding.—Apple-trees, and all others except plums and cherries, should be budded in September, and these should be budded in the latter part of July or the first of August; they should be put in so late that they will not grow the same season. The plan of operation is to select a shoot of the present season, with good buds, and cut off each leaf within half an inch of the leaf-stalk; then hold the shoot in the left hand, and the knife in the right, the lower part of the blade is placed on the shoot about half an inch above the bud—the thumb of the right hand rests on the shoot at the lower extremity of the bark to be removed with the bud; the knife is then drawn towards you, parallel with the shoot, smooth and level, so that the bark and a portion of the wood will be taken off. The stock to be budded should be of the present year's growth—a T should be made in the bark with the knife, and the bark raised with some convenient instrument: the bud is then inserted, and the bark is brought back and tied down over the bud, letting the leaf-stalk project out of the seam in the bark. Grafting is performed in the spring. The last of March is the proper time for plums and cherries, and April for all others. In grafting, thrifty young stocks should be preferred. The operation is simple, and consists in cutting off the stock at the point where we wish to insert the scion, and splitting the stock down the centre: the scion is cut at its lower end, in the form of a wedge, and inserted in the split in the stock: the outside bark of the scion should fit nicely the bark on the stalk. A salve made of 1 pound beeswax, 6 of rosin, melted with 1 pint linseed-oil, is then used to cover the seams made in the operation, so as to render the whole air-tight: the salve should be looked to occasionally, and kept smooth and tight on the seams, for it sometimes gets open and lets in the air, which will destroy the scion. Scions should be of the last

year's growth, and have upon each two or three buds. The cultivation of the grape is increasing here; we think that hardy native grapes might be extensively grown: I have seen 4 bushels of Isabella grapes upon a single vine; from 1000 to 1200 bushels of that variety might be produced upon an acre. There are several varieties of native grapes cultivated here, among which are the Isabella, Catawba, Sweet-water, Spanish-gray, Raisin, and Clinton. The Isabellas are considered the best. To bring the grape to perfection, into beauty, size, and flavor, the ground upon which they are set should be prepared by digging a trench 3 feet deep, and the same in width; fill it with all kinds of earth, such as sand, clay, gravel, loam, muck, and all sorts of manure, such as stable, ashes, lime, bones, forest-mould, and a little fine salt; set your vines in the trench, 8 feet apart; build a trellis 8 feet high and 8 feet long for each vine; beyond such limits they should not be allowed to extend. The vines should be well pruned, so as to allow every cluster to have the direct rays of the sun: grapes grown in the shade are generally small, watery, tasteless, and often mildewed. Vines are propagated by layers, which is done by bending down a branch of the last year's growth, and inserting the knife below a joint; the stalk is cut half off—the knife is drawn, splitting the stalk to the next joint; it is then pegged into the ground, with a hooked wooden peg, to keep it in its place, and to keep the cut open; it is then covered with earth, placing the stalk in an upright position: in 2 or 3 months it will be rooted, ready for transplanting.

Manures.—I would observe that a great saving can be effected by judiciously locating buildings, around which manure is to be made; such buildings should be so situated that all the manure that washes from them might be carried over land that requires manuring annually: a garden or yard for raising roots or fruit would be greatly beautified by receiving the drainings from the manure-yard; but the locating of buildings is only one thing in the arrangement for making and saving manure, and not to be trusted to entirely. Yards for stock should be small, and, if possible, upon hard, dry land; they should be covered, to the depth of 4 or 6 inches, with straw or muck, lime, or whatever else you can procure that will absorb the urine of stock, and hold it until spring: the same should be kept under stables for the same purpose. The manure made in fattening hogs should be collected into heaps, and be covered with bog-earth or muck. In the spring, all the yards should be cleared of all straw and other manure, which should be drawn into the fields, to be planted or sown with spring grain; it should be left in heaps till you are ready to plough; then spread the straw and unrotted manure upon the wettest land; dry straw helps such land wonderfully; it is far better than fine manure—it absorbs a great deal of water, and keeps the land loose and porous, so that an excess of water will soon dry off or run through it. Manure that is well rotted should be spread upon the driest ground, and thoroughly mixed with the soil: it should be ploughed under to a moderate depth, and then harrowed fine. If stables, barns, hog-houses, &c. are well located, and plenty of straw and muck be kept under the stables, and a plenty of that material is constantly thrown into the yards, and all cleared away early in the spring, there will be but little manure wasted. This system is far more simple, and less expensive, than to set buildings by the roadside, or upon the bank of a stream, and then go to work making drains, tanks, and pumps, to carry away the urine of the stock in a liquid state: the very thought of such reservoirs in barn-yards is disgusting. All the straw that is made on a farm should be well stacked after threshing in the fall, and thrown into the yard a little at a time during the season of foddering; then, after soaking under the manure of your stock a few weeks, it is in a first-rate condition to plough under in the spring. Swamp-muck is a powerful manure upon old wornout ridges, or on light dry land of any kind; it is nearly as good as stable-manure. Lime is indispensable for wheat lands, if it does not abound in the soil. It should be sown annually, at the rate of 4 or 5 bushels per acre. Gypsum should be sown yearly upon all dry soils, at the rate of 2 bushels per acre. Guano is not used in this part of the country. The plan of fencing with wire is beginning to receive some attention, and bids fair to supersede the use of crooked rail-fence; it has one advantage over hedges, for we need not wait 4 or 5 years for it to grow. Wire for fencing can be bought for 7 cents per pound; the posts may be set from 4 to 6 rods apart; the whole cost of materials for making a substantial wire-fence will not exceed 60 cents to the rod. It is thought that galvanized wire will last a long time.

I must submit my production to your discretion, and you can use the whole or a part, as will best comport with your ideas of the public interest.

I am, sir, yours truly,

GERSHOM WIBORN.

P. S.—I am entitled to a Patent Office Report for last year; please send me one. I would thankfully receive any rare specimens of grain for trial that you may have for distribution. I would give them a trial, and report my success.

G. W.

Portland, Chautauque County, New York, November 7th, 1850.

Sir:—In reply to your circular requesting information on the various branches of agriculture, I submit the following, which it seems necessary to premise by stating, that the soil and climate of this county are very diversified. The northern part, extending from lake Erie to the dividing ridge, which separates the waters which flow into the lake from those which flow into the Alleghany River, embracing a section three or four miles wide, has a soil and climate very different from that part of the county extending south of the dividing ridge to the State of Pennsylvania. The high lands are rolling, the hillsides of gentle slope, and well watered by numerous springs and small streams, and the soil well adapted to grazing.

The northern part of the county is adapted to the raising of grain, and all the varieties of fruit which are cultivated in any part of the State. The climate is much milder than in the more southern and higher sections; generally but little snow or extremely cold weather, and early and late frosts seldom injure vegetation.

Agricultural Improvements.—There has been for many years a very perceptible change for the better in all branches of agricultural pursuits; while a better system of tillage is practised by those who raise grain, and much labor saved by the use of ploughs, harrows, cultivators, reapers, and other improved farming utensils. Thus the land is better worked, and at less expense than formerly. Those engaged in the dairy business have generally obtained the best apparatus therefor, by which means the labor

is performed with greater facility, and a better article produced than was formerly the case.

A county agricultural society was organized in 1836, and the annual fairs are usually very interesting. The exhibition of stock this year was equal, if not superior to that of any preceding year.

Winter wheat is one of the principal crops in the northern part of the county; and most of the lands in that section produce it well. It is also raised to some extent in the southern part of the county, near Chautauque Lake and its outlet. The quality of the wheat raised is equal to that grown in any other part of the State; the product per acre depends upon the culture and soil. Crops of from 40 to 50 bushels to the acre have been raised, but much of the best wheat land has been, and now is, cropped for many years in succession with wheat or wheat and corn, without manure, until the fertility of the land is greatly impaired. I think the average product will not exceed 18 or 20 bushels. Very little land is prepared for wheat by summer-fallowing. It is generally sown after a crop of oats, barley, spring wheat, or corn, the land being ploughed but once after the preceding crop.

The practice of ploughing pasture and meadow in the fall, and sowing wheat with but one ploughing, has succeeded well. From the 1st to the 20th September is considered the best time for sowing wheat; but as much is sown after a crop of corn is taken off, it is necessarily sown later, even until the ground freezes.

Of varieties, the white flint, Soules, Mediterranean, red-chaff, and blue-stem white wheat are all raised more or less. The white flint and Soules have generally succeeded well. The product of the Mediterranean is small, and not so much is raised now as formerly. The blue-stem white wheat is the product of a small parcel sent here from the Patent Office, in the autumn of 1843, and has thus far succeeded better than any other variety. The quality of the grain is very fine, and in most cases, when sown by the side of other varieties, with soil and culture equal, it has exceeded them in product, and not been injured by the rust or fly when the other varieties have. The product of that small parcel has been sown in Vermont, Canada, Wisconsin, and many counties in this State, this fall. That sown last year in this State and Canada succeeded well, so far as I have heard, and should the product of that now sown be as good as that of former years, it will soon be the most common variety raised. When sown broadcast, from 1½ to 2 bushels is the quantity usually sown per acre. This fall, considerable has been sown with drills, at the rate of 1 or 1½ bushel per acre, and another season will decide which is the best method of sowing.

Spring wheat is sown to considerable extent in all parts of this county. The product, however, is not so great as of winter wheat; but is better in the southern than in the northern part. The tea, Italian, red-chaff, and Black Sea are the varieties grown. Of these, the last named is usually considered the best, and is less liable to rust and fly than the other varieties. Average product, 12 to 14 bushels per acre; although sometimes crops of 25 or 30 bushels have been raised. The product is diminished greatly by the rust, fly, and very warm weather at a certain stage of its growth, which renders it a more uncertain crop than winter wheat. Both winter and spring wheat are limed before sowing, which, when thoroughly done, prevents smut. Blue vitriol is also considered a preventive.

Hessian-fly.—I have heard of no remedy for the Hessian-fly that could be generally practised; but late sowing is considered safest as respects injury from them in the fall. I think that the hard straw of some varieties makes them less liable to injury than others of common straw.

Corn is raised in all sections of this county, and the crop is generally good; but in the southern part it is sometimes injured by frost: for the last few years, however, the crop in that section has been good. The northern part of our county is considered equal, if not superior, to any other section of the State for corn. It grows well on any land that can be ploughed. The usual mode of cultivation is to plough sward or stubble once, and harrow it well before planting; the usual time of which is from 1st to 20th of May. The steel-teeth cultivator is used by many in dressing and weeding it, and very few hill the corn, as formerly. Early planted corn is usually hoed or dressed twice; but most of the late planted (and some of the early, where the land is clean) is hoed but once.

There are many varieties raised, and all produce well. Some prefer one kind, and some another. On good, fertile land, without manure, 50 to 60 bushels per acre are not an uncommon yield; and 110 bushels have been raised on an acre. The probable average, in the northern part, is 40 bushels per acre. When fed to cattle, it is generally ground with the cob, and considered thus better feed for them than if ground without it. Very few grind corn for hogs, but feed it in the ear. I have no doubt that a less quantity, when ground and boiled, is required to fatten hogs; but I am aware of no experiments to show which is the cheapest, taking into consideration the price of corn and the expense of grinding and preparing it. The corn is cut up when ripe enough, and the stalks and shucks saved for fodder.

Broom corn is raised to considerable extent, and the culture of it is increasing. From 500 to 600 pounds of the brush, and from 40 to 60 bushels of seed have been raised on an acre, and are not considered an uncommon crop. It is manufactured into brooms by those who raise it.

Oats, in the southern part of the county, are considered a profitable crop, and are grown to considerable extent; averaging 40 bushels per acre. In the northern part they are not much raised, the climate being too warm and dry for them, the average product not exceeding 25 bushels per acre.

Barley and *rye* but little raised.

Peas were formerly grown as a field crop; but the bugs injured them so much that few are now sown, except in gardens.

Manures.—Barn-yard and stable manures are principally used; but plaster, lime, and ashes, leached and unleached, are used by many with much success. Plaster and ashes would be used more if the expense was not so great. The stone for both plaster and lime is brought from Canada. Buckwheat and clover are sometimes ploughed in to manure the land. Coarse, unrotted manure is applied in spring, and ploughed under. When applied to wheat, it is spread before sowing, and harrowed in with the wheat. Lime, plaster, and ashes are very beneficial; but lands that have been exhausted by constant cultivation without manure, can be restored to their former productiveness by a thorough application of barn-yard manure, and by deep ploughing. Gravelly and loamy soils are ploughed deeper than formerly; subsoil ploughing has not been tested sufficiently to ascertain its results.

Clover and Grass.—Clover is generally sown on grain, and on lands seeded for permanent meadow or pasture. It is usually mixed with timothy, which is the principal meadow-grass, but, on moist lands, the red-top grows apparently spontaneously, after the land has been seeded a year or two with timothy. Hay is worth from $5 to $6 a ton, when the crop is fair. The

quantity cut per acre varies from 1 to 2 tons. The expense of cutting and making hay is much less now than formerly. Where the meadows are smooth, revolving horse-rakes are used, and a more efficient labor-saving machine for farmers never was invented.

Dairy Husbandry.—The high lands of this county are considered equal to any section of the State for dairying. This is the best business pursued by farmers, and has increased very much within a few years past. The income varies, according to the quality of the cows and the skill employed. While the product of some amounts to $35 per cow, others fall far short of this, and the average will not, probably, exceed $25 per cow. The butter and cheese made in this county stand, deservedly, high in the market.

As the dairy business has increased, the raising of stock has diminished. The Durhams and Devonshires, or a cross of these with native, are the most common. Much interest has been manifested in raising the best of stock, and many of our enterprising farmers have imported the most valuable pure-blooded animals to be found in the Eastern States.

Sheep husbandry was, a few years since, a very extensive branch of farming in this section, but, from the low price of wool and the dairy business being more profitable, wool-growing has decreased, so that comparatively little attention is now paid to the business. There are, however, some very superior flocks of Merinoes, and most of the sheep of the county are of a fine grade.

Fruit Culture.—The cultivation of fruit has received much attention for many years. Apples are raised in all sections of the county, and most orchards have a good assortment of the best varieties of early and late or winter apples. That portion of our county near Lake Erie is well adapted to the cultivation of almost all varieties of fruit. Apples, pears, peaches, quinces, plums, cherries, apricots, and grapes, are cultivated, and of these we have most of the varieties considered the best. Pears have been much injured by the blight for some years past, but the early and late varieties do not appear to be as much affected by it as the others. The Isabella and Catawba grapes produce well, and with but little attention. Those which are trained into the tops of fruit-trees and extend a great distance, flourish and bear well, with but little pruning. Buffalo is the only market for grapes, where they are sold, in large quantities, at 4 to 6 cents per pound, and the culture of them is increasing. Our market for apples is poor, there being so many raised in the county; and the cost of transportation to Buffalo is so great that the price here is usually low. This fall, the best of winter apples were sold, at the orchard, for 12½ cents per bushel. They are considered good feed for hogs, and great quantities are thus consumed. Previous to the potato-rot, many farmers practised boiling potatoes and apples together for hogs; but since the rot has so diminished the crop of potatoes that not enough are raised to feed to hogs, it has been ascertained that hogs thrive as well on mellow apples as on any other feed, except corn, which is considered the best when well advanced in fattening. Sweet apples are better for hogs than sour; and many are of opinion that an orchard of sweet apples would be very profitable for fattening hogs.

I would here remark, in regard to the crops the present year, that the wheat crop was not more than an average one; the dry weather in May injured it considerably, but it was very promising up to that time. The corn crop is good—fully equal to last year. Hay was injured by the dry weather, and will not, probably, average more than two-thirds the crop of last year; but corn-fodder and straw are well saved, in good condition, which will, in a great measure, supply the deficiency; and the feed being good this fall, with uncommon warm weather, foddering will not commence as early as usual.

Yours, respectfully,

TIMOTHY JUDSON.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Doylestown, Bucks County, Pennsylvania, November, 1850.

Sir:—I received your circular some time since; and it gives me pleasure to answer, so far as I am able, the inquiries therein proposed. I do not flatter myself, however, that I can add much to your knowledge on the subjects referred to; but if the information I send will enable you to select a single grain of wheat from the chaff, I shall feel well repaid for my labor.

Permit me to say that the Patent Office Reports are yearly exciting increased attention among our farmers, and are much sought after, and perused with an interest which gives strong evidence of their intrinsic value.

Wheat.—The varieties of wheat that have been cultivated in Bucks and the adjoining counties, for several years past, are very numerous, and the success various, depending somewhat upon the seasons; but, from the experience of the last harvest, public opinion has settled down very decidedly in favor of that known as the Mediterranean, the product being larger and the quality superior to any other variety grown the past season. The average produce at the last harvest would, I think, fully reach 20 bushels per acre; time of sowing this variety, from 5th to 25th September; of harvesting, from 1st to 10th July, in ordinary seasons; the seed generally sown without steeping, or any other preparation; quantity of seed, 1½ bushel per acre—rather less when drilled in. As a general rule, the ground is ploughed 3 times for wheat; the first and second ploughings tolerably deep, say from 4 to 6 inches; and the last ploughing not so deep, forming a ridge furrow, by which the grain is thrown into rows, and has the appearance when grown of having been drilled in. The use of the drill is yearly becoming more common, and, I think, with advantage.

In this section of the country, the quantity, not only of wheat, but of other grains and grasses, is rapidly increasing, and has no doubt been doubled in the last 15 or 20 years, and is, at this time, increasing faster than at any former period. The common rotation of crops, commencing with a grass sward, is, first corn, then oats or barley, (seldom the latter,) and the same summer, after the oat crop, the land is prepared with lime and stable-manure for wheat; it is then sown with grass-seeds, generally in March or April following. The timothy-seed is frequently sown immediately after the wheat, with the best chance of success; but the wheat is sometimes injured at harvest, by the strong growth of the timothy, particularly on low and moist lands.

The Hessian-fly is the greatest scourge we have to contend with, and no specific remedy has as yet been discovered. Strong manuring is the best we know; but much depends upon the weather during the month of April and the early part of May: if that season is cold and wet, little injury is

done; if, on the other hand, it is warm and dry, the crop is not only injured but in a measure destroyed by that pernicious insect. The Mediterranean and other early varieties were very little injured by the weevil at harvest; but whether they will injure it in the sheaf, previous to threshing, we have yet to ascertain. The price, since the beginning of 1850, will average about $1.20 per bushel, and seems to be declining since harvest, from the abundance of the crop and the fulness of the supply in Europe.

Corn.—It is somewhat difficult to describe the different varieties of corn, and fix precise values on each—one rule is applicable to the North, and another to the South, depending mainly upon the length of season. The small flint corn would be comparatively unproductive at the South; and the large-eared and grained Southern corn would be equally so at the North, as it would not attain perfection before a frost. The most esteemed variety with us, and in the Middle States generally, is that with the largest grain that will come to full maturity in our climate; and this a medium between the large Southern and the small Northern flint corn, having a large, heavy, smooth grain, without indentation. The average yield, in a series of years, would probably range from 40 to 50 bushels; but 60 or 70 bushels are sometimes reached by our best farmers, in good seasons. In estimating the cost of production, I could hardly expect to approximate the truth. I think it is, however, for the labor bestowed on its production, as profitable as any other grain, and its aggregate value in the whole Union, very nearly, if not quite, equal to all other grains cultivated.

The system of culture varies much in different sections of the country, and possibly with advantage in each. With us in Eastern Pennsylvania, it comes in rotation after the ground has been laid down in grass for 2 or 3 years, and used for mowing or pasturage. The sod is turned down as early in the spring as practicable, and, at the proper season, repeatedly harrowed, until the surface is made quite smooth and mellow. It is then cross-furrowed on the surface, without disturbing the sward underneath, so as to form hills at equal distances, and usually planted from 1st to 20th May. In many instances, it is manured in the hill previous to planting, either with unleached ashes or rich earth, combined and prepared for that purpose, and deposited in the hill before planting the corn, and the farmer is well repaid for the additional labor and toil. A week or 10 days after it appears above the ground, plaster is sprinkled over the hills, in moist weather, and after that time the cultivator is mainly used in keeping the ground loose and free from grass and weeds. It is generally fed to hogs whole, the refuse or soft grain being first used, and answers the purpose of fattening well. For stall-feeding cattle through the winter, it is almost invariably ground, and not unfrequently the corn and cob are ground together, without shelling. The quantity of manure made by hogs is small, the quality, however, is rich: our hogs are seldom confined to the pen, except during the fattening season, and then but for a few weeks. In regard to the amount of manure made by hogs fed upon a given quantity of corn, no definite answer can be given. I can only express the opinion that, if mixed with rich earth, and a small portion put into each hill before planting, it would greatly increase the crop and amply repay the farmer for the extra labor required.

Clover and Grass.—Our principal grass crop is raised upon upland, and the seeds of clover, timothy, and herdsgrass are sown upon wheat and rye, following the regular rotation of these crops with mowing ground or pasturage for 2 or 3 years in succession. We have also our natural meadows, which are but seldom ploughed, and which, by irrigation and occasional top-dressing, with short manure, are made very productive not only for hay, but, in autumn, for the best pasturage. By top-dressing, our meadows are made to produce a fine sward of natural grass, which is equal, if not superior to any other, both for hay and pasture, in producing milk and butter.

The average of hay per acre on upland, in favorable seasons, is about 2 tons. When meadows are ploughed, (which is seldom,) they are generally laid down with timothy and herdsgrass: the quantity of seed to the acre I can hardly specify; but there is little danger of getting too much. Of clover and timothy, 1 bushel of each for every 6 or 8 acres of upland, is about the quantity required.

Dairy Husbandry.—Much attention has been paid to this branch of industry in the vicinity of Philadelphia, and the yearly increase of the product of butter is an evidence that it is profitable to those engaged in it. I believe I am safe in saying, and the fact will be conceded by every one who has visited the different portions of this country, or even of Europe, that Philadelphia butter stands unrivalled at all seasons of the year for its excellence. This market is chiefly supplied from Bucks, Montgomery, Chester, and Delaware counties; all in the immediate vicinity of Philadelphia. But little cheese is made in these counties, and the cost per pound I cannot give of either. The price of butter varies considerably in the Philadelphia market at different seasons, but a fair average for the whole year, would be from 20 to 25 cents per pound; and a large proportion of all made in the aforesaid counties is sold in pound lumps from market-wagons and stalls.

Neat Cattle.—There are comparatively few cattle raised in Bucks county, the calves being generally sold for veal when from 4 to 6 weeks old, and their places supplied by purchase of stock 3 or 4 years old from New York, New Jersey, Ohio, and the western part of Pennsylvania.

The raising of *sheep* is not much attended to, and the wool grown is principally for domestic use of farmers in their own families.

But few *hogs* are raised and fattened more than are required for our own tables. The curing of hams and bacon has undergone a great change within a few years, by combining a portion of sugar and saltpetre with the salt, and putting them down with what we term *sweet pickle*, a valuable discovery, which gives a fine flavor to the hams.

Root Crops.—The Irish potato only is cultivated to any extent: the exact expense of raising, per bushel, is difficult to ascertain. The yield varies with the season; 200 bushels have been raised, under the most favorable circumstances, on an acre; but the average is less than half that quantity. The white Mercer is considered the best variety. They are planted in rows, about 3 feet apart, being deposited at intervals of 10 or 12 inches on the manure, which has been placed in the furrows. The free use of lime and plaster will much increase the crop: but the main secret of producing large crops is the plentiful use of short manure on a tolerably dry soil, and cultivating frequently early in the season. No additional earth should be placed around the stalk after the blossom appears, or a new set of tubers will be thrown out, which may increase the number, but will diminish the size of the potatoes. Large quantities have, the present year, been destroyed by rot, and no effectual remedy has been discovered.

Fruit Culture.—More attention is now paid to the cultivation of fruit and the selection of the best varieties than formerly. Apples are wholesome, and convenient for family use, but could not be made a source of much profit in this section. The early droppings of the orchard are valuable food for hogs, as they serve to put them in a healthy and thriving condition before the season for fattening commences. The same remark will apply to the use of potatoes and pumpkins. The blight seldom attacks our apple or pear trees. For the "yellows" in peach-trees, I know of no remedy but setting out trees every year, and thus keeping up a succession of crops. I prefer budding to grafting for choice fruit; in transplanting, they always succeed when done at the ordinary season in spring. Grapes are raised in great perfection for the use of the table. Most of the foreign varieties succeed, and are a luscious and delightful fruit in their season. They are principally cultivated in gardens, and answer well for arbors in the vicinity of dwellings, both for fruit and shade.

Manures.—There is scarcely any subject that more engages the attention of farmers than that of manures, and none on which there is a greater variety of crude opinions, without any precise facts or experiments to sustain them. When we shall have discovered the *pabulum*, or appropriate food of plants, in their various stages of growth, we shall have the foundation on which to erect theories, and verify them by direct experiments. The merest *tyro* in farming knows that the application of many substances stimulates the growth and perfection of plants; but, if asked by what means, and through what agency these substances are conveyed to the growing plant, he, in common with myself, would be unable to answer. We all know that heat, air, light, and moisture are necessary to the proper growth and perfection of all cultivated plants, and that the absence of any one of these is fatal to their natural and full development; but what the action of any, or the combined action of all these, is upon the healthy growth of a plant, we do not as yet understand. That the principal sustenance and increasing growth depend upon the absorption by the roots and transmission through the stalk or stem to the extremities of the branches and leaves, is undoubtedly true, but we question whether this is the only channel whence nourishment is derived.

The beautiful theory, at one time generally admitted, that a wise and bountiful Providence has provided the vegetable kingdom as the great absorbent of the deleterious portions of our atmosphere—it giving out only such as are favorable to health and comfort, thus at the same time nourishing the vegetable kingdom and purifying the air we breathe—though probably true, as a general theory, requires to be received with some limitations. The limits of a reply to your inquiries on the subject of manures will scarcely allow me to go into detail, or extend my remarks further on this subject.

Very respectfully, yours, &c.

WILLIAM CARR.

Hon. Thomas Ewbank,
Commissioner of Patents.

Arkport, Steuben County, N. Y., December 20th, 1850.

HON. THOMAS EWBANK, *Commissioner of Patents.*

Dear Sir:—Your circular, requesting agricultural information, was duly received, through the politeness of Hon. D. Rumsey, Jr. I regret, exceedingly, that I am not able to give you a more detailed account of the interests of agriculture in Steuben county. We labor under the disadvantage of having no county agricultural society. I believe there was one established in this county several years ago, but, from some cause, (to me unknown,) it has long since "gone to that bourne whence no traveller returns."

Wheat.—The crop of wheat harvested this season was much more than an average one, and the quality would have been remarkably good had it not been for the heavy rains to which it was exposed in the process of harvesting—which commenced here about the 20th of July; and what was got in previous to the 25th (about one-tenth of the whole) was in fine order. It then rained for 15 days in succession, and consequently the greater part of the wheat crop was more or less grown—some fields almost worthless. The "Hutchinson" wheat has been preferred to all other kinds; but, for the past two or three years, it has found a successful competitor in a variety known here as the "Soules" wheat. It is the general opinion, among our best wheat-growers, that the latter will yield, on an average, 5 bushels more per acre than any other variety known. Average product, about 20 bushels per acre. We seed from the 25th of August to the 20th of September; soak the seed in strong brine for 12 hours, and then add half a bushel of unslaked lime to 10 bushels of wheat—mix thoroughly—let it lie over night and sow in the morning, from 1½ to 2 bushels per acre; the latter quantity preferable. The land is generally summer fallowed in June, turning under a good coat of clover. Plough about 6 inches deep, and cross just before seeding; sow on the furrow, and harrow thoroughly. Drills are not much in use about here. The yield per acre is increasing. We are not troubled with the "Hessian-fly" or "weevil." Average price, at our nearest market, (Dansville, Livingston Co.,) for the year 1850, is 94 cents per bushel; although, by getting it floured, and disposing of it to the workmen on the New York and Erie Railroad, at our own doors, we get something over that—$5 per barrel.

Corn.—This most important farm crop, and one that has been too much overlooked by the most of our farmers, is receiving the attention of many who have heretofore entirely under-estimated its value and its importance as a farm crop. The different varieties are, the early gourd, and the 8, 10, and 12-rowed yellow Dutton corn; the latter will yield from 5 to 10 bushels more per acre, and, when the season is favorable for ripening, is much preferred. Average product per acre, about 50 bushels. We harvested this fall, from one field of 9 acres, which was so badly injured by the worms that in June we thought it hardly worth hoeing, 1200 bushels of ears, which would make about 500 of shelled corn. The method we most approve is to plant on sward ground, ploughing it but once, and turning under all the manure we make during the winter; then harrowing, lengthwise of the furrow, until a good tilth is produced. Mark it, 3½ feet each way, and plant about the 10th of May. As soon as the corn is up, (say 5 or 6 inches,) start the cultivator, and have a boy follow, to see that there is none covered. Immediately after, put half a handful of unleached ashes on each hill. In about two or three weeks, we again go through with the cultivator, twice in a row each way, and follow with a hoe, giving a thorough dressing, throwing a little fresh dirt round the plants—but no hilling. This is all that is required until the kernel is sufficiently glazed to cut up. We then put 25 hills together, binding firmly round the top with stalks—husk in October. Cost of production, as follows:—

Interest on land, per acre	$5.00
Ploughing, once	2.00
Harrowing	1.00
Seed, marking, and planting	1.00
Ashes, and putting on the hill	50
Cultivating	2.00
Hoeing, once	1.00
Cutting up	75
Husking and threshing	3.00
Seeming stalks	50
	$16.75

Average yield, 50 bushels; cost of production, 33 cents. In this estimate I have made no account of the manure, because the stalks are worth (well-housed) $5 per acre, to feed stock; besides adding materially to the next year's supply of manure for another crop. The home, with us, is much better than the foreign market. We generally sell at our barns, in the spring, for 62½ cents per bushel.

Oats.—This crop generally follows corn; sow about 3 bushels per acre. We consider it the most exhausting to the soil of any crop we raise. Still it is cultivated very extensively. Average yield, about 60 bushels per acre; worth from 30 to 50 cents per bushel.

Barley.—But little sown; does not do well on our soils; very liable to rust; worth from 60 to 75 cents per bushel. Peas and beans are cultivated only for our own use.

Clover and Grasses.—The quantity of hay cut per acre, in good seasons, will average about 2 tons. We generally seed after oats or wheat, about 5 quarts of clover, (the small kinds,) and 2 of timothy; sow plaster annually on meadows, half bushel to the acre. Hay is worth at the present time, $10 per ton.

Neat Cattle.—Our young cattle, after the first year, are usually wintered on coarse feed—straw, cornstalks, &c., with hay in the spring, till they are 3 years old; they are then worth from $15 to $20. Good dairy cows are worth from $25 to $30 in the spring, and, in the fall, from $12 to $18.

Sheep and Wool.—Wool-growing is not considered very profitable; the average weight of fleece is thought, by good judges, to be about 3 pounds; the price has ranged from 30 to 44 cents, according to fineness of fleece: average, say 36 cents; mutton is worth 2 and 3 cents per pound. Pelts, from 75 cents to $1.

Potatoes.—The potato crop has proved a very light yield, and the disease has prevailed to a very alarming extent; the best remedy yet discovered by us for the rot is to plant healthy tubers on well-prepared dry, but not gravelly soil, as early as the season will admit; harvest early, and keep them dry, but not warm.

I have thus hastily glanced at a few of the topics suggested in your circular, with which I am familiar.

I feel a deep interest in the Reports from your office, and think they are the means of furnishing much useful information, especially to the agricultural part of the community, and shall be highly gratified, should the above be of any service to the Commissioner of Patents, in making out his annual report.

Respectfully yours,

JOHN HURLBUT.

Cumberland County, Virginia, September 17*th*, 1850.

Sir:—Agriculture in this region is in a state of transition. By injudicious modes of cultivation, our lands are much deteriorated, and large quantities nearly ruined. We are generally convinced that they must be improved or abandoned. We find our *patient* in a desperate condition, and conclude that something must be done, and are ready to resort to any experiment, however wild. As necessity stimulates invention, we may in this way occasionally discover something valuable, and eventually adopt a systematic course well adapted to our circumstances. Much useless expenditure has been incurred by sowing clover-seed and plaster on lands utterly incapable of producing clover without an application of nutritious manures. Much loss has been sustained by laboriously cultivating lands too wet to produce any valuable crop without thorough draining. Our manures are often rendered nearly inert by exposure to rains, which wash out the soluble portions, and produce chemical decomposition so rapidly as to evaporate their most valuable elements previous to their application. Many of our animals die, too, from want of proper protection from bad weather. These, and many other obstacles to successful agriculture, must be carefully guarded against, before we can emerge from the difficulties that surround us, and place our fine country in that rank of improvement and value of which it is so highly capable. I have often heard despondent remarks regarding the capabilities of the soil in this region for improvement, at least until the far West shall be fully peopled. From these lugubrious croakings I most deeply, and almost indignantly, dissent. I can personally bear witness to many instances of profitable improvement, rising annually before my eyes. A kind Providence has adapted each portion of our great country to fill its place in a grand and glorious Union, if each portion will but be content to strive to remove *its own* evils, and patiently await, however slow, the unerring progress of national improvement. This is progression for which all should labor.

Wheat stands deservedly at the head of your agricultural inquiries. There are so many who appear to sow wheat simply to make straw—often failing even in that—on poor corn land, that it is very difficult to form even a surmise as to the average crop. Our climate being so variable, forms another difficulty in estimating the average quantity produced, even by those who sow on lands capable of yielding wheat. Leaving the *straw-makers* out of the account, I suppose that 10 bushels per acre might be set down as our average product; for though our best lands, rich tobacco-lots and fallow-grounds, in our best wheat years, go up to 30 bushels, and, in some rare instances, to 40; yet, in unfavorable seasons, the average often falls below 10. And besides, much of our land, which may be called rich, is deficient in those elements necessary to produce good wheat, while they yield largely in tobacco and some other crops.

And now the question arises, how shall we increase the average products of our lands in wheat? Space is denied for a full discussion; but a few remarks in reply may be allowed. We must plough deep, and thoroughly pulverize the soil. Those elements necessary for the formation of wheat which are wanting in the soil, must be supplied. We are denied the free use of lime; but we may use it to a limited extent. Three or four bushels of lime put on with rich stable manure, in which the volatile gases have been fixed by means of gypsum and common salt, must do good by combining with the phosphoric and other acids in the manure. It is admitted that lime, applied to manure, not previously guarded by a suitable acid or salt, will cause a disengagement of ammonia; but if the sulphuric acid in gypsum will absorb the ammonia, I should hardly think a further addition of lime would cause a separation. Some of the chemical salts manufactured in our cities are believed to be worthy of trial. Kettlewell and Davidson's renovator, made in Baltimore, is becoming popular, and I expect to sow wheat this fall, on lands where 70 barrels of this fertilizer have been applied. Several of my neighbors will also try it—one of them largely. Guano certainly, in some instances, increases the quantity of grain and straw; but that the money expended on its purchase invariably affords a profitable return, is, I think, yet to be proved. I have seen failures after the careful use of what was doubtless the genuine article. Whatever manure may be applied, it is important that the utmost care be taken in draining off the redundant water. This should be done to guard against *rust*, which I consider the greatest drawback on our production of wheat. We had, this year, during the last half of May and until late in June, very dry and hot weather, which seemed to parch up instead of ripening our wheat crop. Notwithstanding this severe drought, we suffered more from rust than for many years before. I ascribe this to the excessive rains which fell before the drought, leaving stagnant water upon the land, which, by its putrefaction, poisoned the crop, and caused the rust. For the last 10 days, we have had, perhaps, the coolest weather ever known, for the season, with the ground tolerably dry; yet the tobacco is fearfully firing. This, I think, arises from the same cause as rust in wheat, for we had, some time ago, the heaviest falls of rain that I have ever witnessed. Firing in tobacco and rust in wheat seldom appear until these crops approach maturity.

The time of sowing should depend much upon the variety of seed. Late kinds should be sown about the 20th September. The seeding of earlier varieties may be deferred a month later. I made several experiments of sowing in August; but lost much of the crop from the fly. Many of our best farmers think from 10th to 20th October the best time to sow, to escape the fly. When smut was common, we soaked our seed wheat in a solution of salt, skimming off light grains, spelt, and other seeds of noxious plants, and rolled our seed in lime before sowing. I have heard nothing of smut for many years, and very few now make any further preparation of seed than to clean it. From 1 to 1½ bushel is the quantity usually sown per acre.

Land that has been cultivated the preceding summer in tobacco or any other hoed crop, need be ploughed but once for wheat. It is better, in order to destroy noxious weeds, to plough under a clover or grass-fallow before their seeds ripen in early summer, and to refallow in the fall, before sowing wheat. But most of those who operate on such fallows plough but once, and then get in their seed with what we call a big rake—a large kind of harrow, with 20 or more straight teeth. I prefer the harrow or cultivator, with 7 long and broad-pointed teeth, as, in using the rake too large, a portion of the grain is left uncovered. I like to cover seed wheat at least 2 inches deep. We plough much deeper and use better implements than we formerly did. In place of a little, scratching, 1-horse trowel hoe, we now use 2 and 3-horse ploughs, of various models, cutting from 6 to 10 inches deep. There was, at first, a great outcry against deep ploughing, as burying the soil too deep for return; but it is found to make soil of the whole tilth, and the benefits are too manifest to all who will look, and believe their eyes, to admit of question.

It is difficult to say whether the yield per acre is increasing or diminishing. While the country abounded in forest, the system of culture and, consequently, the product, was more uniform than now. Then all cut down their woods, cultivated their land a few years, and, as soon as it began to fail in fertility, turned it out as old fields, and cut down more woodland. Those who had no more woods to cut down, began to save and apply manure to tobacco lots. The average of other crops began to lessen, until necessity drove many to new countries, others to struggling in ignorance against their hard fate, and some few to earnest endeavors to improve our condition. We have cut nearly all the forest that we dare cut, and are now divided into various classes. Some make less wheat and less straw every year, giving all their manure to standing tobacco lots. Others move their lots every year, to "extend the area" of fertility, and reserve a part of their manure for other crops besides tobacco, sowing clover and plaster, and resorting to every practicable means to improve their lands. Many of these are greatly increasing their crops, and serve as examples and teachers of the rest, who, it must be confessed, are slow to learn. Those who cultivate no tobacco, and are directing all their energies to the general improvement of their land, are too few in number to form a class. In this category, for the present, stands the writer, quite confident that this is the most speedy way of renovating the face of the country;, but sadly doubting whether the individuals who adopt it may not be lost in the mazes of an intricate and untried way, without the guidance of common custom around them to enlighten their path.

We have no uniform system of rotation in crops. Individuals are striving to strike out new plans of their own, adapted to their peculiar circumstances. So far as there is any established system, I think the four-shift rotation of the late John Taylor, of Caroline, the most common. The following is my own plan:—I cultivate corn only upon low grounds; the surface to be smoothed at the last working, for sowing clover-seed, and the clover to be fallowed the next fall, for seeding wheat. I prefer that corn should grow after wheat than after clover, to avoid the clover worm; and I think wheat grows better after clover than after corn. My high land is alternated in clover or peas, and small grain; wheat being sown on the richer and oats on the poor land. Should the price of wheat keep up to a dollar per bushel, and my faith not fail in the efficacy of manure for increasing the average yield, I may be able to get along in this way. I had to begin, however, with most of the high land in a state of great sterility. I do not think our high lands can bear so exhausting a crop as corn oftener than once in 6 or 8 years, and the land should be heavily manured even then, and much less of it tended.

I know no remedy, not already published, against the Hessian-fly. Early threshing and bulking will, doubtless, prevent the egg of the moth weevil from hatching in the wheat; and fumigating the granary thoroughly with burning sulphur is said to expel the black weevil.

Corn.—There are many esteemed varieties of this noble grain, among which, perhaps, the old Tuscarora and Dearing stand foremost for this region. Hardly two persons can be found who would agree as to the average product per acre. There are extensive tracts of land so extremely poor as not to produce a single ear, unless favored with a genial season. It is difficult to divine why such land should be cultivated at all. A man, judicious in other matters, will sometimes cultivate 100 acres in corn, 25 or 30 of which will produce all the crop he makes. Those whom we consider good farmers obtain from 4 to 6 barrels of corn per acre.

The system of culture depends upon the season. I always wish to avoid breaking the corn roots, but, when the grass has grown rapidly during a rainy season, it cannot be killed by the cultivator, and a turning-plough must be used, especially in stiff land. The earth should be completely turned up and pulverized before planting. After this, if the land be light, the big horse-rake, with its front teeth drawn out, may be dragged over the young corn, which should immediately be dressed with hand-rakes, with large spike-nails for teeth. In stiff lands, hoes should be used for dressing the young plants, followed by a mould-board plough, turning the earth first from, and then directly towards the corn. The after culture of the crop may then be trusted to the hoe and cultivator. The chief labor on the corn crop should be applied on its preparation. If the land be rich, it should not be planted until the first half of May. The ground is then much better prepared, the young corn not being in the way. Many good managers plant in March and early in April; but, in that case, the young plants are stunted and discolored by much chilly weather in early spring, and I think never fully recover. If not planted until the ground begins to be warm in May, their growth is vigorous, and they derive the full benefit of hot weather, as well as being in a better state to receive the late rains which often succeed a drought. Poor and low lands require earlier planting.

The *cow-pea* is attracting considerable attention. It has, however, so recently been introduced, that there is need of some caution in its praises. From four years' experience, I am greatly pleased with it as a green crop. It renders an early summer ploughing necessary, which, if early enough, turns under the young spelt, wild carrot, ribwort, wild onion, and other noxious weeds, before their seeds mature; and if there remain a few, they are much smothered by the rank luxuriance of the pea-vines. These vegetable pests are more successfully opposed by a smothering crop than by any other means which I have observed. I have never known the wild onion yield so much to any treatment as to turning it under early in June, when it is in blossom.

Enough has been said of the pea as an antidote against vegetable pests; its value as a cleansing crop cannot be doubted. It remains to speak of it as a fertilizer. I am old enough to have learned, from those long since dead, much about the first settlement of this part of Virginia. Some of them told me that the forests were so thickly covered with wild pea-vines, running up the trees and bushes, that a man on horseback could not be seen in many places at ten feet distance. That on some of our ridges, now esteemed the poorest sort of land, then chosen as the most productive, the decayed vegetable matter laid in such a stratum, all over the woods, that a man could run his foot into it knee-deep, with facility. That cattle could be transported in droves from the Carolinas and Georgia to Philadelphia and Baltimore, without feeding, except on the wild pea-vines, until they approached the thick settlements—and fattened all the way. The traveller or hunter reposed on a couch of Nature's spreading, while his horse, tethered by a short cord, luxuriated on more pea-vines within his reach, than he could destroy. I know not what kind of wild peas were then most abundant. In my boyhood, there were many varieties not to be found now. The most luxuriant grew on the trees, to the height of 25 or 30 feet, but they were very scarce. They had perennial tuberose roots, resembling sweet potatoes, and bore, near their tops, enormous clusters of pods, containing very pretty peas, of medium size. I have seen none of these for many years. There are still many smaller varieties, one of which climbs 8 or 10 feet on weeds and bushes, in rich lands. The custom of allowing stock to roam at large has, however, nearly exterminated them. Their decay formerly, in the opinion of our forefathers, caused that generous fertility which so much distinguished our lands in those days. But that fertility has departed since the wild pea has been exterminated, and it may well be questioned whether there be not a peculiar adaptation of the pea as a fertilizer to the soil of this region, and whether the use of it might not be one of the best means of renovation. The Indian pea has been declared by chemists to contain much of the peculiar nutriment constituting the substance of wheat, and it is known to afford a larger mass of vegetable matter than almost any other plant will produce in one summer. It grows better in dry weather than any other vegetable we have. It has been an almost universal custom for every family to cultivate a patch of peas for domestic use. A Middle or lower Virginian, having wandered to colder climes, could hardly think of his native home without remembering the cornfield pea. These pea patches have always been remarkable as yielding better wheat than the adjoining land. The knowledge of this fact has doubtless led to their more extensive field culture; and all who have tried the pea fallow, I believe, rank peas before any other green crop. There are many ways of cultivating them. Some drill them in: some sow them broadcast, immediately after ploughing in clover or grass, and cover them by running the big rake or drag in the same or exactly contrary direction to that in which the plough went. Some sow them broadcast with oats, and I have heard that the plan answers well. Others sow them in cornfields, and get them in with the last working of the corn. I have been told that on low grounds, cultivated in this way, the product has annually increased, yielding but 3 barrels the first year, and 8 barrels on the eighth. Peas are cultivated further south for the sake of the haulm as provender for stock. I know of no vegetable which in this climate would produce, on rich soil, a greater supply of fine food for animals. They have but recently been introduced in this section, and we cultivate them entirely as a fallow crop for wheat, and some gather the seed for sale.

The chief objections to pea culture on a large scale, arise from the time of sowing being a very busy one, and the great difficulty of breaking up land at that season, if drought occur. This latter objection may be obviated by a previous fallow in winter.

Hogs, Curing Bacon, &c.—The excellence of Virginia bacon is known far and near. We prefer dry and very cool, but not bitterly cold weather, for killing hogs. After killing, and nicely cleaning our hogs, we hang them in an airy place by their gambrels, from 12 to 24 hours, that the animal heat may escape, the blood may drip, and the superficial moisture may evaporate. They are then taken down and cut up, each piece being taken from the butcher, by other hands, to a table, where it is thoroughly rubbed, inside and out, with good Liverpool salt, having, according to size, from one to three tea-spoonfuls of pulverised saltpetre, sprinkled over it, and squeezed around the bones that project. The saltpetre is chiefly put on the hams, sometimes on the shoulders, never on the middlings, which are nearly all fat. I have often eaten excellent bacon on which no saltpetre had been used. The pieces are then packed in "powdering tubs," made of half-hogsheads, or piled upon broad planks. This is preferred when the weather is rather warm: if the weather afterwards be very cold, the meat is permitted to lie in this condition for six weeks. In soft, mild weather, it will "take salt" in three or four weeks. The salt should be piled between the layers thickly enough to prevent the pieces coming in contact, as this causes mouldness. When it is known to have "taken salt," the pieces should be hung in the roof of the smoke-house, on poles, across beams fixed for the purpose, at such intervals as will prevent their touching each other. Moderate fires, made of green hickory or red-oak billets, or the green chips of such wood, are then to be carefully kept up, and especially attended to during damp or rainy weather, until the meat appears to be dry enough, and smoked enough, which must be judged of by the appearance and color. If very closely attended to, it will be converted into good bacon in three weeks. If some remissness be indulged, it may require six. As the fires are intended to dry and smoke the meat, not to heat it, they should, of course, be moderate; and if the house cannot be made perfectly dark, red pepper, bits of old leather, or slow-matches of brimstone should be burned in it, in warm weather, to keep off blowing-flies. After the bacon is cured, it should be packed in the "powdering tubs," with dry ashes or common salt. I prefer the salt, because it looks neater, more effectually excludes rats, is commonly cheaper in spring than fall, and will answer just as well as new salt for the next year's supply.

There are other ways of curing bacon, which do well. It is enough if it be well salted, smoked, and dried. I believe, however, that we are as much indebted to the dryness of our atmosphere for the excellence of our bacon, as to our skill in curing.

Tobacco.—The culture of tobacco is so well understood in Virginia that I cannot hope to benefit the planters of it by descanting lengthily on the subject; and those living elsewhere would take no interest in such remarks. The amount made per acre ranges from 400 to 1800 pounds. I judge the average product, in this immediate vicinity, may amount to 600 or 700 pounds. In districts where shipping tobacco is not aimed at, but light sun-cured tobacco is made for manufacturing, and less manure is used, the average may fall as low as 300 or 400 pounds per acre. It is harder to estimate the average cost of production per cwt. If we compute only the simple cost to the individual grower in labor and expense, it might be put down at from $4 to $5 per hundred; and even less than $4, were he to make arrangements to become exclusively a tobacco-planter. This crop may be managed so as to be made without the expense of teams, the grubbing-hoe being substituted for the plough. But the expense of production is incalculable, when we consider its influence on the wealth of the community, by detracting all the manure from other crops, and a large share of the labor, while the attention of the proprietor must be withdrawn from those objects calculated to adorn and enrich his estate.

I cannot describe very definitely any new mode of curing tobacco. I have heard of a gentleman, in Nelson county, who has cured tobacco by packing the green plants in common salt, and permitting them to remain in that condition until such fermentation has occurred as prepares the leaves readily to cure on exposure to the atmosphere. The article thus managed is said to be fine. I know too little about it to detail the process.

What guano will do for tobacco planters, is yet to be tested. It certainly works wonders in some instances. There is now in my immediate neighborhood a field of good tobacco, just coming to maturity, on which no manure except guano was used. The land was so poor as to be utterly incapable of producing tobacco without aid. I believe it is generally thought that to cultivate tobacco alternately with wheat and clover is the best rotation to maintain the fertility of tobacco land.

Fruit Culture.—From my boyhood, I have been an enthusiast in fruit culture. I am glad to be able to say, that this branch of rural industry is receiving increased attention. I have been told that, 70 or 80 years ago, the orchards rarely failed. In modern times, there is seldom a general fruit crop, and often an almost entire failure. We often, in January and February, have weather warm enough for May, and sometimes we have hard weather in March and April. Low, sheltered places were formerly selected for orchards. In such situations, the ground becomes so warm as to swell the bloom-buds too early in the spring. Experience has taught that fruit-trees are most likely to succeed on our high, bleak ridges. This may be owing to the more profound torpidity, or *hibernation*, so to speak, into which the trees and roots have been thrown by the previous cold weather. I would recommend that the planting of permanent orchards be deferred until one can learn by experiment what part of his farm is best adapted to fruit-trees. This can easily be ascertained by setting out early-bearing trees in different localities. There are few years in which fruit would not escape, to some extent, in the best situations. It is, moreover, worthy of inquiry, whether trees procured from the North are not more easily stimulated to early vegetation by sudden changes from cold to warm, than our native trees. Northern trees, however fine their fruit in their appropriate climate, seldom yield good fruit here. I have 12 or 13 acres in fruit-trees, and, while I do not believe I have lost one native tree by the weather, several of Northern origin die annually. Most of them die from the freezing of the sap, bursting the bark from the wood, which happens in hard weather, after one of the warm spells in winter. It has been but a few years since I first saw an apple-tree affected with blight. I have lost no native trees with that disease, but some of those imported are liable to it, and those budded or grafted from them as much so as the parent. My trees are permitted to branch out near the ground, that their bodies may be shaded and the wind operate against the shortest lever. One main stem only is preserved to the top, from which side branches shoot. Large bifurcations cause splitting.

I have long attended to grapes, and have learned the following rules:—The cuttings should be well planted in November: the vines should be transplanted the second year, as large ones become wormy and die. They should be trained on high scaffolds with flat tops, that the grapes may hang beneath

and get air. Too little trimming is better than too much. Trim closely to the eaves of the scaffold, and a little on its top. Dig in manure from the hen-house, well plastered, and sprinkle freely slaked lime on the surface. Vines are more affected than any other fruit-bearers by peculiarities of soil, in their healthfulness and the flavor of their fruit. But few foreign vines do well here. Out of about 60 varieties, sent me by a friend and relative in Bordeaux, none bore well but a few of the *Chasselas* family. The *Pyrenean Chasselas* yielded a most delicious fruit, but they all died in a few years, in spite of my utmost care. I have rarely succeeded in budding or grafting vines, except between the 20th May and 10th June, and I cut off the part above the bud, as soon as I find it has adhered, that it may grow off at once. On the whole, I am fully convinced that the vine may be successfully cultivated here.

Manures.—This is an important subject to the farmer. I regard as the best plan for making and preserving manures from waste, to have a close reservoir for the urine, well filled with charcoal, sawdust, or any other light absorbent, plentifully intermingled with salt and plaster, where the excrement is kept until wanted for use, as dry as the guano in the South-sea Islands. A little ingenuity will suggest contrivances the most convenient to each individual, for effecting these purposes. My sheep and cattle are furnished with houses made by covering extensive frames of timber with straw, piled up in the shape of a "rick." Spacious as these are, I hope, during the winter, to make them so full of pine-leaves, and other absorbing litters, that there will hardly be room for the stock. It is needless to write long dissertations on making manures. We all know well enough how to make, and apply them, too, were we not so anxious to make money on poor land without them. Lime has been used as a manure in some few instances which have come to my knowledge—in some cases with no perceptible effect, which can only be accounted for after an analysis of the soil. It has sometimes yielded no benefit the first year, but much afterwards. Guano is looked to by many as the sovereign panacea for all the ills that earth is heir to. I have known signal successes and signal failures from its use. Much is yet to be learned about it. From 100 to 250 pounds are applied per acre; and I have seen striking effects from only 50. The use of plaster and its benefits are both increasing.

With sincere wishes for your personal and official welfare, I am, sir,

Your obedient servant,

W. S. MORTON.

CHINESE FRUITS, &c.

Washington, August 28d, 1850.

Sir:—It gives me great pleasure to lay before you the enclosed communication from Mr. S. Wells Williams, of China. This paper was handed to me by Mr. W., on the eve of my departure from Canton, with a request that I would bring it to your notice. It contains many valuable suggestions upon the subject of introducing into this country certain vegetable productions indigenous only to China. The well-known reputation of Mr. Williams, in both literature and botany, will, I am sure, bespeak for his letter your careful consideration.

Very respectfully, your ob't servant,

JOHN W. DAVIS.

To the Hon. Commissioner of Patents.

Canton, (China,) May 21st, 1850.

Hon. J. W. Davis:

My Dear Sir:—Having noticed, in late papers, that the project is mentioned of establishing, at the city of Washington, a department for Agriculture, I have thought that you would be willing to bring to the notice of this bureau, (supposing that the recommendation of the President will be acted upon,) the desirableness of introducing into the United States some of the valuable and important productions of China, and encouraging their growth in such parts of the country as are fitted for their culture. Among the plants which are worthy of the attention of this bureau, are the *lichi, whampe,* and *loquat,* among fruit-trees, and the *cassia, camphor, varnish,* and *tallow* trees, among useful trees.

All of these trees occur in the southern provinces of this empire, and would thrive equally well in the Southern States: all of them are indigenous to this country, and, except the *lichi,* none of them have, to my knowledge, been naturalized in any other country. The *lichi* is now grown in Bengal.

The *lichi* (*Dimocarpus lichi*) belongs to the family of the Sapindaceæ, of which only a few plants are natives of America, and they of no great value. The Chinese have 15 or 20 varieties, but there are only 2 or 3 which are distinctly marked, the others being the growth of different districts, and bearing the name of the places which produce them. It has been cultivated for ages in this country, and furnishes a large amount of food to the people, the produce of a single healthy tree often amounting to 4 bushels.

The *whampe,* (*Cookia punctata,*) or "yellow skin," as the name means, grows in clusters, like the lichi, but belongs to the same family as the orange, though, in shape and size, the fruit resembles the cherry. The wood is hard and close-grained, and would serve for various purposes in the arts. The fruit is pleasantly acid, and might be improved in flavor and size by grafting, for it is now, as seen in these markets, often sour, and harsh in taste, and not fully developed. The produce of the tree is not far from the average of 2 bushels, and, under some of the clusters, bearing 50 or more berries.

The *loquat* (*Eriobotnya Japonica*) resembles the medlar of England more than any other fruit, and has been introduced into hot-houses there. It belongs to the family Rassacea, and the subdivision of Pomacea, or apples,

pears, &c. The loquat ripens early in April, in this country, and is more hardy than the lichi or whampe: it is a more acid fruit than the apple, and serves for cooking rather than as a table fruit. Its size and flavor could both be increased, I have no doubt, by cultivation, and the fruit rendered a valuable addition to our list of early spring fruits, which are not numerous. The loquat grows as far north as Fuhchan, but does not produce as good fruit as in Canton.

You are well acquainted with the taste and qualities of these fruits, and are able to judge, too, whether they would repay the labor and expense of naturalising in our own country. I think they would all become favorite fruits, before many years, and, from a comparison of climate, soil, and position of the two countries, I should infer that the shores of the Gulf of Mexico would be as favorable to their development as those of the China Sea. None of them are properly tropical fruits, for even a fall of snow here, in 1835, (Feb. 7th,) did not injure the loquat trees then in flower, nor cut off the crop of the lichis.

The other trees mentioned are valuable for their timber or products. The camphor and cassia both belong to the Laurinæ, or laurel family—the same as the cinnamon, sassafras, alligator-pear, and red bay. The camphor-tree (*Laurus camphora*) grows in Formosa, and the adjacent provinces of Fuhhien and Kwang-tung, where it forms forests, furnishing wood for timber, and camphor-gum for exportation; the latter is obtained from the leaves, twigs, and rootlets, by distillation, and the former from the trunk. Some of the boards brought to Canton are 18 and 22 inches in diameter, indicating a tree of large size. The tree does not grow near Canton city, but occurs most abundantly on the hills in the departments farther from the coast, and living plants could be most easily obtained at Fuhchan and Amoy, where large quantities of the timber are sold.

The cassia (*Laurus cassia*) grows west of Canton, in the provinces of Kwángsí and Kweichau, whence all the cassia fistula exported from this port is obtained. The cassia is not used for timber, nor does it grow to the consideration of a tree, the object being to increase the twigs, and produce as much bark and oil as possible. The manner of obtaining the cassia would be to send a native to Kweilin, in Kwángsí, and let him bring numbers of the plant, in all stages.

The varnish-tree is less known than either of the preceding, but is quite as valuable. It is allied to the sumach and poison-oak of America, and grows about 25 feet high, and the cultivators trim the branches to increase the size of the trunk. The varnish-tree is found across the mountains in Kwángsí, up and down the valley of the river Kan, whence the inspissated juice is brought to Canton in small cakes, for the use of the lackered-ware manufacturers. It has a much wider range, however, than this valley, and is cultivated over most parts of Central China, and in Japan, furnishing the material from which the well-known lackered-ware is manufactured, by mixing it with lampblack, cinnabar, and other substances, to give it a color. There can hardly be a doubt that the varnish-tree would grow in the United States, as far north as Philadelphia; and our manufacturers would soon be able to produce lackered-ware rivaling that of the Chinese: the processes of this art can all be learned in Canton.

The tallow-tree (*Stillingia sebifera*) is cultivated to a great extent at Ningho, Chusan, and the eastern provinces, for the white tallow which surrounds the seed, which is used for and possesses most of the properties of beef-tallow, furnishing candles, cerate, plasters, &c., for housekeepers and doctors: it is not used for cooking so much as some other vegetable oils by the Chinese. Besides being serviceable for economical uses, the tallow-tree is one of the most beautiful shade-trees known in China, and, with a little care, can be made to take a symmetrical shape. The leaves resemble the aspen in shape and color; and even if the tallow should not be thought valuable for its own uses, the tree would form a valuable addition to the ornamental trees of our country. The tallow is produced in considerable quantities, for it is sold at a few cents per pound at Chusan; and, when mixed with wax, forms a good material for candles. Both the living plants and the seeds can be obtained at Ningho, and all the details of manufacture learned there. It is found about Canton, but is neither cultivated for its tallow nor its shade, as the heat here causes it to run to leaf.

There are many other vegetable productions to be obtained in this country, some of them of considerable use, in the arts. Among these may be mentioned, the *swan-chi*, or Chinese ebony, a tree whose wood furnishes a solid and excellent material for furniture, and is much employed in the carved work so skilfully done by the Chinese. It grows in the western provinces, and would require some trouble to procure available plants for exporting to another country. The *sheh-liáng*, a plant extensively grown in this part of China, for dying cottons and silk brown, is worthy of notice, as presenting a new sort of vegetable pigment; it not only dyes the cloth, but almost tans it, as it is very astringent. Many other pigments are known among the Chinese. The native indigo, cultivated in Cheh-kiang, being one of the most common, and probably inferior to the true indigo.

In respect to the best means of obtaining these plants, and forwarding them to America, I can hardly give any definite information. The three fruit-trees can be sent from this port and Amoy, but all the others must be sought elsewhere. The varnish and cassia trees can only be obtained by trusting their procurement to natives, whose time and travelling expenses must be risked in sending them to the districts where the plants grow, and something trusted to their knowledge of what is wanted. Margin, too, must be left for the expense of unsuccessful attempts, and the death of plants on the passage. The three fruit-trees have all been grown in English hot-houses, and, perhaps, specimens can be obtained there also. I should think the object worthy of an attempt; and, if a few hundred dollars would obtain it, the introduction of so many valuable plants would amply repay it. An appropriation of a thousand dollars, to be expended under the direction of the consuls, might be made, and the experiment attempted, if it comes within the duties of this Bureau of Agriculture to apply their funds to such objects. It would perhaps hardly repay the expense to send out a person for such an object, but the man who undertakes to collect them should be encouraged by the assurance of remuneration, if his attempts be successful. The cassia and camphor trees furnish valuable articles of commerce. The exportation of the gum, the bark, wood, and oil, obtained from them, amounting to fully $200,000 annually. The consumption of camphor-wood in China is enormous; and if it grew among the forests or preserves of our own country, would, I am sure, be equally prized: its bulk quite prevents its being carried to America as timber. The manufacture of cassia-oil would, I think, repay the expense of introducing the cassia-tree, and enlarge the consumption of an article of which the supply here is seldom equal to the demand, and

whose manufacture is attended with considerable trouble and expense from the immense amount of fuel required to distil it.

Attempts to enlarge the sources of national wealth, by the introduction of the productions of other countries, belong to a government, and unsuccessful attempts fall easily on a government, though disastrous to an individual. The attempts now making to introduce the cultivation and manufacture of tea into Carolina will certainly disappoint, for the tastes of our people are formed from the Chinese manufacture, and this has never been successfully imitated abroad; and besides, none could compete with the Chinese in the labor of preparing tea for market.

Such would not be the case with the trees I have recommended, for it is their natural fruit and produce which are wanted.

Commending the subject to your consideration, and hoping you will bring it to the favorable notice of the department at Washington, which is referred to above as about to be established,

I am, my dear sir, most respectfully yours,

S. WELLS WILLIAMS.

Oakland Farm, near Springfield, Clarke County, Ohio, November, 1849.

Dear Sir:—It is with much diffidence that I attempt to answer the queries contained in your circular; but so far as my experience goes, you shall have it freely.

Wheat is first in importance, and first on your circular. We have here 10 or 12 varieties, of which only 3 or 4 are under names known out of the neighborhood. That in most general favor, from its productiveness and early maturity, is the "Mediterranean." This has a large berry, with a thick dark bran, and weighs from 60 to 66 pounds to the bushel. It has improved in quality of late years, and, with care in grinding, makes a very fine quality of flour. The old *red-chaff bearded* is fast getting out of favor, from its failure within five years. Though never considered very productive, yet it withstood the fly, frost, and rust better than other varieties. The *Wabash* is a bald wheat, with a very thin white bran, stands up well in low and rich ground, but is not much raised, from its lateness in ripening, and not more than one crop in three is first-rate: weight from 56 to 60 pounds per bushel. A variety has lately been introduced from a neighboring county, under the name of *Shot wheat*, which, I suppose, is a local name, but denoting well its peculiar plump character. It ripens about the time of the Mediterranean; has a bearded and stiff straw, a fine, round, red berry, and will yield nearly equal to the above: the usual weight is 60 to 62 pounds. Other varieties are raised in different sections, where they are favorites. The only serious enemy the wheat crop has to contend with is the Hessian-fly; and that has not troubled us much for the past two years. The weevil has been very troublesome in some parts of the State; but I have not yet seen any signs of it here. The *rust* is its most serious disease, and is, indeed, a severe check to the cultivation of this grain. This year, from the estimates made, there will not be one-third the usual average crop in this State. In regard to change in character, I find a marked difference in quality when raised on different soils; and experienced millers say they can make from 1 to 2 pounds more flour per bushel, from wheat raised in uplands than from the same variety grown on black bottom soil. We consider the medium between the high and low lands, or what is termed here, "second bottom," the best soil for this crop. Not one acre in ten of wheat has any manure applied. A summer fallow, or corn ground after that crop is taken off, is the usual custom. But sometimes two or even three crops in succession are taken off the same land. The common mode is to put the manure on the fallow ground, and plough it in when the grain is sown. The straw is very little valued, and often burned in the field, and is seldom taken into account as food for stock. The average crop of this and the adjoining counties cannot exceed 14 bushels per acre; and this, I think, is about the average of the State.

Oats.—These are considered a secondary crop in this section. The varieties cultivated are the *common dwarf*, the *side oats*, and the *Tartarean*. The first is not so productive as the other two, but stands up best through our summer storms. The second is most productive, but grows tall, and is very liable to fall. The third is a new variety, introduced within a few years, and is liked so far as known, from its stiff straw and large-sized berry. The straw, from its softness, is used as food for stock. This grain is generally considered of about three-fourths the value of corn for feeding to stock, but is preferred to corn for horses. Standard weight, 33 pounds.

Rye.—There are two varieties in use, known as the *white* and *black* rye. It is principally sown on low, rich soil, which will not produce good wheat, and is quite a certain crop, yielding 20 to 25 bushels per acre. But, from the low price it bears, compared with wheat, it is not much raised. It is nearly all consumed in distilling; and but a small portion is ground for bread. Near towns, the straw is expected to pay the expense of threshing by hand.

Corn.—We have many varieties of this grain, mostly crosses between the gourd-seed and small flint. Our seasons are not long enough for the first, but a larger and later variety than the latter is preferred for this climate. We find by experiment, that this grain soon becomes acclimated; but, in so doing, it loses its peculiar characteristics, and becomes larger or smaller, as the case may be. With good cultivation, our medium lands will produce from 50 to 75 bushels; but the average of this county will not exceed 40 bushels. It is generally ripe enough to cut up on the 15th or 20th September. Our uplands produce the heaviest grain, but the bottoms yield larger stalks and ears. I have never tried any experiments to test the comparative value of the husk and blades; but have observed that sheep, if they have plenty of both, will often refuse the husk entirely; while cattle will eat the husk first, and then the blades. We find that ground corn well repays the extra expense; and the profit of cooking is illustrated every day at our distilleries, where, after the process of distilling, the refuse is found to be equal to the grain in a raw state.

Hay.—We generally consider clover best for cattle, and timothy for horses; but most of our hay is composed of these mixed. Clover is chiefly raised for pasture, or as a fertilizer, and timothy is only raised alone when intended for market. Herdsgrass and timothy is the common mixture for our natural meadows, where the first forms a solid turf, and eradicates the natural grasses. The average produce of pure timothy per acre, I should say, does not exceed 25 to 30 cwt.

Root crops.—Irish potatoes have always succeeded well here until within 2 or 3 years, since which time they have suffered much from the rot. The average yield in field culture does not much exceed 100 bushels per acre. The sweet potato requires a warmer soil and climate than we have here to succeed well. Turnips are rendered very uncertain by the fly, and warm, dry weather at the time of sowing. Beets, carrots, mangel-wurzel, and artichokes are raised to but a limited extent, as food for stock; and, from experience, I think their culture is not profitable, when labor is so high and other fodder so plenty.

Horses and Mules.—Of the number in the State, I have no data upon which to base an estimate. The average value of working-horses here is about $50, and of mules over 3 years old, $60 to $65. Very few of the latter are used, though they are undoubtedly cheaper than horses.

Cattle.—At 3 years old, if of common stock, their price ranges from $15 to $20 per head; if of improved blood, from $30 to $40. Our cattle are driven to the eastern part of Pennsylvania and New York. Six dollars per annum is the usual estimate of the cost of feeding stock from 1 to 3 years old. The Durhams seem to be the favorites, of which we have some very fine specimens, chiefly descended from the Sciota importations.

Sheep.—Wool-growing is quite an extensive branch of industry in this part of the State. Ninety thousand pounds of wool have been bought in our county town the present season; and the aggregate clip of the county is from 75,000 to 80,000 pounds. Nearly all our flocks show the crosses of the Merino and Saxony with the common sheep of the country. From 3 to 3¼ pounds is the average clip. The cost of keeping through the year is about 50 cents per head.

As my experience in farming has not been of many years' standing, it must be my apology for any errors that may exist in the above report. Such as it is, however, it is most respectfully submitted.

Yours truly,

J. MORRISON WARDER.

Hon. Thomas Ewbank,
Commissioner of Patents.

TRANSPLANTING FOREST-TREES.

Report of the Committee of the Rockingham Farmers' Club, "On Transplanting Forest Trees."—Submitted April 4th, 1849.

The kind of Trees.—Above all others, for the street, the elm is preferred. For beauty, gracefulness, *grandeur* even, it has no equal in New England. Besides, it is hardy, long-lived, easily procured, and free from the attacks of insects and disease.

The rock maple comes next—a beautiful and stately tree, though somewhat precise and rigid in its outline, and of much slower growth than the elm. It is hardy, bears transplanting well, affords an impenetrable shade, and, alternating in rows with the elm, by the wayside, or mingling in groups, where there is room for them, it affords a beautiful and desirable variety. Neither the red maple nor the white maple can be compared with the rock maple. They are smaller, shorter lived, less hardy, and altogether inferior to it in grace and beauty, and are recommended only where there is room for variety.

The white ash is a tree which seems not to be appreciated, and is one of our finest trees; and, for size, durability, and beauty, entitled to the third place in our list.

Then we have the bass, or American linden, not surpassed by any tree in the richness and beauty of its foliage. A tree not sufficiently hardy, perhaps, for the street, but "beautiful exceedingly" in a lawn or private grounds.

The beech is a tree deserving its classic fame, but too full of local attachments and home feelings to survive removal without great care—and the walnut is liable to the same objections.

Where space allows, as in public squares and lawns, avoid rows and circles, and mathematics in general, in tree-planting. Avoid sameness in kind, and size, and shape, and endeavor to imitate the cunning hand of Nature in tasteful irregularity of grouping.

Time of transplanting.—All deciduous forest-trees may be removed at any time after the fall of the leaf in autumn, and before the bursting of the buds in spring. If removed in the bright, warm days of spring, their roots should be carefully shaded from the sun, and, in fall and winter, they must not be exposed naked to severe cold.

Preparation for setting.—For trees upon the streets, dig the holes 6 feet in diameter and 18 inches deep, *before the trees are procured;* replace the subsoil with good soil, and procure enough more and deposit near, to fill up level with the earth, so as not to use the sand or gravel from the bottom; and have ready two pieces of joist or plank 4 inches wide, with proper strips of board for protection of the trees. Do all this at your leisure, before the trees are dug. It is the largest half of the whole operation, and should never be left to the hour when, returning late, weary, and heavy laden from your labor of procuring them, you will have neither time nor strength to perform it carefully and speedily, and when your poor trees, like so many fish out of water, are panting and suffering for a return to their native element.

Selection of Trees and digging up.—Procure trees from open land rather than from thick woods, if possible, and those of thick and low growth rather than tall and slender trees, and be sure they are young and growing. It is generally advised to take them from land similar to that where they are to be set; but this is not essential. Elms from swamps and bogs, transplanted on dry lands and pine plains, are now growing all about us in Exeter. It is of more importance to take them from such soil as will allow their removal with least injury to the roots, and, therefore not from land filled with stones or large roots.

Some writers insist that the trees be marked before removal, that they may be set in the same position as to the points of compass as before; and the *theory* is reasonable, though the practice, however it may promote their growth and comfort, is not essential to their life. They soon "get the hang" of their new position, if the theory is disregarded; while Sam Weller's reason for a father's whipping his boy, "It can't do any hurt, if it don't do any good," may be given in support of the practice.

Having selected a tree of about three inches in diameter, with a sharp spade, an axe, and a bog-hoe, dig a trench about two and a half feet from it, completely round it, deep enough to cut off every root; then dig under it till it is loosened, using no crowbar or lever to gall and split the roots, and carefully preserving all the small roots and fibres. Load the trees,

when dug, upon a long wagon, putting pine boughs under them to prevent rubbing, and cover the roots from the sun. About a dozen such will make a load for one horse, and three or four smart men can dig and get them home in half a day.

Trimming and setting out.—With a fine saw and a knife, cut off smoothly all the broken roots. *Next, cut away one-half, at least, of the top*, either by shortening the limbs, or cutting part of them away entirely, as the shape of the tree may require. We are aware that this is disputed territory, and take the responsibility of holding it. We suppose that the sap is supplied through the roots, that in hot, dry weather evaporation goes on rapidly from the leaves, and, if that evaporation exceeds the supply of sap, the leaves wither and the tree dies. But there are other reasons for lessening the top. The tree has grown in a sheltered position, protected from the rude "winds of heaven"—perchance in society, resting its long arms on the shoulders of its friends and kindred—supported in the loving embrace of its companions. It has had no discipline or preparation for the cold, and lonely, and trying exposure of a public position. But now you have cut away its old supporters—literally *root and branch.* With its full top exposed to the tempest, the small, newly-formed roots, which should attach it to its new position, are constantly broken off, and it cannot live. This is the cause of the failure of many attempts at transplanting. Plant the tree no deeper than it grew before. Nature, which has attended to growing trees some six thousand years, understands well how they should be set, and cannot be improved upon. Drive your stakes before the roots are covered, that you may not injure them. Then, having carefully placed the roots in their natural position, fill up with finely pulverized soil, and see that no space is left beneath them. When the roots are fully covered, place about half a bundle of straw, or as much hay over the whole surface of the hole, and cover it with soil, leaving in spring a little hollow about the tree. If you plant in the fall, make a little heap of earth about the tree to turn off the water, and remove it the next spring. The straw will prevent the evaporation of the moisture about the roots and keep the soil around the tree light for several years: it tends to prevent the growth of weeds and grass, and admits the free passage of rain, or water artificially applied. Do not omit this precaution; it is almost essential on sandy land.

Care after planting.—If you plant trees in a public street, do not consider the work complete until they are protected from animals, as well as from motion by the winds, by securing them with stakes, as before suggested. A strip of board on each of the two sides of a tree, or a strip of leather put round it and attached by a wire to each stake, will protect it sufficiently against the racking of the winds, and against roving cattle, which take delight to find a new tree to rub against. But we may still utter the prayer, "Save us from our *friends*," for many of them seem to think that trees are principally useful as a means of *securing horses.* Trees then, near your dwellings, should be boxed up about seven feet high, if you do not intend to lose both your friend and your tree. He will tie his horse to your tree, and the horse, of course, will amuse himself with gnawing the bark. You will be exceeding vexed, and possibly rude, and will be *consoled* by the assurance that he never knew his horse to do so before; and you will part, your friend grieved at the accident, and you wishing him and his horse at the end of their journey.

If a drought comes in midsummer, such as those forgetful people, the "oldest inhabitants," do not recollect to have seen—and such seasons are nothing unusual—if then, once a week, you give the trees a copious watering, it will be an act of generosity which they will not forget; but, if planted according to the foregoing directions, in ordinary situations, nineteen of every twenty of them will live with only the water from the clouds to moisten them. We believe it to be not only unnecessary, but a positive injury to trees to water them daily.

Transplanting Evergreens.—There are no trees more beautiful than the hemlock, the white pine, the spruce and the fir-trees of our own hill-sides, and yet comparatively few of them are seen about our dwellings. The reason is to be found, partly in the want of a just appreciation of what is so common, and partly in the idea that this class of trees cannot be successfully transplanted. This idea is entirely erroneous. In the month of April, 1847, 140 white pine trees from 5 to 8 feet high were transplanted in Exeter, only one of which has died in consequence of the removal.

In the moist climate of England, the summer is said to be the best season for transplanting evergreens; but a variety of experiments have satisfied us, beyond doubt, that this is not the case here. The method to be pursued is this:—Select trees on the open plain, and, with a spade, cut down around them, leaving a circle of turf, two feet or more in diameter, about each tree—and then lift the tree and set it upright in the wagon, with the ball of earth unbroken.

At the place of planting, a hole is to be made, corresponding with the ball of earth, the soil at the bottom made light, and the tree set in, and with a little earth thrown on and pressed down, and the work is done.

Care must be taken to load the roots with stones, or by driving a short stake by each tree, and confining it, that the wind does not upset it. Evergreens should not be much pruned.

Their foliage is covered with a gummy substance, so that evaporation does not go on so rapidly from them as from deciduous trees, and they do not rapidly recover their beauty of form, if mutilated.

Evergreens should be planted in groups, both for beauty and that they may be partially shaded and sheltered. Plant the evergreens of our own forest. In no way can bare walks be so readily screened or the stark and blank landscape so beautifully variegated and adorned, as by setting, here and there, little *vases* of the white pine and hemlock.

Transplanting in winter with balls of earth.—The best of all methods of moving trees of any kind is that suggested in the above title. The process may be described in a few words:—Late in autumn, dig a trench completely round the tree, at a distance proportioned to its size, cutting off all the roots, and digging under the tree, but not so as to loosen it: then dig away the earth on one side of the hole, so that a shed, or drag, may be backed down under it: place some straw or leaves in the bottom of the trench, or cover it with boards, that the bottom may not freeze too hard. Leave it until the ball of earth is frozen hard, and, when there is a little snow, remove it. It will, of course, be necessary either to dig the hole for receiving it, before the ground is frozen, or to cover the place intended for it with straw, that the hole may be made in winter. In the former case, a few loads of soil, with which to fill up, may kept in a barn-cellar, or otherwise protected from frost. Great care should be taken to fill compactly every crevice about the ball in setting, and it is well to confine the tree to an upright position, by braces from the ground against its lower limbs, or by other

means, that it may not lean when the frost comes out of the ground in spring. By this process, we have known elm-trees of 12 and 18 inches in diameter, and hemlocks 25 feet in height, removed with perfect success.

Indeed, if the work is done with skill and care, the tree, on *awaking* in spring, will scarcely know that it has changed its place, and will soon become entirely reconciled to its new position. In this mode, little pruning is necessary, and most of the top may be saved, as the greater part of the roots may be preserved.

The weight of an elm-tree a foot in diameter, with a ball of earth 6 feet across and 18 inches in thickness, would be, probably, 5 or 6 tons; and, in order to execute the work properly, a set of ropes and pulleys would be found convenient. Trees of 6 inches in diameter may be readily moved with a yoke of oxen and the implements commonly at hand.

In conclusion, we would say to all, *plant trees;* let every *young* man plant trees, that he may have something ever near to bring back pleasing recollections of his youth—something, when he is an old man, that will seem of his own age, and sympathise with him, and look on him with a familiar face, that he may not feel quite alone among a new generation. Let the *old* man plant trees. They will, perhaps, be beautiful in his own time, and entice him to remain longer where there is still something left to interest him, and where he may still be useful; and, at least, they will keep alive in the minds of men the memory of one who lived not for himself alone.

For the Committee,

H. F. FRENCH, *Chairman.*

Exeter, N. H., April 4th, 1849.

Talladega County, Talladega P. O., Ala., December, 1850.

Sir:—Having received your circular, I feel disposed to respond, although a small and inconsiderable farmer. The information sought after is of so great importance to the agricultural interests of our common country, that I feel regret that my means of imparting information on the subjects of inquiry presented in the circular are so exceedingly limited, being restricted to the narrow limits of Talladega county, in which few of the subjects of inquiry are cultivated, and even those with more labor than skill; for, as yet, the Talladegians have not turned their attention to scientific agriculture.

The county of Talladega, in this State, (Alabama,) possesses as many advantages as any part of the country I have seen. The valley is chocolate-colored soil, of limestone and stiff clay foundation, and, therefore, well adapted to the cultivation of wheat, oats, Indian corn, tobacco; and the red valley lands of Talladega county resemble, in every point, the red lands of Morocco, in Africa; the climate is precisely the same. John Gray Jackson, who resided at Mogadore, as consul-general, for 12 years, says "that a crop of wheat would feed the entire people for seven years. But the government of Morocco does not admit exportation, except as a special favor, and thousands of acres are left unreaped on the fields." Were it not for that great Southern staple, cotton, (the pest of the age,) Talladega county can compete with any grain-growing part of the United States. When the price of cotton is a little enhanced in value in market, all improvements are dropped, and the whole people rush into the cultivation of that article. No attention is paid to manure.

Bordering on our valleys, we have pine land resembling the pine lands of Georgia and Carolina, affording valuable timber, and the best kind of land for grazing; and when we consult the histories of the pine-clad hills of Sweden and Norway, that have done more for those countries than the rich lands bordering on the Danube and the Vistula, we are compelled to consider them the most valuable land we have. These fine hills abound in iron ore; copper veins have been discovered; gold, marble, and lead are found on those hill lands of pine and oak. With all these advantages around us, we will direct your attention to our agriculture.

We have an agricultural society, called the Talladega Agricultural and Mechanical Association, that has existed some five years. The late Colonel Taul was president at the time of his death, last June. The duties of secretary devolve on myself. This society awakened the attention of the people for some time, and a spirit of improvement was aroused among farmers generally. Very flattering reports of the productiveness of our county were handed in and read.

We have a great variety of wheat; the most successful is called the Orleans wheat. It may be sown as late as December, and succeed well. The usual time of sowing is from the 20th October to 20th of November. This variety of wheat may be sown so late that it escapes the ravages of the fly, and it comes on and ripens so early, it generally escapes the rust, while other varieties are more or less injured by both. The best manner of preparing land for a wheat crop, if upon stalk land, is to break the land deep, subsoil it, level the surface, by drawing a harrow or large brush over it; then seed down the land, I would say, from 1 to 2 bushels per acre, according to the strength of the land, and plough it in deep with a very small plough. In March, upon pine-hill land, 20 bushels of lime per acre should be spread on the field; and, in the last of April or middle of May, about 50 bushels of charcoal per acre will secure the crop against rust, and increase the product of the wheat crop. Wheat cultivated in this way is always secured against the grub, wireworm, and fly, as well as the rust; and the thinnest land will average 25 bushels per acre, where its usual product is not more than an average of from 8 to 10. The quantity of wheat per acre will diminish if sown, and continued to be sown, upon old lands, in the usual way. The price of wheat in Talladega is $1.50 per bushel. As a rotation crop, wheat succeeds better after cotton than any other crop.

We have a great many varieties of corn, some highly spoken of; other varieties preferred by different people, according to fancy. The yellow-flint stands, in my estimation, the highest, though not approved of, for its color, by others. It grows off freely, ripens earlier, stands drought better in our Southern country than any variety I know, and yields more on the field, from the fact that it can be planted much closer than other varieties. I have made an experiment by blending the yellow flint with the red-blaze variety, and I have succeeded beyond my expectation—a sample of which I will forward to the office. The *rationale* of the experiment is this: the yellow flint was considered too small, although it possessed more oil and saccharine juices than the other varieties, that contain so much starch and gluten, with woody fibre, and are affected severely by drought, grow late, and exhaust the soil considerably more than the yellow flint. Now, blend the varieties, and you have the very corn desired; one that grows well upon thin land,

may be planted very thick in the row, bears drought, matures early, possesses more saccharine matter than the other varieties, and makes a larger corn than the yellow flint, possessing all its desirable qualities. The manner of cultivation is, simply to subsoil the field well in breaking; lay off the rows 4 feet wide, and subsoil the furrow for planting, by running a deep furrow in the bottom of the one intended for planting; give 2 feet between the stalks in the row, and cover lightly, not more than an inch deep. I prefer the drill planting to hill planting; it is the most convenient way, and easier cultivated, with a considerably greater production from the same field, as well as a less exhausting manner of cultivation. When the corn is up, just take a side-harrow, or cultivator, and run by the side of the plants, filling nearly up the furrow made in planting. Two harrowings and one ploughing are sufficient to insure 80 bushels of this variety of corn to an acre, on even tolerable land, with a favorable season. No hilling or hoeing is necessary, if the harrowing and ploughing have been done properly.

The best method of feeding corn to stock is by grinding and cooking. Hogs particularly will fatten on half the corn ground and cooked, that they would require fed to them whole; that experiment has and will succeed in every country, and has been long established by even common sense. The manure formed by feeding 20 bushels of corn to hogs, carefully saved and skilfully applied, will make 40 bushels of corn to the acre, where 25 would grow before.

My experience about rye, peas, and beans is that they are fertilizers or renovating crops; they, however, are not attended to in Talladega. No crop equals the pea crop as a renovator; it takes its own nourishment from the atmosphere principally, while its vine protects the land from the exhaustion of exposure to the sun.

Cotton, our great staple, has experienced a great falling off this year, owing to the unfavorable season. The average yield of cotton is 1000 lbs. of seed-cotton to an acre; though the valley will yield considerably more to the acre. The chocolate lands produce cotton finely. The cost per pound is something like 3 cents. All crops do well in rotation after cotton; various experiments have been tried to prevent the rust, army and boll-worm; but none have given general satisfaction, so as to command confidence. The most approved method of cultivating cotton is to plough deep, subsoil the whole field, and then ridge, plant shallow, and cultivate lightly. Cotton land can be improved without resting, by manuring deep, subsoiling, and imbedding the stalks, limbs, &c. in a deep furrow, or subsoil in the middle of the old rows, make the new ridges on the subsoiled furrow, containing the old stalks and limbs, with a little scrapings from the barn-yard and lots, or even scraped up in the woods, where leaves and litter are rotting, will not only keep a cotton field up, but will enrich it every year, though constantly cultivated. Cotton-seed is a great fertilizer, equal to any thing known, when properly applied to either wheat, oats, or corn: it makes splendid food for sheep, cows, and hogs, if boiled with meal.

Rice I have tried upon stiff red-clay upland, and I found the production to surpass my expectation. My experiment was on a small scale, but sufficient to show me what could be done by the cultivation of rice upon upland. I planted a piece of ground in rice, 60 feet by 20, that produced 12 bushels of rice without any extra cultivation, beyond drawing a furrow, and dropping the seed, and keeping down the weeds. Rice is one of the most productive grains in all the Southern country, and will be cultivated to considerable extent, if a market can be found for it, or if cotton should cease to be a staple. Clover and herdsgrass are beginning to receive attention in this county, and promise to do well; nearly as much so as what is grown in more northern latitudes. Thus, you see, that seeds and plants meet in Talladega county, as extremes of latitude from north to south, and flourish side by side. I have seen an account of a clover-seed in the Patent Office, from Brazil, I think, that was furnished by our consul, residing at Valparaiso, termed southern clover, which succeeds well in Florida with Governor Brown. If any remains in the office, please forward the seed to me for the benefit of our Agricultural and Mechanical Association.

Yours, respectfully,

J. A. BROWN.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Williamsport, Warren County, Indiana.

Sir:—A reply to the Agricultural Circular received by the subscriber, may very properly be commenced with some mention of the season, of the products of which it asks information. The winter, which, for six weeks in January and February, had been unusually mild, resumed its accustomed severity in the latter half of the latter month, and continued without abatement till the middle of April. Pasture to sustain cattle did not occur till the 1st of May. The planting of corn was unusually delayed, owing to the backwardness of the season. Much corn never came up, and the stand generally, in this section, was very poor. Then succeeded a period of drought, stunting the meadows, and dwarfing the corn, varied by but a single shower, sufficient to wet the ground to the depth of 4 inches, until about the 4th of July; from that period till the latter part of the fall, the rains were more seasonable, but never such as to swell the streams, or replenish the wells. Our river (the Wabash) was never lower within the memory of the residents of this section. While the heat of summer was uniform, and continued, it was never extreme.

Wheat thrived and yielded well; oats were a short crop.

The settlement of this county cannot be said to have commenced till 1827. Its agriculture, so far, may be characterized as diffuse, improvident, and exhausting. It is only within a very few years that the necessity of a more economical mode of farming has at all been felt. Within the last three years, clover has been used to manure, and as a preparation for wheat, by a few persons. Tradition says that, in the early settlement of the country, no difficulty was felt in raising wheat, either in timber barrens (oak openings) or prairie, the crop being certain, and the yield large: now, raising wheat on the prairie is more uncertain than the yield of a lottery ticket, or the result of an election bet.

The varieties of wheat most in use in this county are the Columbian or Mediterranean, the golden chaff, the China, which is a yellow chaff and heavily bearded, and the bearded red-chaff. The popular names by which they are known in the neighborhood are given, the subscriber and his informants being alike ignorant of their botanical appellatives. The first is the favorite variety, being earlier to the harvest by a week; both it and the golden chaff have less blade and fur, and are believed to be less liable to

rust for that reason. Wheat is sowed, in this region, from the last of August till the middle of October, with no preparation beyond a ploughing from 2½ to 3 inches deep. Much wheat is put in on corn ground with a shovel-plough, the corn being afterwards cut up and shocked. Harvest-time seldom extends beyond a week, and varies from the last week in June to the first week in July, according to the season. Wheat yields as low as 10 and high as 25 bushels, and may be said to average at 12 bushels per acre. It is sown in amount from a bushel to a bushel and a peck to the acre, though an additional bushel of seed not unfrequently adds 5 or 6 bushels to the yield. The product per acre falls much short of the earlier returns, but has advanced on that of more recent culture. It succeeds best on fallow or sod. No remedy for the fly is known or attempted. Weevil is not here. Those among us who know it in Ohio, believe that wheat is best secured against its depredations by threshing, and putting up in the chaff. The average price hereabout may be stated at 65 cents.

The undersigned once believed the gourd-seed corn to be the preferred variety; but further inquiry has shaken that opinion, without establishing any other as a preference. With some, the smooth white is most esteemed. It has a stiffer stalk, and is less liable to break in high winds than other varieties—a quality not without value in a prairie country. The yellow corn, being some 3 cents above white in the market, being as easily raised, yielding better in the opinion of some, on account of its smaller cob, and being easier husked, because a smooth grain, than the white, will always enlist the preference of some; and, of that kind, a long variety, with no special designation, but having an ear from 10 to 13 inches in length, is much affected by some who have strong land. It has a large cob, which makes it measure well in the wagon or barrel, and would be much more cultivated for sale, were it not that, taking the entire season to make itself, it is liable to be nipped by early frosts. Forty bushels of corn are claimed here to be the average product per acre, and it is, perhaps, not far from the truth. A hand, at $12 per month, for 3 months, in cultivating, and 2 in gathering a crop; a team worth $120, which will pay its expenses during the balance of the year, and is therefore only chargeable with half the interest on cost and half the annual depreciation, amounting together to $10; implements, the wear and tear of which will not exceed $10 per annum; and the board of a hand for 22 weeks at $1.50 per week,—form the elements for estimating the cost of cultivating 20 acres, which will yield 800 bushels, worth, at market, 30 cents per bushel, chargeable, of course, with the expense of marketing, and to be credited with the value of the stalks, or fifty cents per acre.

A shallow plant, in close rows, say 3 feet apart, which lays the grain liable to the germinating influence of slighter showers, and shades the ground at an earlier period of the season; a harrowing as soon as the corn is up; a ploughing and cross-ploughing, first with one and next with two furrows in the row, making in all four ploughings with the shovel-plough,—is the course pursued by the best corn-raisers. There is no point in the culture of corn about which men are more generally agreed, in this section, than the propriety of constantly stirring the ground in dry seasons. It was abundantly demonstrated in the past summer. On the 4th of July, corn, on an average, was only knee high, owing to the drought described in the early part of this communication. But, though stunted, it was, owing to the constant stirring of the ground, free from weeds and of a good color. That week there fell a plentiful shower, and the corn, which had grown below while unable to grow above ground, sprang up as if by magic, and, in a week's time, a man and team could not be seen while tending it.

Corn, hereabouts, is only fed whole. When fed to cattle, followed by hogs, this course is far less wasteful than it would seem, the hogs consuming the corn which passes undigested through the cattle. When this is done, it is customary to have two enclosures, in which the cattle are fed alternately—the hogs occupying that which the cattle had been fed in on the previous day. This, however, is said by some to be unnecessary, as the hogs, after the first few days, give preference to the swollen and partially digested grain that has passed through the system of the cattle.

There are four varieties of oats cultivated hereabouts:—the black, the white, the barley, and the side oats, each of which has its advocates. The average products are 35 bushels per acre. It is less exhausting to ground than corn, and, if followed by the latter, the crop of corn will be better than that which preceded it, other things being equal.

The average yield of hay is believed to be 1¼ ton to the acre: timothy, clover, and herds-grass are all used in laying down meadows: the cost of hay per ton is from 60 cents to $1.08 per acre, not reckoning the cost of land.

A good calf costs $4 at weaning, the expense of rearing which may be averaged at $3 per year, till 3 years old, when, at an average, a steer will be worth $16.

Wool-growing is not profitable in our section: the number of lambs saved is not over one-half.

As to hogs, a cross of the China and Russia hog is believed by some to be the best, having sufficient size, and a kindly tendency to fat. Twenty-five bushels of corn will make a hog weighing 220 pounds, with range of field and woods.

Owing to the circular being mislaid after the information was collected, this communication is delayed till this time. A more prompt attention will be given to it another time, if it is deemed desirable.

Very respectfully yours, &c.,

C. R. BOYER.

THOMAS EWBANK, Esq.
Commissioner of Patents.

Palmyra, Wayne County, N. Y.

Sir:—In compliance with your circular of August last, I will cheerfully contribute my mite. I am a mechanic, a tailor by trade, and continually occupied: therefore, but little need be expected; but, so far as I have farmed it, I have been a close observer of results. In the fall of 1836, I purchased 16 acres of meadow and pasture land, situated half a mile out of our village, north of and adjoining the Erie Canal, which leaches more or less and wets the land on the surface some considerable distance. The soil, black mould and clay bottom on the low land, and gravelly loam and clay bottom on the high land: the land was in a bad state, cold and wet, stony and full of scrub-bushes, elders, &c., and very uneven surface. I paid $35 an acre for it: there was not a rod of good fence on it. I commenced work in the spring of 1837, and have made more or less improvements every year since, until it has become like a house-floor on the surface, and has averaged two and a half tons per acre of good timothy and clover hay yearly, for the last ten years. I divided the land in three lots the first season, and made all my outside fences with swamp-oak posts and hemlock boards, costing $1 a rod; the best and cheapest fence that a farmer can make in this section of the country: swamp-oak posts will last from 20 to 30 years, if sawed from live timber; the same with hemlock boards. I have paid out in improvements, during the time, say $65 an acre, all told, in *fencing, grubbing, taking out stone and making blind ditches with them, seeding, &c. &c.*, making a cost of $100 an acre, exclusive of all manuring. As I said above, it has averaged two and a half tons of hay an acre, of the best quality, at an average price of $5.50 a ton, delivered in this village, from the meadow, when cut, or $2 for fall feed, at 37½ cents a week for horned cattle, making an income of $15.75 an acre. I have, until the last two years, hired it cut and delivered for $3 an acre; but I find I can please myself and customers better to hire it done by the day, at a cost of $4 or more, superintending it myself. The usual price of labor is $1 a day of ten hours, for a man and board himself, and $2 for a man with horses and wagon, excepting in haying and harvest, when they work more hours and higher wages, 25 per cent. or more. The land now clears me about 12 per cent. on $100 an acre. *I have uniformly kept Dr. and Cr., and charged $1 a day for my own services, and interest on the investment,* striking a balance on the first of January in every year, and *adding one year's interest on the balance until it has ceased to be a debt.* On the first day of January, 1850, fourteen years after my purchase, there was a surplus of $40, giving me 7 per cent. interest on all costs and charges from beginning. *The land and $40 in cash as costing nothing.* This land has been brought to its present state by many blind ditches leading into a large open ditch running through the field. The blind ditches are laid with common stone, of the smaller size, taken out of the land, laid so as to leave a narrow trench from 4 to 6 or 8 inches, capped with suitable stones, and well chinked in with the smallest stones and covered with straw, and the earth round up over it, and seeded. The wettest part of it, next the canal, has been well covered with chips and dirt from wood-yards and leached ashes at the rate of fifty good wagon-loads on an acre. Twice during the time, (fourteen years,) I have covered the whole with a good dressing of horse-manure, put on mostly in September, at the rate of fifty large wagon-loads on an acre, at an average cost of 50 cents a load when spread. Good stable-manure, from horses fed mostly with grain, is decidedly the best; and I prefer to put it on as soon after the hay is cut as I can, thereby keeping the ground moist, so the roots will not dry out during the hot season, and keeping them warm and in a growing state through the winter. It does well to put on coarse manure in swales and low places, in the spring, if it can be done without cutting up the land too much in getting it on the spot wanting it.

From all this, I learn that quite wet, cold land can be made dry by blind ditching, the sourness taken out with leached ashes, and made warm with dirt and horse-manure, making an abundant crop of good timothy and clover hay, where naught but short, sour grasses and noxious plants grew before. I seed with timothy only, sowing twelve quarts on an acre: clover comes in of itself, more or less, in a few years after seeding. The poorest acre there was of this land next to the canal, now rolls out a windrow of a swath, mostly clover: it has never been ploughed. I have sowed timothy, and dragged it in and covered it at the same time with horse-manure: this is the land that had the chips and ashes on it, as well as manure. It pays well to cover all newly seeded land with a light dressing of horse-manure the first fall after seeding: it takes much better. Red-top hay is good for horned cattle, and does better than timothy on all low, moist land, or that which is often wet through swales, &c.; but timothy is most decidedly best for horses.

One word in regard to the manner of securing a crop of grass or making hay. Timothy should not be cut until it will shell a little by the process of making it hay. All that is mowed in the forenoon, *in case the sun shines*, should be spread before going to dinner—the thickest of it turned over by all hands immediately after dinner. Then, let some rake round the field with a hand-rake, and pitch it in from the fences, and others mow: from 2 to 3 o'clock, P. M., put the horse-rake in motion, and men enough to cock it up after them. Hay makes in that way better than in any other that I have tried. Put up in the hot sun, in moderate sized cocks: the next day, as soon as the dew is off, it is fit to deliver. In pitching it on and off, it dries out the sweat and makes a perfect cure. This cannot be done, however, if cut too green, neither will clover or red-top cure in this manner sufficiently, without opening the cocks to the sun before delivering. I have 3¼ acres of similar land, that I have managed in a manner similar to the former: for the past three years, I have more than doubled the crop of hay and improved the quality: this year, I delivered 12 tons 98lbs. of hay from it; that is, nearly 4 tons an acre: it was well cured. I find, by several experiments in weighing hay newly made, and weighing it over in the fall or winter, that it does not shrink or fall short in weight over 8 or 10 per cent., if properly cured. It is far more profitable to put land in a high state of cultivation and keep it so, than to work it in a cheap and slovenly manner, getting but half a crop, and that of a poor quality.

I have three acres of corn ground, joining this last piece of meadow, clay and sandy or gravelly loam: it had been pastured many years. I had it broken up in the month of November, in 1846; it froze hard in a few days after: that killed the wireworm, which so often spoils a field of corn the first and, sometimes, the second season. After breaking up, it was planted on shares two years: the soil rich and mellow. They raised less than 100 bushels of ears on an acre. I took it in hand myself, put on 150 wagon-loads of manure in the spring of 1849; spread it evenly over the whole field; ploughed it once; marked it with a horse, and a piece of scantling with four pins in it, at a suitable distance for the rows apart; planted on the surface, all but half an acre of swale that was soaked from the canal, which I ridged up while wet, and planted on top as soon as sufficiently dry. That gave me the best corn on the field, where none of consequence had grown before: my rows were 40 inches apart, running east and west, and the hills only 20 inches in the row. The philosophy of that is, that it takes the morning and evening sun more, and, at noonday, less. I pulled out at second hoeing all but two stalks: it grew tall and rank, and stood the drought of that season much better than any other corn about: it did not ripen as well as thinner pieces. I planted the 12-rowed Dutton: had 125 bushels of ears an acre; but few pieces went over 100. The labor of planting and hoeing in this close manner is more than the gain. I planted it again this season, selecting the best ears of last year's crop; broke off the small ends before shelling; ploughed once, and planted the 4th of June; rows 3½ feet each way: it ripened well, and gave me 144 bushels of ears to an acre, although planted two weeks later than my neighbors, pulled out to four stalks at second hoeing: had 21 loads of pumpkins each year, at $1 each, and 25 cents a bushel for corn in the ear delivered.

Respectfully,

BURR BUTLER.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Hunter, Green County, N. Y., December 20*th*, 1850.

Sir:—I owe you an apology for my delay in reporting my potato crop, which escaped in a good measure the rot, while my neighbors lost nearly their whole planting. I wished to see how they would keep in the cellar, before communicating further with you. I planted the most of my seed on sandy bottom land, oat stubble, dressed before ploughing with a good coat of fresh stable-manure, early in May. They were hoed twice, and, after each hoeing, I had a boy, 12 years old, pass along the rows, and scatter a handful of plaster over the stalks. The hoeing was easy, and my laborers covered the hills too deep, as I thought. This piece ripened in September; the yield was light, and about 30 per cent. of them were more or less affected by the dry rot, generally lightly, next the skin. The other was a small piece, planted on upland, naturally wet in the spring, which had been turned from the sod in 1849, and had a dressing of manure as above, and planted with potatoes. We had no rot in 1849. It was late before I could plant this piece, and having used all my manure on the other, I was unable to prepare a new field; so I ventured a second crop, contrary to my usual practice. It was hoed but once, and lightly covered. It was plastered like the other, ripened in October, and yielded a good average crop. From 3 to 5 per cent. only were affected by the rot. My neighbors, who did not use plaster, have, without exception, so far as I have heard, lost from 50 to 90 per cent. of their crops. My Irish laborers used no plaster on their patches, upon which they depended for their winter's supply, and scarcely got their seed. I feel warranted, therefore, to attribute my success to the use of plaster, (the common ground Nova Scotia,) and recommend a handful being cast upon the seed before covering, and another on the vines after hoeing. I am also confident that late planting is better than early, for winter supplies. Experience has taught me, that in all lands not subject to early frost, the growth, after the drought of harvest, is far greater in size and number than when the vines mature at or before that period. In the late planting, the tubers grow until the vines are killed by the frost. I am equally certain, that upland is better than lowland, for this esculent. I prefer a slope, where the water will not remain long on the surface. I feel well assured, that potatoes may be raised on such lands, far to the South, if planted in July or August; (I have known fair crops to be raised here, from planting the 4th of July;) and wherever public improvements are in progress, planters there will find it greatly to their interest to cultivate them. I passed rapidly through the State of Virginia, from Guyandotte to Charlotte, about the first of September, and rarely saw a potato on the table; and when I did, they were very small. In the few fields which I saw between Stanton and the Blue Ridge, the stalks looked dry and dead. And I saw a farmer selling potatoes to the Irish laborers at the tunnel, so small as would be certainly rejected at the North. I saw one small field, on Paint Creek, which had been late planted, and never hoed: the vines were green and rank as the weeds which wellnigh smothered them. I urged the owner to attend to them, as a substitute for his short corn crop; but his hands were all boat-building, and I doubt if any thing came of it. I hope some public-spirited men will be found, who will try late planting next season south of the Potomac, and give you the result.

I am yours, respectfully,

WM. W. EDWARDS.

REMARKS.—Our correspondent should know that nothing is more common at the South than to plant Irish potatoes every month, from August to April: even north of the Potomac, in Maryland, they were grown out in the open air, in the winter of 1849 and 1850, and ready to dig, for cooking, in March and April. They need *cool weather*, and not only plaster, but wood-ashes, and either leaf, straw, or sod mould to feed the plants. Give potatoes the right temperature and moisture, and proper food, and they will do well, provided the seed is sound.—ED.

Scottsville P. O., Town of Wheatland, Monroe County, N. Y.
December 30*th*, 1850.

Sir:—In consequence of sickness for the last month, I have found it impracticable to answer your circular at an earlier period; consequently, the time employed on it has been so limited, that I find it so imperfect, and of so little interest, I very much doubt the propriety of troubling you with it. Although I have farmed it in this town for the last 30 years, I have never found time or inclination to go into minute calculation or investigation as to the exact cost or profit of particular modes of cultivation, and still less to experiment on different processes of fattening animals, or the exact result of such processes. My remarks will, therefore, be principally limited to a general view of the method of farming, as it actually exists in this vicinity. I also find that I have extended my remarks to too many subjects, and have, consequently, not been sufficiently particular about any to make them useful; but, such as they are, they are placed at your disposal.

The town of Wheatland is located on the Genesee River, 12 miles south of Rochester, where the Onondaga salt group of rocks crosses the river, and contains several plaster-beds; and it has been found from experience that the cultivation of wheat, clover, and corn are most suitable and profitable, and to them the attention of farmers is principally directed. Although oats, barley, peas, and root crops are necessarily cultivated to a limited extent, for home consumption, they are never depended on for market or exportation to any considerable amount. Their cultivation may be considered incidental, and limited to particular pieces of land, that happen, from the nature of the soil and previous cultivation, to be particularly adapted to an occasional crop. The land in this town consists almost wholly of what is called oak-openings, and was originally considered poor and barren, which, in fact, was the case, until the use of clover and plaster was resorted to, and which took place from 1815 to 1820, at which time the capability and fertility of the soil were fully developed, and the crops of clover, wheat, and corn were not unfrequently doubled, furnishing food for sheep and

cattle, which also increased in the same proportion, and the means of improving and renovating the soil both by pasturage and barnyard manure.

Manure.—In 1815, the price of lands, partially improved or cleared, was from $10 to $20; from that time until the present, the price has gradually advanced, selling at this time at from $50 to $70, as to quality and improvements. When the plaster first came into use, the soil was wonderfully sensitive to its effects, and the results on the clover fields truly astonishing. Such strips as happened to be missed in sowing were so small and dwarfish that they could not be mowed with the scythe; in fact, the same strips were almost equally perceptible in the succeeding wheat or corn crop. The effect did not appear to depend so much on the quantity used as upon the evenness of sowing; and when 100 pounds could be spread even, it seemed to have the same effect as double the amount; indeed, any given amount exceeding 150 pounds did not appear to improve the crops in the least.

From 1820 to 1825, the crops arrived at their maximum, and from that period to 1840 the average product did not appear to vary much, although, towards the close of that period, the average began to diminish sensibly, and the plaster to lose its effects. The land generally, and especially that portion of it well adapted to the cultivation of wheat, being summer fallowed and sown every other year, and although the clover crop was frequently ploughed in the rotation, proved too exhausting, there being little other manure used. The land appeared to tire of this continued drill of the same crops.

Since 1840, many of the farmers have adopted the three year rotation, pasturing the land the year succeeding the wheat crop, and either summer fallowing the second year, or manuring the sward in the spring, and planting with corn, which is cut up about the middle of September, and sowed with wheat, seeded to clover the next spring, to go through the same rotation. Where the three year system has been adopted for any length of time, the crops improve, and the average product increases gradually to about the old standard. I would not be understood that the above changes were confined to the mentioned dates, or that the above results would correspond to the experience of every farmer. The lands being brought successively into cultivation, and the use of clover and pasture commenced at different periods, the crops of one farmer might be increasing, while those of his neighbor might be diminishing, all depending upon the period at which the process, as described, commenced. But it is believed that the land went through something like the above process, in periods corresponding to the above dates.

The average yield of wheat, per acre, at different periods, is supposed to be about as follows:—Being in 1815, 15 bushels; in 1820, 20 bushels; from 1820 to 1830, 25 bushels, and, under favorable circumstances, as high as 35 and 40 bushels, per acre, which last was by no means uncommon. At this time, I suppose the average product to be about 22½ bushels.

The red-chaff bald, with white berry, was the variety universally used originally, and succeeded well while the land was new and fresh: it was, however, particularly obnoxious to the Hessian-fly, whenever they abounded; but as the ground became stiff and old, it gradually began to be liable to rust and winter-kill, until, from 1825 to 1830, it became quite uncertain, and was succeeded by the white flint, which proved a much hardier variety, and less liable to injury from the fly, from the peculiar solidity and hardness of the straw, and was less liable to rust. Several other varieties were introduced, and cultivated to some extent, the most prominent of which were the Hutchinson, a bearded wheat, and the Indiana white, beardless: both did better than the original bald, but could not compete with the white flint. Within the last six years, the Soules wheat, a white variety, has been cultivated to some extent, and, when the tillage is good, and the land in good heart, it not unfrequently outyields the flint from 5 to 10 bushels per acre. In many localities it is fast coming into favor, and superseding the flint. It is about a week earlier, rendering it less liable to rust: it shells readily: if not harvested in season, it does not withstand wet so well, the berry being but slightly covered with chaff. The white flint, on the contrary, is but little liable to sprout in consequence of exposure, nor does it shell readily. The last two are the varieties principally in use. For the past two years, the Mediterranean has been tried to a limited extent: it is the earliest variety known here, and is said to escape injury from the weevil; but it being a red wheat, and thick hulled, our millers object to it on account of the inferior quality of the flour; and as the weevil has not made its appearance, or not to any extent, west of Seneca county, the wheat in question will not find much favor until that event takes place. It will be unnecessary to enter more into details in relation to the particular qualities of the different varieties, Professor Emmons having done it in the last volume of the Natural History of this State. The time of seeding commences, with the stiffest soils, about the 1st of September, and, on low clay lands, even as early as the last 10 days of August; but for our best upland wheat soils, from the 10th to the 15th of September is preferred. As to the preparation of the seed, we find but little necessary, the soil being so natural to, and so well adapted to the cultivation of wheat: it has hitherto been liable to but few diseases: whenever any smut occasionally makes its appearance, the application of brine, and drying in lime or plaster, is found to be a sure remedy. The quantity sowed, per acre, we find necessary to increase gradually as the land grows older; we commenced with 1 bushel per acre, of the old red-chaff, and, when the white flint was first introduced, 3 pecks were found to be sufficient under favourable circumstances: the quantity has been gradually increasing, and has arrived at 5 pecks on the most favorable localities, up to 6 and 8 pecks on stiff and lumpy clays, where much of the seed does not vegetate.

The time of harvest never varies but a few days from the 15th of July, and any pieces whose ripening is protracted, from any cause, such as late sowing, or cold, wet soil, much beyond the 20th, hardly ever escape more or less injury from rust.

Until within the last six or eight years, the usual preparation of the soil for wheat was to plough two or three times: now, the practice of turning over clover in June, and following with the harrow and cultivator, to keep the land in good tilth, and subdue any grass that may spring up until sowing time, has been fast growing into favor, and now appears to be the most approved method of preparation: if, however, in the spring, the wheat appears to be so grassy that there is little or no prospect of clover succeeding well, the stubble is generally fallowed the succeeding season, and ploughed two, or, if necessary, three times, to eradicate the grass thoroughly, and then seeded with clover to remain two years.

When the oak openings were first broken up, it was not found advisable to plough very deep, or not more so than was necessary to get under the roots of grass and brush, which was about four inches; but as the land

become exhausted at the surface, from continued cultivation, it has been found necessary to deepen the furrow gradually to 7 or 8 inches, and even to 10 inches; and as the lime and salts become exhausted on the surface, a supply is sought in the subsoil for the wants of the crops.

It may be well to mention in this connection, that the New York system of lime-rocks extends from east to west, and that we consider, and, in fact, find from experience, that the Onondaga Salt Group, and its immediate vicinity, are the best calculated for the cultivation of wheat; and that as we recede from it, either north or south, the capability and fitness of the soil for wheat decrease, until at certain distances, varying in different localities, the cultivation of wheat is nearly abandoned. As far as the debris of this rock extends, and is mixed with the soil to any great depth, it only requires exposure to the atmosphere, and a certain admixture of vegetable matter to develop its peculiar adaptation to wheat culture; and hence, the extensive fame of Genesee wheat, and the high price of its flour in the markets of the world.

There has been no remedy found for the Hessian-fly, except late sowing; and this has, of late, been but little attended to, it being found that to protract sowing much beyond the usual and approved time, exposed the crop to a more serious injury, viz. rust and shrinkage, and liability to winter-kill, the roots not being sufficiently strong and well established to withstand the continued freezing and thawing of March and April. It has also been found, that in seasons when the fly prevails, they frequently attack late sown wheat, and even barley, in the spring, and injure it far more than the early sown. It is, however, a subject of congratulation to the wheat farmer, that the ravages of the fly are steadily upon the decrease, and that at present little apprehension is felt from them, and comparatively little damage sustained. No weevil has hitherto appeared in this vicinity, or nearer than Seneca; but, as they appear to be on the march to the west gradually, we may reasonably expect to make their acquaintance in time. The average price, during 1850, at the mills, in this town, will not vary much from $1.19 or $1.22.

Estimated expense of cultivating 5 acres of wheat:

5 days ploughing, using 8 horses and 1 man, at $2.25 per day...	$13.25
Wear of plough and points...	1.00
1 day harrowing, 1 team and boy, and use of harrow...	2.00
2 days cultivating " " " cultivator...	4.00
1 day drilling in wheat, " " drill...	2.25
Seed wheat, 5 pecks per acre being sufficient, drilled, at $1.19 per bushel...	7.45
Harvesting and drawing to barn per acre, $2...	10.00
Use of land one year, allowing pasturage, spring and fall, for its use the seasons that the wheat is sowed and harvested, $4. per acre...	20.00
	$59.95
Estimated yield, 22½ bushels per acre, at $1.19 per bushel...	$133.87
Deduct expense...	59.95
Profits on 5 acres...	73.92

Or, on one acre, nearly $14.75. Or, if the whole is done well, or in good season, we may safely calculate on 25 bushels per acre, which would increase the profits nearly $8 per acre, or $17.75 per acre, admitting the straw and chaff will pay for threshing and carting to mill.

The cultivation of corn is supposed to be increasing, and taking the place of root crops to a great extent: it is considered secondary to wheat, principally used for home consumption, and seldom for exportation: there are several varieties in use; but the early 8 and 10-rowed yellow and white, are preferred on wheat soils. Corn is usually cut up by the ground, and followed by wheat, as already mentioned. The yield per acre is exceedingly various, depending upon the adaptation of the soil to the crop, and the amount and quality of the manure used; indeed, the land can hardly be too rich: under ordinary or rather unfavorable circumstances, the yield may be 30 to 40 bushels; and under favorable circumstances, depending on season and cultivation, it will go as high as 60 to 70 and even 80 bushels per acre.

It is difficult to arrive at correct estimates of the cost of raising, although such estimates are frequently made, so much depending upon the natural qualities of the soil, as well as upon previous cultivation and manuring.

The mode of cultivation most approved here is to apply the manure of the previous winter on clover sward: if the land is dry and loamy, plough once from the 1st to 15th of May; roll, harrow, and cultivate, and plant as soon thereafter as possible; or, if a stiff soil, inclining to clay, manure and plough in the fall, pulverize from the 15th to 20th of May, planting as soon after as possible. At one time, it was not unusual to plant about the 1st of May: it is now discontinued, it being found that it increased the labor of after cultivation, and gave time for the growth of grass and weeds before the first hoeing, and the corn being very liable to injury from late frosts. Corn is usually fed to hogs in the ear; for cattle, it is always ground.

Oats are considered an exhausting crop, and are also cultivated mostly for home use; the stubble is seldom used to follow with wheat, and very rarely succeeds when tried. Average yield, under ordinary circumstances, 30 bushels; but when the season is favorable, or we have seasonable rains, they will yield 40 to 50 bushels: the land for oats is hardly ever ploughed but once: average price, 30 or 34 cents.

Barley is but little cultivated on our best wheat soils, and is confined principally to loamy soils, containing a good supply of vegetable matter, or on well manured corn or potato ground: it does not succeed on poor or grassy land: under favorable circumstances it may yield 40 bushels per acre, but more frequently less: it is almost wholly sold to brewers, and seldom fed out on the farm. It is not considered an exhausting crop, and is generally followed by wheat. The price per bushel generally 50 to 60 cents: this season it has sold at 75 in Rochester.

Rye not cultivated.

Peas are raised to some extent on loamy and moist localities, and frequently do well there, yielding about 30 bushels per acre; but seldom succeed on dry, light soils: they are generally followed by wheat, which generally succeeds well after them. When the pea crop does well, it is useful in subduing grass, leaving the land light and in good condition, and is therefore considered an ameliorating rather than an exhausting crop. The green crop is never ploughed in for manure. When cultivated extensively for a few years in succession, they become so infested with bugs that farmers are compelled to abandon their use for a time: they are fed to hogs either in the straw, or soaked, or boiled, and are considered equivalent to corn: they

are seldom sold off the farm, except in the spring, for seed, and frequently sell at $1 per bushel.

Beans have been tried to a limited extent as a fallow crop, but did not appear to succeed, probably on account of the expense involved, their cultivation being now mostly limited to family use.

Clover and *timothy* are the only grasses used for cultivation; and meadows of said grasses, except in cases of unseasonable droughts, will yield 2 tons per acre. The principal and almost only fertilizer used is plaster, either sown with the seeds in the spring, or the following spring, early in May: the seeds are mixed, when sown in the spring, 6 or 7 pounds of clover to from 2 to 4 quarts of timothy to the acre. Of late years, the practice of sowing the timothy in the fall, and immediately after the wheat, has been adopted, the clover in the spring, from the 1st of March to 1st of April, and is considered an improvement, as timothy sowed in the spring frequently failed in consequence of drought. The expense per acre would be about as follows, viz.:—

Cost of seeds	$0.80		
150 lbs. of plaster, and sowing plaster and seeds	0.70		
Mowing 2 tons per acre	1.50		
Raking and drawing, &c.	2.50		
Interest on land	4.00	expense	$9.51
Cr.			
By 2 tons hay	at $7.50		15.00
Profit per acre			$5.49
Or $2.75 per ton.			

Wool-growing, at present prices, disconnected with wheat-raising, and at the present price of land, would not pay; but a certain amount of sheep may be kept on wheat farms to advantage, to consume the clover, and consequently enriching the land, and also to reduce wheat straw by feeding on it, trampling it fine, and mixing with their manure. Sheep may be wintered on straw and chaff, with a small daily additional allowance of ½ a gill of corn, or its equivalent in other grain, successfully, and averaging 3½ pounds fine wool per head: in lieu of the grain, 1½ pound of good hay may be substituted; indeed this is a very common practice with all except lambs, which require plenty of good hay. Having no experience in coarse-woolled sheep, I cannot judge of the comparative profits of each.

Farmers here do not keep many more neat cattle than are required for the use of the farm, and none follow dairying as a principal business. Cattle, after the first winter, are principally kept on straw and chaff: the straw being stacked near the barn, they are allowed to run about it, and a sufficient quantity being daily cut off the stack and spread about the yard and sheds during the winter, to be converted into manure; a certain amount of cattle or sheep, or both, being necessary for that purpose, and as the straw is of but little or no value here for any other purpose; we do not estimate the expense of wintering the number requisite for that purpose as costing us any thing, but being rather an advantage. Calves, milch-cows, and working-cattle are either stabled or have separate yards, and are fed, in addition to the above, with hay or cornstalks. The cost of rearing a calf the first summer will be about $5, the first winter $5, the two succeeding summers, say 60 weeks pasturage, 18 cents per week, $10.80, making $20.80. Steers, in fall, at 2½ years old from the pasture, ordinarily sell at about the amount, and, if kept through the winter until 3 years old, (if kept as above described,) would still sell for about the same amount, not being in so good condition. Cows may be valued in the fall, at from $16 to $18; in the spring, from $22 to $25. Durhams and Devons, and their crosses, are the cattle usually raised, and of the two breeds, pure, the Devons are generally preferred, both on account of their beauty and their being the most hardy and easiest kept. Having but little experience in the fattening and management of cattle, I am not competent to give you reliable information. Of late years, the facility of sending fresh beef and pork to Eastern markets by railroad, has considerably enhanced their price. I have seen good beef sold in Rochester at $2.50 per cwt.: it now sells at $4 and $4.50.

As to *hogs*, new varieties are so frequently introduced, and are so quickly mixed up, it is difficult to determine the best breeds; farmers vary much in opinion: I have been the best pleased with what has been called the Mocha, and their crosses. The cheapest method of fattening, and the one generally adopted here, is to commence as early as a supply of potatoes and apples can be got, boiling them together in such proportions as our supplies of each will admit, adding some meal or middlings after boiling; the more the proportion of apples, the greater the quantity of meal required: pumpkins may be added as soon as they come to maturity, but they are inferior to either of the former: this course is followed until with a few weeks (2 to 4) of killing time, when corn in the ear or meal is used to harden the pork. The Onondaga coarse or evaporated salt is used for packing pork, little or no bacon being made.

Root crops of all kinds, except potatoes, are now but little cultivated. From 5 to 10 years ago, the cultivation of ruta baga, beets, and carrots was pretty extensively tried by our most enterprising farmers; but, owing to the expense of cultivation, and the uncertainty of the crop, arising, principally, from the prevalence of unseasonable drought, they have gradually been disused, it being found that when large breadths had been planted, and stock provided specially for their consumption, the crop so frequently failed that it subjected the farmer to much loss and inconvenience, and the corn crop has almost uniformly taken their place, as being more reliable. Still, with proper preparation of the soil, and the present improved demand for meat, their culture may be revived with more success.

Irish potatoes are cultivated to a considerable extent. The most approved method of preparation and tillage is the same as corn, except that the manure ought to be finer and better rotted; they do best planted in hills, not less than 2½ feet apart each way; a handful of plaster and ashes, half of each, applied to each hill, either before or after covering, is frequently used to advantage. The most prolific variety in use is the Merino; they are not considered as nutritious as the other varieties, and are used principally for feeding out. Some years ago, the Rohan potatoes excited much attention; but, when tested, were disapproved of and discontinued. The flesh-coloured (Plate II. of Professor Emmons) is much in use, and is more firm and better for the table than Merino, but second as a bearer. Next best in yield is the long and round pink-eye; then follows the Mercer as a yielder. The Carter potato is now being introduced; it is a late variety, superior to any other for table use; its yielding qualities are not sufficiently tested as yet to form correct conclusions. I have raised it, to a limited extent, the last two seasons; it has suffered less from the rot than

any of the above varieties, which were planted in the same field. The quality of the above varieties for table use improves from the first to the last mentioned, and from the last to the first as bearers.

The raising of potatoes has been curtailed, on account of the prevalence of the rot, for the last 5 years, and they have suffered from it the last season probably more than ever before. The average crop is estimated from 160 to 170 bushels per acre. Cost of production, 18 cents per bushel; usual price at the time of digging, 25 cents; profit per acre, taking the average at 170 bushels, would be $29.

Having paid but little attention to orcharding, and my communication being spun out to such a length, I will forbear saying any thing on the subject, and here conclude.

It will be observed that the above estimates fall far short of the results published in the reports of our agricultural societies, which, since writing the above, I have partially examined: mine have been made without reference to any other, and from my own observation and experience, if any thing, they may be too low; but it is confidently believed that they will not vary materially from the general results as they actually exist. When a farmer contends for a premium, he selects his land in reference to the intended crop, cultivates with extra care, and, perhaps, is assisted by adventitious circumstances, such as a seasonable and, perhaps, limited shower of rain, that does not extend to many of his neighbors; and, if successful, he naturally endeavors to make the most of it, in order to exhibit his skill and the superiority of his soil over that of his neighbor.

Very respectfully yours,
DAVID McVEAN.

Hon. Thomas Ewbank,
Commissioner of Patents.

Allenton, Washington Co., Rhode Island, Dec. 23d, 1850.

Sir:—Having been kindly furnished with a circular from the Patent Office, requesting information upon various subjects connected with agriculture and rural economy, I proceed to reply (though incompetent) as far as the questions have a local application, and shall confine myself to some of the most important farm products and operations. There are but few kinds of business which require a closer personal attention and more skill in order to succeed than that of farming. The purchasing of a large portion of his cattle, sheep, and swine; the feeding and preparing them for the butcher; the rearing of calves, lambs, pigs, poultry, and eggs; the making of butter and cheese; selling milk; raising vegetables and fruits of various kinds for market, with some of the more staple products—constitute, in part, the occupation and resources of the farmer.

The land is generally uneven, both in surface and quality, and presents many varieties of soil even within the same field. No uniform rule of practice can well be applied. Each one must determine for himself the best mode of operations. The great secret of success consists in the judicious preparation and liberal distribution of manures. It is the foundation upon which every farmer must rely for a profitable return for his labor and capital employed. By the liberal use of manure and thorough cultivation, the crops are, comparatively speaking, placed beyond the influence of unfavorable seasons and other vicissitudes to which they are so subject.

Indian corn forms one of our most valuable crops, regarded both as forage for stock of all kinds, and as food for the support of man. It must be admitted to hold a rank far above any other plant known in husbandry. The soil best adapted for raising this crop is the sandy loam; although it thrives well on all soils, if well manured, excepting the cold and wet clay soils. The varieties most esteemed here are the large and small white-cap corn. The former for strong and rich, and the latter for poor and light soils. They always accommodate themselves, in a remarkable degree, to the soil and the seasons, always maturing and yielding, according to land and cultivation, from 10 to 60 bushels per acre. Cost of production, from 20 to 75 cents per bushel, not including the cost of manure, which will be more than balanced by the additional quantity of fodder obtained during the several years which the manure continues to exert an influence. The largest yield costs the least per bushel. One of the best methods for raising this crop is to allow the grass to grow upon sward land till about the 25th of May, then spread 20 ox-cart loads of good, unfermented stable manure to the acre, and plough the whole under to the depth of eight inches; roll it well, mark out with the plough 3½ feet apart, and intersect the furrows at right angles with a chain, the same distance apart for the hills, put a small quantity of fine compost in each, then drop in four grains and cover deep. The whole work should be quickly performed. As soon as the corn can be well seen, pass a fine-tooth harrow between the rows, each way, and follow with the hoe to clear away, leaving no hill. Soon after this, let the cultivator pass in like manner; also follow with the hoe, leaving but small hills. The third hoeing should take place before it tassels out, avoiding large hills, as before. As soon as the corn is well glazed, cut it up close to the ground, and put up in small shocks. If the land could be made smooth, it would be a great saving of labour to plant with a machine. Tarring the corn, before planting, is a sure preventive against the depredations of birds. The past has been a favorable season for corn.

Rye is well adapted to our light, poor soil, and, with a little manuring, will yield from 12 to 30 bushels per acre: cost per bushel, from 20 to 50 cents, not including manure, which will be paid for by the straw, it being worth from $6 to $7 per ton.

Oats and *barley* are cultivated only to a small extent, and are considered very exhausting.

Beans do well on light soil. Yield, about 12 bushels per acre. Cost of raising, $1 per bushel.

Hay is an excellent and profitable crop on moist land, if supplied occasionally with suitable manure. Fish, spread on the land after the crop has been taken off, at the rate of 50 barrels to the acre, will produce astonishing effects, frequently quadrupling the next year's crop. Stable manure will do well also. Moist land should always be selected for this crop, when practicable, and the dry lands for tillage. The past year has been very favorable for grass—at least 25 per cent. over that of the year before. The quantity per acre varies from ½ ton to 2½ tons, and it is worth about $3 per ton to cut and secure it in good order.

Potatoes.—This is the most valuable of our root-crops, and its qualities are beginning to be better appreciated as the difficulty and uncertainty of raising become more apparent. The past season has proved to be the most

fatal to this crop. It has also been remarkable for the unusual quantity of rain. These circumstances may not be without their benefit in assisting to determine the cause of the disease, and thereby settle the question that has given rise to so many unprofitable and speculative theories. It may not be out of place here to suggest what has appeared to me evidently to be the cause; and that is, an excess of heat and moisture, combined with ammonia, a highly fertilizing salt, well known to exist in all rich soils and manures. The rot has always been found to be excessive on highly manured and wet land, and in a season of high atmospheric temperature; while in poor, dry soils, it rarely, if ever, makes its appearance. Notwithstanding its liability to decay, it continues to be extensively cultivated, and proving to be, in many instances, where it is only partially destroyed, the most profitable crop raised by our farmers. Yield, from 50 to 250 bushels per acre. Price per bushel, 50 to 80 cents. To those near a market, or on the waters of the Narragansett Bay, the Mercer or Chenango is the best variety, more especially on light soils. The ground should be well ploughed twice before planting. A little plaster on the seed in the hill is a good manure for the potato; also, a little manure is good with the plaster, on light soils. Wet land should be avoided for the Mercer variety, and, perhaps, for most others.

Onions and *carrots* are raised on the same ground, in alternate rows, producing full crops of each. The onions come to maturity early, and are gathered, thus leaving the carrots in full possession until they mature. This is considered a beneficial occupation of the land. Roots, of various kinds, are beginning to be cultivated for the use of stock in winter.

Stock-breeding has been much neglected in this county. It is to be hoped, however, that some of our enterprising farmers will make the experiment, for, I have no doubt, it would be a profitable undertaking, if well conducted. They should avoid the imported stock, which, by extreme care in crossing, together with high keeping, have been brought to the highest degree of perfection, and which would, without this same care and high keeping, probably degenerate, as they have done in other cases. But, by careful and judicious crossing with some of our best native cattle, there might, no doubt, be a breed produced that would be valuable both for work, the dairy, and the shambles, and which would be better suited to our climate, and better prepared to endure the careless treatment common among us. Feeding stock for beef is practised to some extent by some of our best farmers. In selecting animals for this purpose, care should be taken to procure those that will fatten readily; and when the business of feeding has commenced, it should be attended to faithfully, for the sooner it is done the more profitable it will be.

Sheep have decreased in number very much, of late. They are now kept, not so much for wool, as for the rearing of lambs, which are sold to the butchers at about three months old, and bring about $2 per head. The coarse-woolled, native breeds are the best for this purpose.

Hogs cannot be raised and fattened at the present price of pork, with any degree of profit, beyond what are required to consume the offal of the farm, dairy, and kitchen. Breeding-sows are kept for raising pigs, and produce two litters a year, which are sold, at about 8 weeks old, for $3 each.

Poultry.—Washington county has become quite celebrated throughout the country for its fine-flavored poultry. The quantity annually produced is large, the greater portion of which is sent to Boston. All our farmers are engaged more or less extensively in this business. Some devote almost their whole attention to this branch of industry.

Manures.—The collecting and composting of manure should be attended to by all means, whenever it is practicable. Peat taken from the swamp and composted with stable manure, in the proportion of one of manure to four of peat, and allowed to remain until a slight fermentation takes place, makes an excellent manure for all light soils, and for almost all crops. Leached ashes mixed with peat, in proportion of one to two, makes a good manure also. Stable manure is the best for top-dressing on grass lands and for corn, to be ploughed under in an unfermented state. Fish manure is very active, and, whenever it can be procured at a reasonable rate, will pay well for the expenditure. The stable is our main dependence for manure, and should be kept well littered with straw, eel-grass, lowland hay, and peat, kept dry for that purpose.

Dairy.—Narragansett was formerly one of the most celebrated dairy districts in New England. The business is now pursued to some extent, and, where the land is suitable, is, perhaps, one of the most profitable branches of husbandry. The annual amount realized from each cow, including the calf, is about $35. Ice is used in all good dairies for cooling the cream, and preserving the butter till marketed. Price per pound, 22 to 25 cents. Cheeses of inferior quality are for the most part made, and sell for about 5 cents per pound.

Fruits of all kinds are receiving increased attention, and are beginning to be extensively cultivated, not only as a source of profit, but also for the decoration of the homestead. They are also highly esteemed as a healthy and delicious food. Many of the old orchards of common fruit are fast going to decay, and others are being planted to supply their places, great care being had to procure esteemed varieties. The best variety of apples, for this district, is the Rhode Island Greening. It is unsurpassed for all purposes, is an early and constant bearer, and the trees are long lived; some of which are now in a bearing condition, being 100 years old. It is much finer flavored, the flesh is firmer, is of a deeper green color, and keeps longer when produced in this vicinity, than when produced west of the Connecticut River. In cultivating an orchard of apples, pears, or peaches, care should be had to keep the ground loose, and deeply ploughed and under tillage, till the trees are well grown and nearly shade the ground. It should be lightly manured every year with good compost manure. No grass, rye, oats, or barley should ever be allowed to grow in an orchard. Some root crop, alternating with Indian corn, will be best. June is, perhaps, the best month for pruning an orchard, though it may be done at any season of the year. The heads should be cut out and formed while the trees are growing, and little care will be necessary in after years.

Very respectfully yours,

CHARLES ALLEN.

Benton, Elkhart County, Ia., Dec. 24th, 1850.

Sir:—In answer to certain questions contained in your Agricultural Circular of the 26th of August, 1850, I proceed according to the best of my abilities.

Wheat.—The Mediterranean has been sown, of necessity, for a few years past, on account of the ravages of the Hessian-fly, for other kinds are destroyed, while this escapes. It is not a very productive wheat. Its average product is estimated at 15 bushels per acre. The kinds in use, and most esteemed, when not disturbed by the fly, are the Wabash, Hutchinson, red, and white chaff bearded. The average product is 20 bushels per acre. The time of seeding is from the 1st to the 20th September, and of harvesting, from the 4th to the 15th of July. No preparation of seed. We usually plough twice and harrow in the seed. It is better to plough deep the first time, (say 8 inches,) and the next time not so deep. The best fallow land is that on which corn grew the previous year. If the land receives good culture, we consider our yield increasing. We know of no remedy for the Hessian-fly but to sow the Mediterranean wheat. We have no weevils. Average price per bushel, 56 cents.

Corn.—The variety most esteemed here is white with a red cob, though a yellow corn, lately introduced here from South Carolina, is the most productive; but it is sometimes injured by frosts. It is, however, becoming better adapted to our climate, and, I think, it will soon be the most profitable kind to raise. Our old varieties averaged 45 bushels, and the last-named, 65 bushels per acre. The best system of culture is, to plough the ground deep in the spring, furrow and cross it about 3½ feet apart, plant 3 or 4 grains in a hill, harrow, and then plough 3 times, and hoe at least twice. Average price per bushel 20 cents.

Oats.—A fair crop is about 30 bushels to the acre. One bushel and a peck are sown. Average price, 18¾ cents.

Neat Cattle.—Owing to our dry, sandy soil, grasses are not productive, consequently, we raise but few cattle. Three years' old steers are worth from 10 to 12 dollars. Good milch-cows, with their calves, in the spring, average $12, and in the fall, $10. Native stock suits our climate best.

Sheep.—The raising of sheep has attracted some attention of late, owing to there being a demand for wool from abroad. Coarse wool sells for 31 cents per pound. The finer kinds are not much grown here. Sheep do well.

Hogs.—Not much more pork is raised here than is necessary for home consumption. Average price, $2.75 per cwt. Our method for putting down pork is to salt it well, and, after it has taken the salt, hang it up and smoke it, and when well smoked, prepare a mixture of ground black-pepper and salt, and rub it well all over, which prevents the bugs from disturbing it.

Potatoes are raised only for home consumption. Varieties, the Meshannock and Mackinaw, which yield well. Mode of culture, manure the land, plough and harrow it, then furrow and plant four potatoes in a hill, about 3 feet apart; afterwards harrow and plough two or three times, and hill well with the hoe.

Fruit.—Great attention is paid to the culture of fruit. We frequently have apples which weigh from 16 to 22 ounces, though our orchards are young. The "never-fail" and bellflower are the best kinds for keeping.

The best time for transplanting and grafting is in the month of April. My information upon the other subjects of inquiry contained in your circular is so limited, that I think it unnecessary for me to attempt to answer further.

I am yours respectfully,

JOHN JACKSON.

Mount Pleasant, Clockville, Madison county, N. Y. Dec. 17, 1850.

Sir:—Your Agricultural Circular was duly received. I shall be able to reply to but few of the questions it contains.

Dairy Husbandry.—The average yearly produce of butter, per cow, in this section, taking altogether, would not much exceed 100 lbs.; of cheese, 200 lbs. There are extra dairies, however, which will give over 200 lbs. of butter per cow. One pound of butter is generally considered equal to two of cheese; yet, I think, two pounds of cheese can be made from less milk, and with less expense, than one of butter. The average price of butter, the past season, has been 13 cents per lb., and cheese, 5½ cents.

Neat Cattle.—The cost of rearing, until three years old, is about $10, for the first year, and $8 for the second, and $10 for the third, making in all $28. The usual price, at that age, is $30 for a steer, and $20 for a heifer, in the spring. The value of good dairy-cows in the spring is $25; in the fall, $16. Extra cows are worth more, while many are worth less. As to whether a given amount of food will make more meat in a Durham, Devon, or Hereford animal, than in a native, I am fully convinced, so far as the Durhams are concerned, it will; but cannot say with regard to the others, having had no experience with them. There has been, for years past, too little regard paid by farmers in general to neat cattle. When it is considered that the expense of rearing an inferior, common, or superior animal is nearly the same, it is astonishing that we have not more superior animals. In the estimate above, I have given as the price of a three-year old heifer, $20. A good grade heifer, say half Durham, (or a cross on any other of the improved breeds,) at two years old, would bring as much or more, and a saving, by the owner, of one year's keeping. A thorough-bred animal, at two years old, would bring from $100 to $300, and could be reared at about the same expense as a native animal. It is, however, the first cost that stands so much in the way of improvement; yet, when it is considered with what ease, and comparatively small expense, grade animals can be obtained in most sections of this country, and this grade be again improved by the introduction of more pure blood, the farmer who neglects to improve his stock has no excuse. It has now been little over half a century since the first Durham cattle were brought to this country; yet they were not imported to any great extent until some sixteen years since. The rapidity with which they have since found their way into almost every section of our country, and the universal satisfaction they have given, in almost every instance, when fairly tried, proves their superiority over the native cattle. In 1846, E. P. Prentice, Esq., of Albany, New York, slaughtered a Durham ox, five years old. His live weight was 2546 lbs.; dead weight, four quarters, 1688 lbs.; loose tallow, 260 lbs.; hide, 126 lbs.; making the whole net weight 2074 lbs., or a shrinkage of only 472 lbs. in an animal weighing over 2500 lbs. The shrinkage in our native cattle is allowed to be one-third; that is, a native animal, weighing 1200 lbs. alive, is expected to weigh 800 lbs. when dressed. They are as superior, in many instances, for the dairy, as for the shambles. In 1844 the New York State Agricultural Society awarded the first premium to George Vail, Esq., of Troy, New York, for the largest quantity of butter made from six cows, in thirty successive days. The quantity made was 265 lbs. 10 oz. These cows were all thorough-bred Durhams, and had no feed, during the trial, but grass pasture. In the Patent Office Report for 1848, page 397, mention is made of one of my short-horned heifers. I have given this cow, during the past season, a very thorough trial, as regards milk and butter. She gave, on grass feed, in 71 days, 3484 lbs. of milk. In favorable weather, 19 lbs. of her milk would give one pound of butter. She made, during ten days in June last, (very unfavorable weather,) 20 lbs. 4 oz. of butter; during ten days in August, 19 lbs. 14 oz.; her feed being grass only.

I might give many other examples, showing their great value, both for the dairy and the shambles, but fear it would occupy too much space in your Report.

I would not be understood, by the foregoing, that the Durhams should be introduced exclusively into all parts of our country; but I do contend that some of our improved breeds should be much more generally adopted. Let farmers also pay greater regard to selecting, secure the best animals within their reach, give them proper care and attention, and millions of dollars will be added to the real wealth of our country.

I am, sir, yours truly,

S. P. CHAPMAN.

Sir:—As to the inquiries in your circular, respecting agriculture, I shall be very brief, knowing, as I do, that there are so many who are extensively engaged in that business, and who possess so many more advantages than myself, that I think it would be unwise for me to say much on that subject; but will give you my views on a few points, which, if worth noticing, well—if not, as well.

Wheat.—Very little is grown in the easterly part of Connecticut: I do not know of one bushel having been raised in this town last season. The easy transportation from the West, by railroad, for flour, reducing the price so low, and the high price of labor, have put a stop to growing it almost entirely.

Corn is a staple article with us, our common brown bread being made from a mixture of corn and rye meal. As to varieties, the yellow is preferred. In Rhode Island, the white is mostly used, especially for johnny-cakes, &c. The average product, per acre, is 35 to 40 bushels. The expense of raising the same would be, for labor, $7, and for manure $10, which is spread broadcast. For feeding, we grind with the cob, and cook it. Twenty bushels of corn, consumed by hogs, will produce 10 loads of manure, which, spread on an acre, will add to the crop from 25 to 30 per cent. I think a great addition may be made to the manure of hogs, both in quality and quantity, (when it can be done,) by letting the refuse matter of the kitchen and sink run into the hog-yard, and by throwing in wash weeds, &c., and let the hogs muzzle it. Perhaps not more than one-third of our clover crop is used for fodder; it is worth $5 per ton. The remaining two-thirds are saved for seed, which Windham county is somewhat noted for, as Wethersfield is for onions. We get from 140 to 180 pounds of seed to the acre: the price is from 10 to 15 cents per pound: the miller has 10 per cent. for getting it out: the straw is worth but little, except for manure. I have received for the seed, per acre, more than $33 net profit. The cultivation of apples has received uncommon attention for a few years past, more as to quality, than quantity, for very few are planted out without being budded, or grafted, which is *vice versa* from what it was 40 years ago. Double the quantity of apples has been sent to market the present year than in any previous year; and more within five than ever before. Good apples have sold, the past fall, for 40 to 60 cents per bushel. I think an acre of good land, with good cultivation, would yield from 200 to 300 bushels. The Roxbury Russet, which is an annual bearer, I consider fully equal to any other variety for winter use; and for fall use, the Royal Pound apple, a native of Connecticut, also a good bearer.

I send you a set of meteorological tables, as requested in your circular, only, perhaps, more extensive than your request, which I thought required only one year; but, as far as my knowledge extends, I do not recollect seeing a single table or page on the subject from Connecticut. I thought I would give the result of my observations for several years past. I think they are correct, and do not extend too far back to give the general information of the heat, cold, wind, rain, and snow. It would be very agreeable to have the tables published entire; but they are at your disposal: please arrange them in such order as you think best. The tables are so plain as to need no explanation.

Yours respectfully,

JONATHAN CLARK.

P. S. I have no rain-gauge.

Meteorological Tables for the Village of Goshen, in Hampton, Windham County, Connecticut; N. latitude 41° 47′ 49″; *longitude* 72° 7′; *elevation above tide-water,* 561 *feet; and* 19 *miles north of tide-water. By* JONATHAN CLARK, *County Surveyor.*

1840.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow in inches.	Number of thunder showers.	No. of days all or part foggy.	Direction of wind. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	19	2	5	2	8	6	20½	...	2	18	1	4	...	...	2	2	4
Feb.	11	1	3	4	9	8	5¼	...	6	9	...	8	2	...	...	9	...
March	17	8	4	4	8	8	11¾	...	1	10	...	8	...	...	3	4	6
April	18	3	5	3	1	3	8	...	...	13	...	...	2	1	1	10	3
May	20	7	...	2	2	1	2	...	...	11	...	8	2	...	...	9	1
June	16	5	8	...	6	...	...	2	...	14	2	6	1	...	1	4	3
July	17	6	2	3	8	...	...	3	2	10	1	5	...	...	...	11	4
August	19	2	2	1	7	...	...	4	1	18	...	...	...	...	...	13	...
Sept.	18	2	7	1	2	...	...	1	2	14	...	2	...	...	...	11	3
October	16	2	5	5	3	1	4	...	2	13	1	4	3	...	1	7	2
Nov.	15	3	1	2	4	4	10½	...	...	12	...	15	...	...	...	1	2
Dec.	21	3	...	2	5	...	16	...	...	21	...	6	...	...	...	2	2
Total	207	44	37	29	48	21	78¼	10	10	163	5	66	10	1	8	83	29

Last frost in the spring, April 28th. First frost in autumn, September 22d.
Last snow in the spring, April 1st. First snow in autumn, November 26th.

1841.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow in inches.	No. of thunder showers.	No. of days all or part foggy.	Direction of wind. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	14	4	4	9	1	6	12½	...	2	11	2	5	2	1	1	6	3
Feb.	18	5	5	2	...	5	13½	...	...	14	2	5	1	...	...	3	3
March	20	3	2	5	1	5	11½	...	...	16	...	8	...	...	1	4	2
April	9	6	1	5	9	3	14	1	1	9	...	10	...	1	2	8	...
May	16	2	4	2	7	1	½	1	4	14	...	5	1	1	1	5	3
June	17	4	3	3	3	...	...	3	3	3	...	6	...	...	...	10	11
July	19	4	1	2	5	...	...	6	2	15	...	3	...	...	...	7	6
August	16	6	1	3	5	...	...	3	6	3	...	6	1	...	...	14	7
Sept.	14	8	1	2	5	...	...	2	5	6	6	11	...	...	...	5	2
October	17	3	5	3	3	1	2	...	1	15	1	8	...	...	...	5	2
Nov.	18	3	2	2	5	2	5	...	1	15	1	5	1	...	...	2	5
Dec.	9	7	6	2	6	4	14	...	...	11	1	2	...	...	3	8	6
Total	187	56	35	40	50	27	78	16	25	132	13	74	6	3	8	77	51

Last frost in spring, May 20th. First frost in autumn, September 30th.
Last snow in spring, May 3d. First snow in autumn, October 3d.

1842.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow in inches.	No. of thunder showers.	No. of days all or part foggy.	Direction of wind. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	19	3	3	2	4	3	10	...	1	7	...	5	...	1	...	9	9
Feb.	18	2	1	5	2	4	8½	1	1	18	...	4	...	1	...	6	4
March	19	3	2	2	5	2	8	2	1	8	1	5	...	...	...	8	9
April	16	3	2	7	2	...	...	...	...	9	1	14	...	1	...	2	3
May	16	4	2	3	6	...	...	1	3	3	1	5	...	1	1	15	5
June	18	5	1	5	1	...	...	2	3	5	1	4	...	1	...	15	4
July	15	5	1	4	6	...	...	7	2	3	1	3	1	...	1	17	5
August	18	4	...	5	9	...	...	7	3	4	1	10	2	3	1	4	6
Sept.	16	5	3	5	1	...	...	2	...	11	...	5	...	1	1	9	3
October	24	1	3	1	2	1	1	1	1	14	...	6	...	...	1	5	5
Nov.	21	1	...	4	5	4	10½	...	...	6	2	10	...	1	1	1	9
Dec.	16	5	1	2	7	8	12	...	...	13	1	7	...	...	...	3	7
Total	211	41	19	45	50	22	50	23	15	96	9	78	3	10	6	94	69

Last snow in spring, May 31st. First frost in autumn, October 6th.
Last frost in spring, April 16th. First snow in autumn, October 20th.

[illegible]	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	Direction of wind. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	15	9	2	4	1	4	7	...	7	10	...	11	...	...	...	6	4
Feb.	17	8	3	3	2	5	25	...	2	3	2	7	...	1	...	3	12
March	19	1	1	6	4	8	15	...	...	11	3	6	...	2	...	3	6
April	16	8	1	7	3	8	7	...	1	4	3	9	1	1	1	5	6
May	14	7	6	1	8	...	...	1	...	6	2	8	...	...	1	7	7
June	19	1	3	2	5	...	...	5	4	6	...	3	...	...	...	16	5
July	17	2	4	3	5	...	...	4	1	9	2	4	...	1	...	10	5
August	14	4	3	5	5	...	...	3	4	6	3	6	1	...	...	6	9
Sept.	18	5	4	1	2	...	...	2	1	6	...	8	1	...	...	2	18
October	15	4	2	3	7	2	4½	...	1	3	1	4	...	1	1	5	16
Nov.	16	1	4	4	5	1	...	...	...	11	2	6	...	1	...	8	2
Dec.	12	6	4	2	7	8	20	...	...	7	...	10	...	...	1	4	9
Total	192	46	37	41	49	31	78½	15	21	82	18	82	3	7	4	75	94

Last snow in spring, April 19th.
Last frost in spring, June 2d, so that it killed vines.

First frost in autumn, September 1st.
First snow in autumn, October 22d.

1844.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	Direction of wind. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	18	2	2	4	5	9	11	...	1	15	2	5	1	...	...	6	2
Feb.	19	1	4	8	2	6	16¾	...	...	9	2	9	...	...	...	8	6
March	14	5	1	7	4	7	20	...	2	4	3	10	...	1	1	9	8
April	18	2	6	1	8	...	...	...	...	4	1	7	...	3	1	5	9
May	15	2	2	2	10	...	...	...	1	9	...	2	...	2	2	10	6
June	17	2	6	2	8	...	...	8	...	8	...	5	...	...	...	12	5
July	18	5	2	5	6	...	...	5	1	7	...	9	...	...	1	9	5
August	12	4	6	2	7	...	...	6	...	8	1	6	...	...	...	13	8
Sept.	20	5	1	3	1	...	...	1	...	4	1	12	...	1	2	7	3
October	17	4	1	4	5	1	½	...	...	8	4	9	...	...	...	8	2
Nov.	16	3	2	4	5	2	4	1	...	13	1	6	1	1	...	4	4
Dec.	14	6	2	2	7	7	12½	...	8	10	1	8	1	2	...	4	5
Total	198	41	35	39	58	31	44½	16	8	99	16	88	3	10	7	90	58

Last snow in spring, March 30th.
Last frost in spring, May 23d, and little in low-lands, June 11th.

First frost in autumn, September 1st.
First snow in autumn, October 31st.

[illegible]	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	Direction of wind. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	14	3	3	5	6	5	12½	...	...	5	4	10	...	...	...	5	7
Feb.	19	2	2	3	2	4	20½	...	...	10	1	2	1	...	1	6	7
March	18	2	4	3	4	4	8	1	3	10	...	7	...	...	...	7	7
April	9	5	5	5	6	4	3	1	3	9	...	12	...	...	...	5	4
May	18	1	2	4	6	2	2½	2	...	6	4	4	...	...	1	11	6
June	17	1	1	3	8	...	...	3	1	8	1	2	...	...	...	18	1
July	23	1	1	...	6	...	...	9	...	18	...	1	...	1	1	5	5
August	22	3	1	...	5	...	...	4	2	6	...	4	8	...	1	16	1
Sept.	17	2	...	4	7	...	...	6	2	11	...	4	...	...	1	18	1
October	20	3	1	3	4	...	...	...	1	9	2	6	...	1	...	10	6
Nov.	17	2	...	3	9	1	½	1	1	5	1	2	2	2	3	9	6
Dec.	17	3	...	2	9	7	12½	...	...	10	1	8	...	...	1	6	6
Total	211	28	20	35	72	27	59½	27	13	107	14	62	6	4	9	110	58

Last snow in spring, April 11th.
Last frost in spring, May 31st, so severe as to kill corn and vines.

First frost in autumn, September 14th.
First snow in autumn, November 10th.

July 14th, at 2 o'clock, P. M., a severe thunder storm commenced, with high wind and rain; hail-stones fell as large as ounce balls. Just as it began to rain, the Rev. Nathaniel Rawson, of this town, who was raking hay in an open field, was instantly killed by lightning: a small hole was made in his hat, and his rake split in pieces; while a Mr. Lincoln, who was within three or four rods, received little injury. Much damage was done by the lightning and storm.

1846.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	Direction of wind. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	18	3	2	3	5	6	15	...	...	7	...	2	1	1	...	7	11
Feb.	17	4	1	3	3	6	24½	...	...	8	...	8	...	...	...	4	6
March	18	5	2	3	3	3	2½	1	...	9	1	8	1	2	1	7	[illegible]
April	17	1	5	7	6	1	1	...	1	6	2	8	1	...	1	13	[illegible]
May	11	6	3	4	7	...	...	4	...	4	1	7	...	1	3	14	1
June	15	3	3	...	9	...	...	6	1	6	1	7	...	...	...	16	...
July	10	5	2	3	11	...	...	5	2	4	2	4	1	...	...	14	6
August	17	2	5	...	7	...	...	5	4	4	2	4	1	1	...	18	6
Sept.	21	...	5	...	4	...	...	...	7	5	...	4	1	2	2	12	4
October	18	3	3	3	3	1	1	...	1	7	2	9	...	...	...	12	1
Nov.	9	9	6	4	2	2	5	...	...	8	...	18	...	...	...	6	3
Dec.	15	4	2	3	7	7	20½	...	...	14	...	5	...	...	...	6	6
Total	186	45	39	33	67	26	69½	21	16	82	11	69	6	7	7	124	59

Last snow in spring, April 15th.
Last frost in spring, May 22d.

First frost in autumn, September 16th.
First snow in autumn, October 29th, snow fell 16 inches deep.

1847.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	No. of thunder showers.	No. of days all or part foggy.	Direction of wind. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	18	5	2	1	5	4	10	...	1	10	...	8	...	1	...	11	6
Feb......	12	8	2	4	7	10	18½	...	...	10	1	8	...	...	...	2	7
March..	12	8	5	8	8	9	12	...	2	15	...	4	...	...	...	6	6
April....	17	1	4	1	7	2	4½	1	...	15	1	2	...	...	...	10	2
May.....	19	8	2	2	5	...	...	...	4	4	2	12	...	...	...	8	5
June	15	8	...	4	8	...	...	2	1	14	2	8	...	1	3	7	...
July.....	20	...	4	...	7	...	...	7	2	6	1	8	...	1	5	10	...
August.	21	2	1	2	5	...	...	3	1	4	2	5	...	...	...	12	8
Sept.....	12	7	2	1	8	...	...	...	1	8	1	12	...	2	...	6	1
October	24	1	...	2	4	...	...	...	1	12	2	2	4	1	...	5	5
Nov......	20	2	3	2	8	1	½	...	1	12	...	...	...	4	2	7	5
Dec......	6	9	4	6	6	8	12	...	3	6	1	8	...	1	1	10	4
Total	196	39	29	28	78	34	57½	18	17	116	13	67	4	11	11	94	49

Last snow in spring, April 23d.
Last frost in spring, April 25th.

First frost in autumn, September 16th.
First snow in autumn, November 28th.

1848.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	Direction of wind. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	16	4	5	3	3	2	8½	...	2	14	...	11	1	...	...	5	...
Feb......	24	1	1	1	1	2	6	...	...	17	2	3	...	1	1	...	5
March..	22	2	1	5	1	2	4½	...	...	10	1	7	...	...	...	8	5
April....	20	2	4	2	2	3	6	...	...	10	...	4	...	1	1	7	6
May.....	18	4	2	3	9	...	...	4	2	10	...	7	...	...	1	10	3
June	18	2	2	...	8	...	...	6	2	15	1	3	...	1	...	9	1
July.....	9	3	10	...	9	...	...	3	3	4	1	6	4	1	...	13	2
August.	17	1	7	1	5	...	...	1	2	7	2	8	1	...	...	12	1
Sept.....	17	2	2	1	8	...	...	1	1	8	1	3	...	1	...	11	6
October	17	6	1	5	2	...	...	1	1	6	2	9	...	1	1	6	6
Nov......	17	4	3	3	3	4	14¼	...	...	18	...	4	...	...	2	4	3
Dec.	12	5	2	4	3	4	16	2	...	3	...	10	1	2	...	8	7
Total	202	36	40	28	59	17	50¼	17	18	117	10	75	7	8	6	93	50

Last snow in spring, April 19th.
Last frost in spring, May 1st.

First frost in autumn, September 13th.
First snow in autumn, November 7th.

1849.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	Direction of wind. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	20	4	1	...	6	3	8½	...	...	15	1	...	...	1	...	9	5
Feb......	18	6	...	3	6	9	18½	...	...	10	...	12	...	...	...	3	3
March..	18	1	3	5	4	2	8½	...	...	10	1	11	...	1	1	5	2
April....	19	8	2	1	5	1	1	...	...	15	1	2	1	3	...	6	2
May.....	14	8	1	2	6	...	...	2	1	8	2	10	1	2	...	5	3
June	20	...	3	2	5	...	...	2	1	10	...	7	...	...	...	10	3
July.....	22	1	2	1	5	...	...	4	5	4	1	9	1	...	1	7	3
August.	20	1	...	2	3	...	...	1	3	5	...	6	1	1	1	15	2
Sept.....	22	4	1	...	3	...	...	...	...	...	...	...	...	...	...	...	...
October	13	8	2	3	4	1	1	...	...	7	6	6	...	...	1	7	3
Nov......	17	8	1	2	2	1	1½	1	3	8	2	10	1	1	1	4	4
Dec.	17	4	2	2	6	3	14½	...	...	18	...	5	...	2	...	4	2
Total	215	48	18	23	60	25	43½	10	18	123	14	88	7	12	5	75	41

Last snow in spring, April 19th.
Last frost in spring, April 20th.

First frost in autumn, October 15th.
First snow in autumn, November 28th.

1850.	Clear days.	Cloudy all day.	Part cloudy, part clear.	Rain or snow, or both, all day.	Rain or snow part of the day.	No. of days on which snow fell.	Depth of snow, in inches.	Number of thunder showers.	No. of days all or part foggy.	Direction of wind. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	17	2	2	4	6	6	17	...	...	18	1	6	1	1	1	5	3
Feb......	18	2	2	2	4	3	3¼	...	2	13	...	...	...	1	1	8	5
March..	18	1	3	4	5	9	15½	1	...	14	1	6	...	1	...	5	4
April....	17	3	3	4	3	5	7	1	3	10	...	4	1	1	2	9	3
May.....	7	4	3	3	14	...	...	7	3	9	2	9	4	2	...	3	2
June	20	2	...	...	8	...	...	6	3	11	...	4	...	1	3	5	6
July.....	14	4	3	2	8	...	...	4	7	8	2	5	...	1	1	11	3
August.	17	1	2	2	9	...	...	3	6	12	2	3	1	...	2	8	3
Sept.....	19	2	5	2	2	...	...	9	1	15	2	5	2	...	1	5	...
October	19	4	2	2	4	...	...	1	...	18	2	2	...	...	1	6	2
Nov......	19	6	1	...	4	...	...	5	...	9	4	8	1	1	...	6	1
Dec.* ...	8	10	1	3	4	6	7	...	1	14	...	7	...	...	...	5	1
Total	198	41	27	28	69	29	49¾	37	26	146	16	59	10	9	12	76	33

* This month is not complete by five days.

Last snow in spring, April 14th.
Last frost in spring, April 24th.

First frost in autumn, September 30th.
First snow in autumn, December 1st.

This table contains all the days on which the thermometer stood at and below zero at sunrise. Also, the same days at noon above zero for 22 years, beginning in 1829, and ending with 1850:—

Years and Months.		Days of Month.	Sunrise, below 0.	Noon, above 0.	Years and Months.		Days of Month.	Sunrise, below 0.	Noon, above 0.	Years and Months.		Days of Month.	Sunrise, below 0.	Noon, above 0.	Years and Months.		Days of Month.	Sunrise, below 0.	Noon, above 0.
Jan.	1829.	8	12½	½	March,	1835.	2	8	25	Jan.	1839.	24	1	6	Jan.	1844.	28	6	20
"	"	4	0	14	Dec.	"	16	7	7	Feb.	"	7	0	18	"	"	29	0	6
"	"	11	½	10	"	"	17	10	2	"	"	...	...	...	"	"	30	4	11
Feb.	"	5	0	31	"	"	18	0	13	Jan.	1840.	1	0	8	"	"	31	1	8
Jan.	1830.	31	8	9	Jan.	1836.	21	0	29	"	"	2	6	7	Feb.	1845.	1	0	12
Feb.	"	6	10	9	"	"	29	0	18	"	"	16	7	4	"	"	2	2	12
"	"	7	6	17	Feb.	"	2	11	4	"	"	17	7	6	"	"	3	2	20
"	"	12	8	14	"	"	3	6	11	"	"	18	3	10	Jan.	1846.	19	2	8
"	"	14	2	24	"	"	4	0	12	Feb.	"	4	4	5	"	"	20	1	20
Jan.	1831.	14	1½	16	"	"	5	6	3	"	"	5	3	15	Feb.	"	16	0	18
"	"	21	7	10	"	"	6	6	13	Jan.	1841.	4	2	16	"	"	27	0	8
"	"	24	0	8	"	"	15	0	14	"	"	5	4	22	"	1847.	24	0	22
Jan.	1832.	26	3	8	"	"	17	0	23	Feb.	"	12	1	16	Jan.	1848.	11	9	6
"	"	27	0	12	"	"	19	8	29	"	"	13	0	16	Feb.	"	11	1	25
"	"	28	4	14	Dec.	"	28	0	14	Jan.	1842.	24	0	18	"	"	...	...	...
March,	1833.	3	4	14	Jan.	1837.	3	1	4	"	1843.	4	0	14	Jan.	1849.	11	6	5
Feb.	1834.	8	0	22	"	"	4	6	12	Feb.	"	8	0	30	Feb.	"	8	5	18
Dec.	"	15	10	4	"	"	26	0	18	"	"	10	0	28	"	"	15	1	12
Jan.	1835.	4	10	5	"	"	27	0	24	"	"	17	1	22	"	"	16	10	14
"	"	5	7	15	Feb.	"	14	2	18	Jan.	1844.	9	2	16	"	"	19	1	12
"	"	7	6	6	"	"	18	4	16	"	"	21	1	14	"	"	20	2	29
"	"	8	5	20	"	1838.	17	½	9	"	"	26	7	5	1850, none.				
Feb.	"	8	0	8						"	"	27	5	8					

This table shows one day each for the months of May and September, also two days each for June, July, and August, when the thermometer was below 90°, for 22 years, at sunrise and at noon, beginning with 1829, and ending in 1850:—

Years and Months.	Days of Month.	Sunrise.	Noon.	Years and Months.	Days of Month.	Sunrise.	Noon.	Years and Months.	Days of Month.	Sunrise.	Noon.	Years and Months.	Days of Month.	Sunrise.	Noon.
May, 1829.	25	64	86	May, 1835.	20	61	86	May, 1841.	22	56	80	May, 1847.	10	58	80
June "	5	65	85	June "	10	60	86	June "	30	72	88	June "	25	62	86
" "	15	66	84	" "	3	58	82	" "	8	67	87	" "	27	68	84
July "	21	63	86	July "	24	64	86	July "	23	70	89	July "	8	64	88
" "	22	69	88	" "	14	68	84	" "	20	62	86	" "	13	70	86
August "	8	71	89	Aug. "	14	68	84	Aug. "	4	62	88	Aug. "	10	70	86
" "	22	72	87	" "	18	62	81	" "	21	66	87	" "	12	70	84
Sept. "	2	67	89	Sept. "	6	64	82	Sept. "	3	68	84	Sept. "	6	68	84
May, 1830.	2	57	78	May, 1836.	21	59	82	May, 1842.	11	50	76	May, 1848.	20	62	86
June "	16	69	84	June "	17	60	89	June "	26	62	80	June "	16	66	88
" "	18	63	85	" "	9	64	86	" "	17	66	79	" "	29	70	86
July "	5	69	87	July "	7	68	88	July "	30	68	86	July "	26	68	88
" "	25	72	88	" "	2	62	87	" "	13	64	84	" "	22	68	86
August "	12	65	86	Aug. "	8	58	88	Aug. "	23	56	86	Aug. "	17	72	89
" "	7	64	88	" "	28	56	84	" "	15	64	84	" "	15	68	86
Sept. "	24	64	82	Sept. "	19	64	86	Sept. "	13	70	80	Sept. "	1	65	82
May, 1831.	18	60	80	May, 1837.	31	56	83	May, 1843.	15	56	80	May, 1849.	21	58	78
June "	11	68	89	June "	30	60	88	June "	24	64	84	June "	16	60	89
" "	19	70	88	" "	1	60	82	" "	22	62	82	" "	20	70	88
July "	24	70	86	July "	1	64	89	July "	29	74	88	July "	20	64	89
" "	25	67	84	" "	18	56	82	" "	24	64	86	" "	8	68	88
August "	16	74	88	Aug. "	2	62	86	Aug. "	13	62	85	Aug. "	29	70	86
" "	20	70	86	" "	19	64	84	" "	27	66	88	" "	31	68	84
Sept. "	3	72	80	Sept. "	11	68	78	Sept. "	19	68	86	Sept. "	17	60	82
May, 1832.	14	58	78	May, 1838.	21	56	78	May, 1844.	25	64	82	May, 1850.	28	55	78
June "	12	58	86	June "	14	67	88	June "	27	68	86	June "	29	68	88
" "	25	62	86	" "	12	68	87	" "	28	70	84	" "	19	65	87
July "	3	70	88	July "	4	66	89	July "	21	64	85	July "	16	72	88
" "	6	58	86	" "	9	66	88	" "	24	66	84	" "	1	67	87
August "	7	70	86	Aug. "	8	66	88	Aug. "	17	62	86	Aug. "	6	68	88
" "	10	66	86	" "	4	58	86	" "	18	64	84	" "	5	70	86
Sept. "	19	58	86	Sept. "	7	58	84	Sept. "	10	72	78	Sept. "	1	68	84
May, 1833.	19	62	84	May, 1839.	16	54	82	May, 1845.	12	64	88				
June "	23	60	80	June "	27	54	81	June "	10	64	88				
" "	18	48	78	" "	30	60	80	" "	18	62	84				
July "	1	62	89	July "	26	68	86	July "	15	68	88				
" "	8	70	86	" "	30	66	84	" "	26	52	85				
August "	27	68	86	Aug. "	27	69	86	Aug. "	28	72	88				
" "	20	54	80	" "	21	62	85	" "	21	70	87				
Sept. "	5	68	84	Sept. "	7	62	82	Sept. "	8	66	81				
May, 1834.	27	56	80	May, 1840.	29	59	86	May, 1846.	25	54	88				
June "	9	64	88	June "	10	58	82	June "	15	62	85				
" "	10	64	84	" "	24	57	80	" "	4	60	84				
July "	27	73	88	July "	12	62	89	July "	12	74	88				
" "	7	70	86	" "	17	69	88	" "	21	66	86				
August "	12	67	86	Aug. "	21	64	86	Aug. "	17	66	88				
" "	24	62	84	" "	23	70	84	" "	29	66	86				
Sept. "	6	66	80	Sept. "	10	64	80	Sept. "	6	74	87				

Average of the thermometer for each quarter of the year, viz. winter, spring, summer, and fall. Also, the average for each year, for 22 years, beginning the 1st day of December, 1828, and ending the 30th of November, 1850.

Years.	Winter: Dec. Jan. Feb.		Spring: March, April, May.		Summer: June, July, Aug.		Fall: Sept. Oct. Nov.		Whole Year.	
	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.	Sunrise.	Noon.
	°	°	°	°	°	°	°	°	°	°
1828–29	23.17	33.05	38.50	54.22	60.12	76.95	42.69	56.62	41.22	55.48
1829–30	24.42	34.75	43.04	56.54	62.67	77.79	43.02	60.67	44.21	57.96
1830–31	22.70	31.12	43.04	56.77	63.78	79.91	46.97	58.39	44.25	56.41
1831–32	19.93	29.69	36.80	51.14	58.93	76.58	44.97	58.22	40.21	53.96
1832–33	24.93	32.65	39.91	56.61	58.93	74.68	43.52	56.13	41.67	55.14
1833–34	25.47	34.08	38.27	53.80	60.14	77.01	42.86	56.24	41.77	55.38
1834–35	21.66	30.99	35.69	50.89	58.40	76.40	43.21	58.38	39.83	54.28
1835–36	17.05	26.83	35.01	60.67	57.14	73.01	40.55	53.87	37.55	51.27
1836–37	19.21	29.11	35.17	49.79	56.88	72.94	41.54	55.59	38.74	51.58
1837–38	21.17	31.83	36.12	51.38	61.76	80.26	41.87	53.99	40.21	54.48
1838–39	21.81	31.85	38.80	54.49	58.46	74.25	42.41	57.27	40.34	54.58
1839–40	22.57	31.26	39.27	54.48	60.54	76.80	43.33	56.19	41.27	54.77
1840–41	23.07	34.83	36.46	51.39	60.30	77.45	42.44	55.35	40.68	50.74
1841–42	26.05	36.05	38.88	53.27	60.52	75.74	41.62	56.97	41.86	55.61
1842–43	22.77	32.71	35.54	50.48	59.82	76.17	43.16	56.22	40.41	54
1843–44	19.09	32.16	41.33	56.80	59.65	75.43	42.96	56.91	40.87	55.59
1844–45	24.71	34.81	38.91	64.25	60.65	78.58	43.46	57.01	42.08	53.51
1845–46	19.63	29.43	39.78	56.94	60.24	76.96	46.04	58.15	41.40	55.87
1846–47	21.97	31.88	36.44	51.16	60.38	77.06	43.66	56.84	40.54	54.48
1847–48	25.88	35.71	38.37	54.02	60	77	40.50	55.04	41.12	55.33
1848–49	21.11	30.90	36.73	51.09	59.68	78.42	44.70	58.21	40.65	54.76
1849–50	24.55	33.55	35.43	48.80	59.52	77.81	43.56	57.93	41.25	54.63

REMARKS.—You will see that 1830 was the warmest, and 1836 was the coldest year in the above table; and that July, 1838, was the warmest, and February, 1838, the coldest month in said years; and that the 24th of August, 1838, was the warmest day at noon, mercury 96°; and that the 16th day of December was the coldest, mercury 7° below zero at sunrise and at noon, and at 9 P. M. 13° below. The 3d of January, 1829, it was 12½°, below zero, and at noon ½° below.

This table contains all the days on which the thermometer stood at and above 90°, at sunrise and at noon of same day, for 22 years, beginning with the year 1829, and ending with 1850.

Years and Months.	Days of Month.	Deg. at Sunrise.	Deg. at Noon.	Years and Months.	Days of Month.	Deg. at Sunrise.	Deg. at Noon.
July, 1829	15	65	90	Aug. 1838	6	70	90
" 1830	16	67	90	" "	24	68	96
" "	17	72	92	1839.			
" "	18	72	94	July, 1840	15	68	92
" "	19	72	93	" "	16	66	92
" "	20	70	90	Aug. "	20	64	90
" "	21	70	94	1841.			
" "	22	72	95	1842.			
May, 1831	30	71	90	July, 1843	1	70	90
" "	31	66	92	1844.			
June, "	1	71	91	June, 1845	9	72	90
" "	2	72	92	July, "	14	64	95½
" "	3	62	92	" "	16	70	92
Aug. "	18	70	91	" "	17	70	92
" "	19	66	92	" "	21	70	90
" "	21	72	92	Aug. "	9	70	90
June, 1832	16	68	90	July, 1846	10	70	92
" "	17	70	90	" "	11	76	94
July, "	2	68	92	" "	30	68	90
" "	7	62	92	Aug. "	6	70	92
" 1833	14	68	90	July, 1847	7	62	90
" "	22	64	90	" "	11	70	92
" 1834	8	72	92	" "	18	70	90
" "	9	72	95	" "	19	68	91
Aug. "	5	61	90	" "	20	70	91
" "	6	70	90	June, 1848	17	70	90
" "	7	66	94	" "	18	62	90
July, 1835	13	68	90	June, 1849	21	73	92
" 1836	3	68	92	" "	22	65	93
1837.				" "	23	68	92
June, 1838	10	60	91	" "	24	62	90
" "	11	68	91	July, "	12	68	90
July, "	3	60	90	" "	18	71	92
" "	10	70	93	June, 1850	20	70	90
" "	11	74	90	July, "	30	72	90
" "	30	72	91				

The mercury did not rise as high as 90° during the years that are left blank.

This table shows one day each of the coldest weather in the months of March and November, also two days each in the months of December, January, and February, when the mercury was above zero, for 22 years, from January, 1829, to December, 1850:—

Years and Months.	Days of Month.	Sunrise.	Noon.	Years and Months.	Days of Month.	Sunrise.	Noon.	Years and Months.	Days of Month.	Sunrise.	Noon.	Years and Months.	Days of Month.	Sunrise.	Noon.
Jan. 1829.	12	4	22	Jan. 1835.	8	2	8	Jan. 1841.	8	12	18	Jan. 1847.	22	2	5
" "	10	2	8	" "	9	1	22	" "	19	6	20	" "	23	5	18
Feb. "	23	3½	14	Feb. "	9	2	18	Feb. "	24	6	23	Feb. "	5	8	22
" "	24	4	28	" "	11	1	26	" "	26	6	29	" "	18	10	28
March "	15	14	27	March "	5	1	31	March "	5	9	34	March "	12	12	23
Nov. "	18	20	36	Nov. "	30	11	25	Nov. "	30	16	32	Nov. "	16	18	27
Dec. "	4	10	28	Dec. "	8	1	20	Dec. "	22	6	22	Dec. "	21	15	25
" "	23	13	30	" "	11	5	21	" "	26	10	24	" "	27	5	14
Jan. 1830.	19	3	24	Jan. 1836.	16	3	14	Jan. 1842.	3	6	14	Jan. 1848.	10	3	6
" "	24	4	17	" "	28	1	14	" "	6	1	22	" "	19	7	14
Feb. "	9	2	26	Feb. "	7	4	29	Feb. "	9	6	15	Feb. "	12	1	25
" "	13	8	18	" "	18	1	15	" "	15	6	20	" "	26	4	25
March "	9	14	28	March "	6	6	32	March "	12	12	26	March "	15	4	14
Nov. "	27	36	40	Nov. "	26	11	25	Nov. "	29	16	24	Nov. "	11	10	28
Dec. "	22	6	18	Dec. "	30	4	8	Dec. "	19	10	24	Dec. "	23	5	15
" "	23	5	19	" "	31	2	12	" "	24	2	22	" "	24	7	28
Jan. 1831.	18	1	10	Jan. 1837.	14	4	13	Jan. 1843.	1	10	28	Jan. 1849.	10	4	8
" "	25	2	14	" "	15	1	15	" "	2	10	21	" "	19	2	11
Feb. "	6	2	16	Feb. "	8	6	22	Feb. "	9	4	22	Feb. "	7	3	28
" "	8	4	28	" "	19	8	29	" "	18	2	20	" "	10	2	14
March "	6	2	16	March "	2	2	21	March "	8	8	24	March "	5	14	32
Nov. "	30	20	26	Nov. "	26	6	24	Nov. "	15	18	38	Nov. "	1	24	29
Dec. "	16	1	19	Dec. "	22	5	16	Dec. "	6	10	30	Dec. "	12	12	22
" "	23	2	15	" "	23	4	23	" "	18	4	18	" "	26	2	12
Jan. 1832.	4	4	16	Jan. 1838.	30	7	12	Jan. 1844.	11	2	18	Jan. 1850.	1	4	12
" "	23	5	32	" "	31	2	14	" "	20	2	12	" "	7	8	32
Feb. "	17	4	18	Feb. "	21	2	16	Feb. "	1	4	18	Feb. "	4	6	18
" "	24	1	18	" "	27	2	21	" "	10	4	20	" "	5	5	14
March "	18	9	12	March "	2	18	34	March "	5	8	24	March "	4	9	26
Nov. "	16	14	40	Nov. "	25	3	16	Nov. "	26	14	20	Nov. "	23	28	46
Dec. "	23	10	16	Dec. "	17	3	22	Dec. "	21	6	24	Dec. "	14	2	22
" "	30	11	28	" "	24	4	10	" "	29	8	26	" "	24	5	10
Jan. 1833.	17	8	18	Jan. 1839.	20	8	10	Jan. 1845.	14	10	28				
" "	19	1	18	" "	22	2	16	" "	19	8	17				
Feb. "	7	8	12	Feb. "	6	4	12	Feb. "	10	7	26				
" "	25	2	16	" "	10	4	24	" "	18	6	12				
March "	25	2	16	March "	4	2	22	March "	12	18	48				
Nov. "	21	14	40	Nov. "	26	18	18	Nov. "	29	10	24				
Dec. "	13	10	24	Dec. "	19	7	17	Dec. "	12	2	18				
" "	20	13	28	" "	20	2	14	" "	18	2	20				
Jan. 1834.	23	3	10	Jan. 1840.	3	8	14	Jan. 1846.	18	8	6				
" "	24	2	15	" "	26	4	15	" "	22	5	6				
Feb. "	12	13	18	Feb. "	2	6	22	Feb. "	18	4	6				
" "	18	12	30	" "	8	9	26	" "	19	2	20				
March "	22	14	24	March "	8	7	26	March "	1	9	27				
Nov. "	17	21	33	Nov. "	21	23	36	Nov. "	27	23	28				
Dec. "	17	11	22	Dec. "	25	2	14	Dec. "	16	8	22				
" "	26	9	18	" "	26	10	20	" "	24	9	26				

This table shows when July was the warmest and when August was the warmest, for 22 years: also, when January was the coldest, and when February was the coldest, for the same period:—

Years.	January.	February.	July.	August.
1829		Coldest.		Warmest.
1830	Coldest.		Warmest.	
1831		Coldest.		Warmest.
1832		Coldest.		Warmest.
1833		Coldest.	Warmest.	
1834	Coldest.		Warmest.	
1835		Coldest.	Warmest.	
1836		Coldest.	Warmest.	
1837	Coldest.		Warmest.	
1838		Coldest.	Warmest.	
1839	Coldest.		Warmest.	
1840	Coldest.		Warmest.	
1841		Coldest.		Warmest.
1842	Coldest.		Warmest.	
1843		Coldest.		Warmest.
1844	Coldest.			Warmest.
1845		Coldest.		Warmest.
1846		Coldest.	Warmest.	
1847	Coldest.		Warmest.	
1848		Coldest.		Warmest.
1849		Coldest.	Warmest.	
1850	Coldest.		Warmest.	

Temperature of water in 4 wells and 5 springs, taken in August, at and near my residence:—

Wells: 1 at	53¾°	Springs: 2 at	54°
1 at	53	1 at	53
1 at	52	1 at	52
1 at	51	1 at	51

As cold-water establishments have of late become quite popular in curing diseases, I have made this note.

The author of the foregoing tables, Mr. Jonathan Clark, is one of the most careful and laborious observers and recorders of meteorological facts, of my acquaintance, in our State. I hope they will be carefully transferred to the pages of the Patent Office Report.

C. F. CLEAVELAND, M. C.

Burlington, January 8, 1851.

Sir:—About the first of this month, your circular of August 26, 1850, was put into my hands, with a request that I would furnish you with something in relation to our meteorology. I have kept a meteorological journal here, most of the time, for the last 20 years, and for the last 13 years it has been uninterrupted. The enclosed paper contains some abstracts from it. In addition to this, my journal contains daily records of the clearness of the sky, course of the winds, range of barometer, closing and opening of the lake, &c. &c. Those could be furnished, if desired, if I could find time to copy them; but perhaps I now send you more than you will think best to use.

Respectfully, your ob't servant,

ZADOCK THOMPSON.

THOMAS EWBANK, Esq.
Commissioner of Patents, Washington, D. C.

Abstracts of Meteorological Observations made at Burlington, Vermont, by Zadock Thompson.

Burlington is on the east side of Lake Champlain, where the lake is 10 miles wide. The place of observation is one mile from the lake shore, and 256 feet above the mean level of the lake, and in lat. 44° 29′ N. and 73° 11′ W. from Greenwich. The mean level of Lake Champlain is 90 feet above that of the ocean.

The mean temperatures are deduced from *three daily observations*, made at sunrise, 1 P. M., and 9 P. M.

Monthly and Annual Temperature of 13 Years.

Months.	1838.	1839.	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	Mean of 13 Years.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°
January...	25.7	18.6	12.2	25.3	22.3	23.02	9.91	21.36	19.77	20.97	24.17	15.66	23.74	20.55
February..	12.3	24.2	23.4	19.6	26.6	12.95	20.33	22.63	15.05	18.59	21.09	14.34	24.32	20.04
March	32.6	31.6	31.4	25.3	35.8	25.66	31.00	34.09	33.89	25.78	29.08	31.66	30.47	30.53
April	35.8	46.3	47.0	39.1	44.6	43.85	49.50	43.82	47.78	37.48	42.89	39.90	41.85	43.02
May	51.7	53.3	57.2	52.8	53.5	53.92	58.50	53.81	57.60	56.40	58.86	51.59	51.64	54.68
June........	68.1	60.7	65.6	67.1	63.8	61.36	66.50	65.21	64.97	64.15	65.02	66.76	67.12	65.15
July	71.8	71.5	71.6	68.9	70.0	64.16	67.10	68.40	69.51	71.08	68.39	72.74	70.08	69.68
August	67.5	68.3	72.5	70.5	70.1	67.78	65.60	69.43	70.45	67.62	66.82	69.14	66.03	68.60
September	60.5	60.6	58.3	61.9	57.3	59.59	59.90	58.12	64.75	58.80	56.41	58.02	59.69	59.58
October ...	46.8	50.8	48.0	45.0	47.5	42.84	47.00	51.15	45.37	45.89	47.24	47.10	48.25	47.15
November.	31.3	34.0	35.6	35.3	34.4	31.56	34.10	39.26	41.26	39.84	34.81	43.29	40.83	36.55
December.	19.1	26.2	21.1	26.4	21.3	26.87	23.40	17.81	23.43	27.00	30.01	23.17	18.65	23.42
An. Temp.	43.7	45.6	45.7	44.8	45.6	43.25	44.40	45.42	46.15	43.88	45.39	44.40	45.14	44.91

Monthly and Annual Fall of Water, for 13 Years, in inches and hundredths.

Months.	1838.	1839.	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	Mean of 13 Years.
January...	2.58	0.85	1.26	3.49	1.04	0.71	2.29	2.88	1.72	2.80	1.84	0.79	1.57	1.74
February .	1.32	1.29	1.89	0.80	3.75	1.43	0.78	2.52	1.47	1.85	0.90	0.41	1.79	1.54
March	1.10	1.48	3.06	3.28	1.97	2.12	2.85	2.48	2.20	2.10	2.44	2.14	1.11	2.18
April	1.34	1.60	4.69	3.51	2.52	0.82	1.48	2.22	0.91	3.15	1.09	0.47	2.41	2.01
May........	4.51	2.48	2.46	2.28	1.55	2.47	4.40	3.39	3.18	1.85	4.24	2.74	5.04	3.12
June	5.37	3.70	2.84	5.16	3.24	4.58	2.08	2.08	3.63	5.05	2.19	1.41	3.18	3.42
July	3.25	6.26	4.18	2.87	4.62	2.59	5.85	4.51	5.08	4.05	3.57	1.73	5.08	4.08
August	2.41	1.91	3.51	1.40	1.74	2.09	3.46	2.87	0.48	3.12	4.40	5.69	0.89	2.57
September	1.83	2.91	4.71	3.62	3.80	1.80	1.86	5.62	3.78	4.69	2.91	1.83	3.25	3.16
October ...	2.98	0.45	3.76	0.83	4.10	5.03	5.11	2.26	2.65	3.69	2.59	5.32	3.11	3.61
November.	3.78	2.57	2.22	2.47	2.82	1.63	0.57	4.00	2.88	2.13	2.26	2.69	1.77	2.41
December.	0.92	2.68	2.52	3.02	3.20	1.48	2.08	2.21	1.68	4.07	2.95	1.68	3.81	2.45
An. Am't..	30.88	27.99	37.19	32.68	33.85	26.75	31.21	36.04	29.66	38.55	31.38	26.85	37.51	32.24

The fall of water embraces that obtained from melted snow, as well as rain.

Fall of Snow in 13 successive Winters, in Inches.

Months.	1837–'38.	1838–'39.	1839–'40.	1840–'41.	1841–'42.	1842–'43.	1843–'44.	1844–'45.	1845–'46.	1846–'47.	1847–'48.	1848–'49.	1849–'50.
October.....	0	1	0	2½	0	0	10	0	0	7	0	0	0
November..	7	7½	8½	10½	8½	9	3	2	0	5	4	8	1
December..	8	12½	22	17	17½	47	18	18	36	22	18	18	19
January....	15	3½	11½	25½	7	9	16	20	9	24	11	10	16
February...	17	7	1	14	20	20	18	22	24	25	19	10	18
March	12	6	10	16	11	38	18	12	4	22	20	7	12
April........	1	3½	0	7	0	2	0	6	0	7	1	0	8
Total. ...	60	41	48	92½	64	123	78	75	73	112	68	48	74

The snows were measured immediately after their fall.

Advance of Spring for 14 Successive Years.

Years.	Robins seen.	Bluebirds seen.	Barn Swallows seen.	Currants blossom.	Red Plums blossom.	Plums & Cherries blossom.	Crab Apples blossom.	Com. Apples blossom.
1837..	March 20	March 28	April 30	May 16	May 19	May 28	May 30	June 2
1838..	" 23	" 27	May 2	" 19	" 22	" 26	June 1	" 2
1839..	" 25	" 31	April 26	" 4	" 12	" 14	May 22	May 26
1840..	" 15	" 15	" 21	" 8	" 12	" 17	" 20	" 28
1841..	" 27	" 27	" 27	" 28	" 25	" 26	" 29	" 31
1842..	" 18	" 18	May 2	" 11	" 14		" 27	" 29
1843..	April 12	April 12	" 8		" 15	" 17		" 26
1844..	March 21	March 25	April 25	April 25	April 30	" 4	" 9	" 11
1845..	" 9	" 18	May 8			" 18		" 21
1846..	" 25	" 26	April 29	" 29	May 5	" 10	" 18	" 17
1847..	" 25	" 25	May 4	May 16	" 20	" 22	" 26	" 28
1848..	" 25	" 23	" 4	" 5	" 11	" 14	" 18	" 20
1849..	" 14	" 26	" 10	" 20	" 23	" 26	June 1	June 4
1850..	" 29	" 23	" 2	" 18	" 19	" 20	" 2	" 4

Meteorological Table for 1850.—*Climate of Newark.*

Barometer, one of Troughton's, well-regulated: Thermometer, self-registering, hanging about nine feet from the ground, with a northern exposure, protected from rain and reflection. The monthly means are deduced from those of each day. The surface of the rain-gauge, four feet from the ground. The number of fair days, derived from the addition of half-days, the general character of each A. M. and P. M. being recorded. Days of rain, those on which it fell in appreciable quantities. Days of snow, those on which it fell, without regard to quantity.

Months.	Barometer. Mean, 7½ A. M. Attached Thermometer.	Barometer. Mean, 7½ A. M. Pressure.	Barometer. Mean, 5 P. M. Attached Thermometer.	Barometer. Mean, 5 P. M. Pressure.	Thermometer. Maximum. Date.	Thermometer. Maximum. Degrees.	Thermometer. Minimum. Date.	Thermometer. Minimum. Degrees.	Highest daily mean.	Lowest daily mean.	Monthly mean.	Daily Range. Greatest.	Daily Range. Least.	Daily Range. Mean.	Weather. Fair on Days.	Weather. Rain on Days.	Weather. Snow on Days.	Weather. Inches of Rain and Snow.	Prevailing Winds.
January	Imper	fect.	observ	ations.	27	57.75	1	18.00	49.50	19.00	34.444	28.00	1.00	11.39	14	10	6	5.010	N. W.
February	39.75	29.97	44.82	30.11	27	68.00	5	10.00	50.50	17.87	35.282	30.75	2.75	13.62	20	5	8	3.055	S. W. to N. W.
March	44.98	29.97	50.52	29.96	14	71.00	4	9.75	68.75	19.88	38.198	28.50	2.25	14.02	20	6	8	4.175	N. W.
April	63.61	30.01	65.16	30.00	30	74.00	15	24.25	62.50	34.62	47.745	32.00	3.00	20.78	18	10	2	3.080	N. W. to S. W.
May	67.64	29.99	69.00	29.97	28	86.75	8	37.75	78.75	49.38	57.020	32.50	5.00	18.69	15	16	—	7.435	Variable.
June	78.95	30.08	75.04	30.04	20	98.00	2	46.25	82.68	55.50	71.092	29.25	9.50	21.10	20	7	—	3.535	S. W.
July	76.88	30.07	78.85	30.05	25	98.50	12	55.50	83.87	67.00	75.899	28.75	3.00	17.86	21	9	—	7.420	S. E. to E.
August	73.95	30.03	76.20	30.03	6	92.00	18	53.00	80.88	64.50	72.888	25.25	1.75	17.82	24	9	—	4.725	N. W. to S. W.
September	69.90	30.10	60.67	30.08	6	85.75	30	42.00	78.75	53.37	65.725	28.50	1.00	17.40	22	5	—	4.405	N. W.
October	66.48	30.04	66.88	30.42	5	74.75	30	32.00	65.25	47.25	56.214	33.25	6.75	18.70	23	6	—	1.725	N. W. to S. W.
November	63.90	30.01	66.14	30.04	27	67.50	28	25.75	57.50	32.75	47.016	33.25	2.75	15.72	16	6	—	1.520	N. W. to S. W.
December	60.98	30.07	62.48	30.06	1	56.75	25	11.00	45.62	20.00	33.798	24.75	2.00	12.01	12	8	9	5.110	N. W. to S. W.
Mean results, 1850.	68.81	30.06	64.98	30.07	Max.	98.50	Min.	9.75	66.21	40.05	52.855	29.15	3.65	16.59	224	97	28	51.145	
Do. 1849.	56.48	29.91	63.12	29.88	"	99.75	"	2.75	63.42	36.71	50.869	29.11	3.00	15.35	214	95	22	40.050	
Do. 1848.	57.71	30.07	62.86	30.05	"	94.50	"	0.00	64.87	36.62	51.249	30.98	5.42	17.41	233	91	23	36.905	
Do. 1847.	58.38	30.03	62.67	30.06	"	98.50	"	0.50	65.80	36.30	49.881	29.85	4.00	16.73	219	91	31	54.835	
Do. 1846.	60.49	30.08	64.57	30.04	"	94.00	"	1.50	65.48	37.65	51.661	28.17	2.54	15.30	209	98	23	51.575	
Do. 1845.	64.36*	30.09*	67.69*	30.01*	"	98.25	"	3.50	64.28	36.00	51.870	28.67	4.54	15.87	238	88	24	36.470	
Do. 1844.	* The last three months.				"	92.50	"	3.75	62.96	38.54	51.208	28.28	3.35	16.31	282	101	26	40.205	

Monthly Means of the Thermometer, taken at Sunrise and at Noon, for 22 *Years, beginning January* 1*st*, 1829, *and ending December*, 1850.

Years.	January. Sunrise.	January. Noon.	February. Sunrise.	February. Noon.	March. Sunrise.	March. Noon.	April. Sunrise.	April. Noon.	May. Sunrise.	May. Noon.	June. Sunrise.	June. Noon.	July. Sunrise.	July. Noon.	August. Sunrise.	August. Noon.	September. Sunrise.	September. Noon.	October. Sunrise.	October. Noon.	November. Sunrise.	November. Noon.	December. Sunrise.	December. Noon.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
1829	22.80	31.22	14.18	27.18	25.88	38.50	38.66	54.78	51.47	71.25	57.50	74.88	60.50	77.50	62.29	78.13	49.76	66.53	42.51	58.90	35.30	44.36	33.71	42.90
1830	20.09	29.99	19.46	32.85	31.09	44.00	42.26	59.18	49.80	66.68	59.26	78.90	65.82	81.16	68.82	78.51	54.08	68.80	45.96	62.51	44.16	50.68	31.77	37.85
1831	17.74	25.77	18.07	29.68	34.16	45.88	42.76	56.56	52.19	68.85	64.28	80.18	64.88	78.84	65.98	80.77	56.68	69.96	47.98	61.77	34.00	44.88	18.87	22.71
1832	22.98	33.42	23.24	33.16	29.38	42.88	34.98	48.98	46.08	62.03	55.50	74.86	58.90	77.42	62.29	77.90	58.28	68.18	45.29	59.67	36.40	46.80	27.18	34.09
1833	26.58	33.19	20.64	30.46	26.22	40.42	41.78	60.00	51.80	69.51	54.80	71.54	61.88	77.54	58.06	69.84	54.16	69.20	45.18	57.45	31.22	41.67	27.80	33.20
1834	20.87	28.64	28.64	40.25	30.08	42.74	38.96	56.06	45.84	62.67	54.68	71.60	65.16	81.77	60.45	77.48	60.46	69.60	41.26	55.16	31.55	44.00	28.98	32.80
1835	22.09	31.61	18.82	28.28	24.90	37.77	34.28	49.18	46.98	65.71	56.26	78.98	60.85	79.29	58.51	75.90	48.88	66.78	46.71	63.74	34.46	44.50	18.19	25.64
1836	20.29	29.82	12.88	25.44	22.80	35.82	35.56	50.40	47.16	65.77	53.80	69.20	62.96	77.68	56.18	78.42	54.86	68.16	36.67	52.98	30.48	40.58	28.48	32.55
1837	14.55	24.90	19.64	29.96	25.16	37.65	35.00	51.28	45.88	60.64	55.56	72.06	57.51	74.19	57.51	72.59	50.10	66.50	41.84	55.51	32.66	44.46	23.06	33.51
1838	27.88	37.06	12.21	24.18	30.18	43.88	32.66	48.06	45.45	62.58	57.56	78.26	67.90	82.29	60.96	80.16	58.70	68.66	40.09	58.55	30.70	39.70	19.97	30.51
1839	21.48	30.98	22.64	34.85	28.77	40.77	39.38	56.90	48.81	65.87	52.68	69.00	62.88	78.45	60.06	75.13	52.00	67.70	44.00	60.82	31.20	41.70	26.45	33.51
1840	18.90	25.80	27.69	38.18	30.82	41.64	40.28	54.66	47.29	67.18	57.08	72.60	62.29	79.90	62.19	78.09	50.90	67.86	44.48	57.22	34.28	48.96	21.71	32.42
1841	26.85	35.71	20.96	34.89	28.55	44.00	34.80	48.86	45.08	61.77	58.80	75.58	60.61	77.80	61.45	78.98	57.88	72.10	38.18	51.45	31.96	42.68	27.82	36.00
1842	22.98	34.18	28.10	33.25	34.16	46.08	38.46	53.06	44.00	60.71	52.20	71.28	68.80	79.18	62.06	76.71	52.00	67.40	42.00	59.29	30.86	44.16	24.51	31.88
1843	27.06	33.06	15.08	28.25	19.98	34.67	39.26	52.83	47.55	64.85	56.20	78.40	60.65	77.89	62.51	77.64	56.56	72.38	41.90	58.81	31.06	54.00	24.19	35.42
1844	18.22	24.74	20.00	36.62	30.74	41.84	42.50	62.90	50.80	66.48	57.96	78.68	60.82	75.51	60.00	77.10	49.11	69.28	43.77	55.54	32.63	46.00	26.18	34.90
1845	25.85	34.66	22.48	34.39	31.64	45.42	37.30	58.18	48.06	64.16	56.43	72.56	62.71	79.81	62.67	80.93	51.66	66.60	40.74	56.29	37.86	48.17	20.51	28.19
1846	22.58	32.74	15.71	27.14	30.85	44.89	38.36	58.08	49.16	66.61	55.29	75.28	63.29	79.19	61.82	79.29	57.10	75.06	41.10	55.14	40.16	47.06	22.64	31.84
1847	21.85	31.16	21.25	32.00	24.67	36.88	34.81	50.60	48.61	64.51	57.90	74.80	62.26	82.64	60.77	77.40	52.80	65.98	40.08	55.88	38.26	49.26	31.96	37.64
1848	25.22	34.51	18.62	32.86	25.22	38.71	37.07	54.00	52.77	67.88	58.58	74.50	60.55	78.18	60.87	78.29	49.96	67.83	42.08	56.06	29.46	40.86	30.67	39.51
1849	17.41	36.19	14.60	26.21	30.06	40.00	35.90	51.63	44.20	60.68	56.60	76.86	61.09	80.09	61.26	78.28	50.43	61.48	43.22	55.89	40.50	51.98	24.71	31.97
1850	23.26	33.06	25.82	35.82	26.45	34.64	34.20	48.78	45.33	59.80	57.80	77.26	62.61	79.90	58.74	76.22	53.46	67.98	44.00	58.22	36.56	47.63	23.92	32.19

Meteorological Table for the Year 1850.

Union County, Arkansas.

Latitude, 33 degrees 18 minutes north; longitude, west of Washington, 16 degrees.

	Morning.	Noon.	Night.	Clear Days.	Cloudy Days.	Rainy Days.	Thunder.	Lightning.	Frost.	Snow.	Sleet.	Hail.	The Highest Range of the Thermometer in each Month.	The Lowest Range in each Month.	Highest Range in the Year.	Lowest Range in the Year.	Difference between the Highest and Lowest Range.	Quantity of Rain in each Month.
January	48	50	49	10	21	16	6	4	3	...	1	...	70°	29°	...	...	...	9.18
February	43	53	46	10	18	10	2	...	5	2	...	...	79	18	...	...	...	6.58
March	50	61	56	12	19	11	9	5	9	1	1	2	79	32	...	...	...	5.25
April	56	67	63	11	19	14	13	4	3	...	1	1	81	36	...	...	...	11.88
May	62	71	67	16	15	14	11	3	...	...	...	...	88	47	...	...	...	7.24
June	71	82	77	22	8	17	15	10	...	...	...	...	89	58	...	...	...	3.26
July	73	87	80	24	7	13	22	15	...	...	...	...	98	65	...	...	...	2.68
August	76	91	82	29	2	12	16	11	...	...	...	...	98	69	98	...	...	18.83
September	67	82	74	29	1	8	4	2	...	...	...	...	87	58	...	...	...	1.25
October	56	70	64	25	6	9	6	2	2	...	...	...	82	37	...	...	...	3.50
November	46	60	56	17	13	12	8	3	8	...	...	...	76	25	...	...	...	6.25
December	39	46	44	12	18	14	8	2	8	3	2	...	75	18	...	18	85	11.12
Mean for the year	52	65	63	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total	....	....	....	217	147	145	180	61	82	6	5	3	....	....	....	....	....	81.17/100

The mean range of the Thermometer is represented in the three first columns.

The rain-gauge is graduated to the hundredth part of an inch. All days in which rain fell are marked rainy days. Days, the greater part of which were cloudy, are registered cloudy days. When thunder and lightning occurred, they are marked one to the day under their appropriate column.

D. C. ROSS.

Report of the Temperature for 15 *Years, from* 1836 *to* 1850.

Hillsborough, Highland County, Ohio.

Latitude about 39° 15′ North; longitude about 6° 45′ West from Washington. Elevation nearly 700 feet above low water at Cincinnati.

The thermometer hangs outside of the house, on the north side. It has been examined at sunrise in the morning, and about 2 o'clock, P. M., each day. The highest and lowest points during each month, are put down in the 1st and 2d column for each year, and, in the 3d column, the average of the month. The average for the whole year is given at the bottom, except three years, during which I was from home part of the time. The lowest point to which the mercury has sunk, in the 15 years, is 22 below zero: the highest to which it has risen, 92 above. The coldest year was 1836; the warmest, 1846. The coldest winter was that of 1840 and 1841; the warmest, 1844 and 1845.

JOS. McD. MATHEWS.

	1836.			1837.			1838.			1839.		
	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.
January	14	54	27	4	44	25	4	60	31.3	6	58	24
February	11	54	24	2	54	27	[illegible]	42	15	6	60	32.6
March	8	62	33	15	[illegible]	33	6	77	43	18	73	38
April	22	80	49.5	23	[illegible]	42.5	24	76	40	[illegible]	80	56
May	35	83	62	[illegible]	[illegible]	56	30	80	51	30	83	63.5
June	50	82	66	[illegible]	[illegible]	61	[illegible]	[illegible]	69.5	46	89	71
July	52	83	69.5	[illegible]	[illegible]	70	52	92	75.5	51	90	73
August	54	82	67.2	44	[illegible]	67	54	[illegible]	72.7	49	89	70
September	34	86	65.5	[illegible]	81	61	34	[illegible]	62.5	30	76	60
October	24	70	44.5	22	72	47	[illegible]	74	42.5	[illegible]	79	54.7
November	10	64	36	[illegible]	66	44	9	60	35.7	3	64	36
December	1	54	26.2	[illegible]	[illegible]	32.5	5	[illegible]	25.2	3	42	29.2
Average			47.4			46.6			47.7			50.6
Peach-trees bloomed	....			April 30.			....			March 20		
Cherry-trees bloomed	....			May 2.			....			....		
Apple-trees bloomed	April 30.			May 5.			April 24.			April 27.		
Average of Thermometer	....			1836–'37. 29.46			1837–'38. 29.5			1838–'39. 31		

	1840.			1841.			1842.			1843.		
	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.
January	2	50	28.5	8	40	27.9	8	60	36	4	64	36.2
February	6	68	40.1	1	50	26.9	4	63	34.9	5	40	24.4
March	16	71	44.4	13	70	34.8	23	76	50.5	1	80	26.2
April	24	87	62.5	26	75	48.2	30	80	56	24	78	48.4
May	36	82	60.7	36	84	56.5	38	77	60.3	40	76	60
June	44	86	67.6	[illegible]	90	72.5	46	88	66.4	46	70	67.6
July	50	88	73	[illegible]	[illegible]	73	52	88	70.5	56	89	72.5
August	54	84	70.5	[illegible]	90	70.7	46	82	65.5	52	80	68.2
September	...	...	...	49	87	65.5	40	86	65.2	42	84	66.5
October	...	...	...	28	73	48.3	28	73	54.6	22	86	[illegible]
November	16	68	[illegible]	20	67	41.1	2	66	32.6	21	80	37.5
December	4	66	26.5	10	68	28.8	1	61	32.2	12	66	34.4
Average						50.4			51.9			60
Peach-trees bloomed	April 4.			April 17.			March 21.			April 28.		
Cherry-trees bloomed	April 7.			April 20.			March 30.			May 5.		
Apple-trees bloomed	April 17.			....			April 2.			May 6.		
Average of Thermometer	1839–'40. 33.9			1840–'41. 28.9			1841–'42. 34.6			1842–'43. 30.6		

	1844.			1845.			1846.			1847.		
	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.
January	15	54	26.5	10	57	36.3	7	56	34	4	62	37.9
February	10	61	34.6	8	66	37.2	1	53	30.2	5	53	34.4
March	27	65	44.2	38	73	44.3	17	62	42.9	11	66	37.1
April	37	82	61.5	18	[illegible]	56.4	31	82	58.7	26	77	52.2
May	37	[illegible]	66.4	36	81	60.5	48	86	65.6	[illegible]	80	60.2
June	42	84	68.4	51	[illegible]	70.1	48	82	68.9	47	86	64.7
July	[illegible]	86	73.4	58	[illegible]	71.6	[illegible]	90	73.8	[illegible]	[illegible]	73.9
August	...	...	...	56	87	72.8	[illegible]	90	73.5	48	82	68.5
September	[illegible]	[illegible]	63.2	...	...	...	47	84	68.9	[illegible]	81	58.5
October	26	[illegible]	47.5	[illegible]	[illegible]	51.6	27	74	52.4	27	78	51.1
November	12	66	42.2	9	65	41.3	16	66	46	16	70	45.2
December	11	62	[illegible]	12	44	28.7	13	62	37.7	6	66	31.4
Average									54			48.2
Peach-trees bloomed	April 5.			March 28.			....			April 13.		
Cherry-trees bloomed	April 9.			April 11.			April 28.			....		
Apple-trees bloomed	April 11.			....			....			....		
Average of Thermometer	1843–'44. 32.5			1844–'45. 36			1845–'46. 29.3			1846–'47. 33.3		

	1848.			1849.			1850.		
	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.	Minimum.	Maximum.	Average of the Month.
January	4	66	36.1	5	56	30.4	4	54	34
February	[illegible]	46	24.8	3	62	27.7	2	62	33.5
March	6	79	39.7	25	64	43.9	14	62	38
April	[illegible]	78	51.9	22	81	49.2	24	74	46.4
May	[illegible]	80	64.0	42	79	60	36	82	56
June	[illegible]	88	66.7	56	88	70.8	44	86	69.9
July	[illegible]	88	70.7	54	88	69.4	60	90	75.7
August	54	84	66	56	80	64.5	54	86	71.8
September	[illegible]	78	60	42	79	60.5	40	82	62.7
October	26	68	51.8	36	68	50.9	30	74	51.8
November	[illegible]	62	36.9	22	72	48.2	24	72	44.8
December	19	66	30.4	2	51	28	11	58	31.6
Average			52			50.9			51.4
Peach-trees bloomed	April 4.			April 7.			April 22.		
Cherry-trees bloomed	....			....			April 27.		
Apple-trees bloomed	....			....			May 2.		
Average of Thermometer	1847–'48. 34.1			1848–'49. 31.8			1849–'50. 32.2		

OF THE INORGANIC CONSTITUENTS OF FOOD.

From the Journal of the Royal Agricultural Society of England.

We discover in the bodies of animals the several mineral substances the existence of which are ascertained in vegetables. The bones, as we have seen, contain a large quantity of phosphate of lime; it is requisite, therefore, that the elements of this salt, phosphoric acid and lime, should form part of the ration or diet-roll: this is a point upon which all physiologists are agreed; but the point upon which there is nothing like uniformity yet attained, has reference to the precise quantity of mineral matter which must enter into the constitution of the food.

The analyses of ashes which I have given show that, if vegetable aliments all contain nearly the same inorganic principles, they still contain them in very different proportions: thus, potatoes, wheat, oats, and beans contain much less lime than clover, straw, and peas. The phosphoric and sulphuric acids and the alkalies do not vary less: so that we are led to ask, whether a ration compounded of such and such an article, or of such and such articles, will furnish the animals to which it is supplied with the necessary dose of inorganic principles which must be assimilated daily, and are quite indispensable to maintain them in health and vigor.

It is easy to arrive at the knowledge of the mineral principles which are necessary as elements of the diet, by ascertaining their quantity in the ration, which long experience has shown to be sufficient; yet, as there is reason to believe that, in many cases, mineral substances are present in excess, I have thought that it might be useful to determine by means of analysis the nature and the proportion of the inorganic elements which are actually assimilated by an individual, in order to have a minimum which might serve as a basis for any reasonings or inferences on the subject. My experiments were performed in two opposite circumstances, in which I regard assimilation as most rapid and most complete; videlicit, a calf in full growth, and a milch-cow in calf.

The calf was six months old, and weighed 369 lbs. Some days before being made the subject of experiment, it was fed with hay. During the two days, when it had this fodder ad libitum, it ate 19 lbs.

In the course of the 1st day, the calf passed......	21.49	lbs. of excrement,
2d day..............................	20.39	
	41.88	

which, dried, was reduced to 7.41 lbs.

In the course of the two days, 5.584 lbs. of urine were collected, which, evaporated, yielded 2933.2 grains of extract: the animal having, in the same interval, drunk 45.7 pints of water.

Analysis discovered in 100:

Of the hay, azote...............	1.6.........	Ashes.........	7.6
Of the dry excrements.........	2.1...........................		12.7
Of the urinous extract.........	4.0...........................		40.0

Now, if we inquire from these data, in regard to the quantity of azote, and of mineral matters which were consumed with the food, in the course of two days, we have,

In the food, discarding fractions, azote....	69.	Mineral substances,	328
In the excrements..........................	50.5		214
In the urine..................................	3.8		38
Together......................................	54.3		252

Therefore azote fixed or exhausted in 24 days.......... 14.7 half-drachms.
Mineral substances fixed in two days..................... 76 "

The composition of the ashes obtained from the hay and from the excrements shows us approximately both the quantity and the nature of the several inorganic substances which had been assimilated.

The composition of these ashes is as follows:—

	Of the hay.	Of the excrements.	Of the urine.
Acids, Carbonic...........	9.0	2.0	17.3
Acids, Phosphoric........	5.3	5.1	9.2
Acids, Sulphuric..........	2.4	2.3	7.0
Chlorine......................	2.3	1.9	9.9
Lime...........................	20.4	16.0	0.9
Magnesia.....................	6.0	6.5	6.0
Potash and soda............	17.3	12.5	57.3
Oxide of iron, alumina......	1.5	1.0	...
Silica..........................	33.7	51.0	1.2
Loss...........................	2.1	1.7	...
	100.0	100.0	100.0

If the hay consumed contained 328 half-drachms of ash, or mineral matter, the excrements and urine 252 half-drachms of the same matter, the difference between the two sums, 76 half-drachms,* is the quantity of mineral matter fixed in the course of two days, of which 200.6 grains were phosphoric acid, and 494.0 grains were lime.

This quantity of lime, however, is more than four times as much as is necessary to constitute a subphosphate of lime—such as exists in the bones. It is true, indeed, that there is always a quantity of carbonate of lime associated with the subphosphate in bones; 10 of carbonate, for 38 of phosphate, according to Fourcroy and Vauquelin, in those of the ox. Still, the quantity of lime assimilated was vastly more than it ought to have been, had it only gone to assist in the formation of bone. If there was no error in the observations, it is probable that the base in question enters into the constitution of the salts with organic acids, which are encountered in all parts of the animal body.

By a series of weighings, I ascertained that my calf, fed simply upon hay, increased, every day, by a quantity equal to 9725.9 grains troy, in

* The exact quantity is 2392.8 grains troy.

which were included 858.35 grains of mineral substances. The calcareous phosphate and carbonate of the bones, in this quantity, being represented by 262.4 grains, or nearly 3 per cent. of the entire weight acquired in the course of twenty-four hours.

In the experiment with the milch-cow in calf, I limited my inquiries to the phosphoric acid, and the lime taken in and given out. The animal, four years old, was two and a half months gone with calf, and weighed 1452.6 lbs. She had the same allowance, during the experiment, as she had had for several days before, and which, for twenty-four hours, consisted of

Hay	16.6 lbs.
Cut wheat straw	9.9 "
Beet	59.4 "

The experiment was continued for four days, during which the excrements, the urine, and the milk were carefully collected and weighed, and the ashes, both of the food consumed and of the products rendered, were determined by chemical analysis. Suffice it to say, that, representing the quantity of mineral matters assumed into the body, in the course of the experiment, by 849.9 half-drachms, the quantity voided amounted to no more than 5.56 half-drachms. In the quantity assumed, there were 100.2 half-drachms of phosphoric acid, and 203.8 half-drachms of lime. In the quantity voided, there were but 68.2 half-drachms of phosphoric acid, and 116.8 half drachms of lime. This is at the rate of about 8 half-drachms of phosphoric acid, and 22 half-drachms of lime assimilated in the course of twenty-four hours. Here, as in the case of the calf, the quantity of lime assimilated is greatly superior to what it ought to be, in order, by combining with the phosphoric acid, to constitute the phosphate of lime of the bones.

From these inquiries into the nutrition of the calf, and of a cow in calf, it follows that there is a portion of the mineral substance taken in with the food, which remains definitively fixed to concur in the growth, or in the evolution of the individual. In an adult animal, it is to be presumed that no such definitive fixation of inorganic principles takes place, or that it is much less considerable, that in the dejections and several secretions ought to be found the whole of the phosphoric acid, of the lime, &c. taken in with the food; and this presumption is confirmed by experience, for, on instituting an inquiry into the matter upon a horse, it was found that the mineral matters assumed were almost exactly balanced by those discharged. Nevertheless, and granting this to be quite true, which it is, it would be a grave mistake to suppose that an adult animal could go on, for even a very short period of time, upon food that contained no mineral matter. Precisely as in the case of organic matter, it appears that a portion of inorganic matter is also fixed in the living frame, where, for a time, it forms an integral element in the wonderful structure, and a supply of the latter kind is, undoubtedly, no less necessary than is the supply of the former description recognised by all the world.

Were there an inadequate quantity of phosphoric acid, of lime, &c. in the food, there is no question but that the body would speedily feel the effects of the deficiency, and that disease and death would by-and-by put an end to life. So much, indeed, seems demonstrated by the very interesting experiments of M. Chossat, in which he kept graminivorous animals upon a diet rich in azotized principles and in starch, but deficient in lime. From some previous inquiries, M. Chossat had observed that pigeons even

require to add a certain proportion of lime to their ordinary food, the quantity naturally contained in which does not suffice them. Wheat, as we have seen, though it contains a large proportion of phosphate of magnesia, contains very little phosphate of lime, and pigeons, put on this grain, though they do perfectly well at first, and even get fat, begin by-and-by to fall off. In from 2 or 3 months, the birds appeared to suffer from constant thirst; they drank frequently; the fæces became soft and liquid, and the flesh wasted; and, in from 8 to 10 months, the creatures died under the effects of a diarrhœa, which M. Chossat attributed to *deficiency of the calcareous aliment* in the food: and it is neither uninteresting nor unimportant to observe that the same thing occasionally occurs in the human subject, during the period when the process of ossification is usually most active. But one of the most remarkable features of M. Chossat's experiments was observed in the state of the bones of the pigeons; they became so thin and weak that they broke, during the life of the birds, with the slightest force.* The conclusion from this fact is obvious—supplies of all the elements of all the parts of the body are indispensable to the maintenance of health, to the continuance of life.

A pigeon will eat about 468.140 grains of wheat per diem, containing 9.725 grains of ash, in which analysis discovers 4.569 grains of phosphoric acid, and 0.277 of a grain of lime. But this small quantity of lime is incompetent to maintain the bones in their standard condition. I have thought it of moment to insist upon these facts, because I see that they may sometimes come into play in practical rural economy. No breeder or feeder ought to be ignorant of the influence of mineral substances on nutrition.

It is not only indispensable that the allowance of an animal in full growth be sufficient to support and even to add to the soft textures; it must further contain the elements requisite for the nutrition of the osseous system; and it is not impossible but that in managing the feeding of young cattle or young horses in such a way as to reduce to a minimum or to give in excess certain of the inorganic elements of the food, we may succeed in impressing one character or another upon a race. It is even possible that the empirical rules which are acted upon with a view to increase or diminish the quantity of bone, the weight of flesh or of fat, &c., are all connected with various proportions of phosphoric acid, of lime, magnesia, &c. in the food. It will probably be discovered some day, that Bakewell's art is to be explained through the composition of the ashes of the food.

Wheat is not the only alimentary matter that contains an insufficient quantity of lime: maize or Indian corn contains still less; and if that which is grown in the tropics contains as little as that which is produced in Europe, it would be difficult to explain how the grain should answer so well, as it unquestionably does, for food.†

It is true that it is seldom or never consumed alone and without addition; and in South America, where the animals have it largely, I have observed that they frequently eat earth. The habit which certain tribes of the natives have of eating earth, too, which has been particularly remarked upon by travellers and missionaries as an instance of depravation of taste, presents itself to me in quite another light, since I became acquainted with the com-

* Chossat, in Comptes Rendus, t. xiv. p. 455.

† An ash of maize, analyzed in my laboratory by M. Letellier, contained but 1.8 per cent. of lime to 50.1 of phosphoric acid, and 17.0 of magnesia.

position of the ashes of the ordinary article of diet in the countries where it occurs.*

The calcareous and other salts necessary to nutrition, however, are not derived from the food exclusively; the water that is generally consumed contains a quantity which is by no means to be neglected. A horse or a cow, for instance, which drinks from 15 to 45 quarts of water per diem, will, even if the water be as pure as that of the artesian well of Grenoble, take in from 35 to 108 grains of saline matter, in which carbonate of lime predominates. Water that is less free from saline impregnation would, of course, introduce a much larger proportion; some waters, in the quantities above specified, will contain from 188 to upwards of 400 grains of saline matter, one-half of which may be carbonate of lime. And I am here speaking of clear or filtered water; that which is muddy or turbid contains a still larger quantity of earthy matter in suspension than in solution. In an experiment made for the purpose of getting at the amount of earthy matter taken by a milch-cow from the watering-trough in the course of the day, I found that it amounted to about 770 grains troy.

Notwithstanding these facts, it is still doubtful whether the lime contained in ordinary well-water would prove sufficient to supply a growing animal with the material requisite to the formation of its bones; in adults, indeed, changes in the elements of the bones appear to proceed so slowly, that a very small quantity of calcareous matter, probably, suffices to repair losses; but it is otherwise with young and growing animals. I have shown that a calf, six months old, receives with its forage a quantity of phosphoric acid which corresponds to 555.7 grains of phosphate of lime. A calf, a few weeks old, when it has 17 or 18 pints of milk per diem, receives 802.7 grains of mineral substance, into which subphosphate of lime, or bone-earth, enters in the proportion of 370.5 grains. It would be interesting to ascertain what quantities of these substances were assimilated by so young an animal, and at a period when the growth is so rapid that the increase, from day to day, sometimes exceeds two pounds.

The importance of the inorganic principles of the food once recognised, it concerns us to take note of their nature and quantity in the ratio we allow to our domestic animals. It is, in fact, this consideration which has led me to determine the quantities of phosphoric acid and lime contained in the various articles of food the ashes of which have been analyzed. With these data the proportion of bone-earth contained in a given ratio is forthwith perceived.

One thousand parts of the forage, gathered by Bechelbron, in its ordinary state, contained—

* I several times saw children chastised in Indian villages, who had been caught eating earth.

Forage.	Mineral Substances.	Azote.	Phosphoric Acid.	Lime.	Bone-earth.
Hay	66.88	11.50	8.37	10.04	6.96
Potatoes	9.64	8.70	1.09	0.17	0.38
Beet	7.70	2.10	0.46	0.54	0.95
Turnip	5.70	1.80	0.85	0.62	0.72
Jerusalem Potato	12.47	8.75	1.85	0.29	0.56
Wheat	20.51	20.50	9.64	0.60	1.16
Maize	11.00	16.40	5.51	0.14	0.27
Oats	81.74	17.87	4.78	1.17	2.27
Wheat straw	51.90	8.00	1.61	4.41	8.82
Oat straw	85.70	8.00	1.07	2.97	2.21
Clover hay	78.50	21.00	4.68	18.06	9.85
Peas	80.00	88.40	9.03	8.08	5.88
Haricots	85.00	48.80	9.88	2.02	5.94
Beans	80.00	51.10	10.26	1.58	9.27

We seem here to observe a certain relation between the proportion of azote and that of the phosphoric acid contained in the food. The most highly azotized are also those that generally contain the largest quantity of the acid—a circumstance which seems to indicate that in the vegetable kingdom the phosphates are connected more especially with the azotized principles, and that they accompany them in passing into the textures of animals. With the assistance of the above table, it is easy to ascertain the quantity of phosphate of lime which enters into a given ration. Let us take that given to the horses in experiment 3d, in which the half of the hay was replaced by potatoes, one of the articles that contains the smallest proportion of lime, and to find in the

26.6 lbs. of hay, 632.9 grs. phosphoric acid and 1869.9 grs. of lime,
30.8 lbs. of potatoes, 387.7 grs. " 37.9 "

numbers which correspond with 1798.5 grains of bone-earth, and 978.7 grains of uncombined lime.

In his usual allowance, a work-horse at Bechelbron receives,

Hay, 22 lbs. containing 524.8 grs. of phosphoric acid, and 1543.8 grs. of lime,
Straw, 5.5 " 60.7
Oats, 7.2 " 230.2

81.57

In other words, 1735 grains of bone-earth, and 864 grains of free lime.

I have found that very young foals, growing rapidly, and weighing about 374 lbs., consume per diem,

Hay.... 19.8 lbs. containing of phosphoric acid 463 grs., lime 389 grs.
Oats.... 7.2 " " 231 " 58.6

which represents 95 of bone or subphosphate of lime. As a consequence of the relation which appears to exist between the azote and phosphoric acid of an article of sustenance, it comes to pass that like nutritive equivalents also indicate like proportions of phosphoric acid; so that, by introducing a suitable quantity of hay or clover, articles that abound in lime, into the ration, we are always certain of having food favorable to the development of the osseous system, whatever the nature and quality of the other articles that enter into the constitution of the allowance.

The relation of the phosphoric acid to the azote approaches the ratio of 8 to 10 in the more ordinary articles of forage; but the same relation is no longer apparent in the cereals and leguminous vegetables: in grain, and peas, and beans, the phosphoric acid amounts to about a fourth of the azote contained. Thus we have,

	Theoretical equivalent.	Phosphoric acid in the equivalent.
Hay	100	0.34
Potatoes	320	0.35
Beet	548	0.28
Turnip	885	0.31
Jerusalems	273	0.34
Wheat straw	235	0.87
Oat straw	380	0.40
Oats	68	0.32
Maize	70	0.38
Wheat	43	0.41
Haricots	27	0.25
Beans	23	0.24

THE COTTON TRADE, FROM 1825 TO 1850.

BY PROFESSOR M'KAY, UNIVERSITY OF GEORGIA.

Instead of our annual review of the cotton trade, for a single year, we propose to extend our examinations back to a longer period. For this purpose, we have collected, in our statistical tables, the production, consumption, stocks, and prices of cotton for each year from 1840 to 1850; and, for the more important particulars of the trade, we have gone back as far as 1825. This period of 25 years we have divided into intervals of 5 years, and given the average for each, noting the rate of increase or decrease for each country separately. By taking average results, we get clear of the fluctuations arising from short crops, and other disturbing causes, and are able to observe the general progress, free from those temporary variations which prevent our judging accurately the real changes that are taking place. In this review, we shall see a very prominent place assigned to our country. The United States is now, not only the largest producer, but the largest consumer of cotton: our production has advanced with such rapid strides, that we have distanced all competitors: the cotton goods worn by our people exceed now the amount used by Great Britain and all her dependencies in the four quarters of the globe; and the demands of our manufactories have increased with much greater rapidity than those of any other country in the world. In the table of supplies, (Table I., at the end of this article,) we may observe, that, while other countries have been nearly stationary, our production has advanced with great rapidity. In 20 years, our average crop has increased from 848,000 bales to 2,351,000, or nearly three hundred per cent. If the period of 25 years, from 1825 to 1850, be divided into five equal intervals, the increase for each will be found to be 27, 37, 38, and 15 per cent. In the same time, the production of all other countries has only

risen from 383,000 to 440,000 bales, having absolutely declined, in the last five years, over 16 per cent. In the first period of five years, the crop of the United States constituted 68 per cent. of the whole; in the second, 74; in the third, 77; in the fourth, 80; and, in the fifth, 84 per cent. of the whole. As our bags have increased very much in weight, and are now much larger than those of other countries, our advance has been still greater, and our rank still higher than these figures indicate. If the table of consumption (Table II.) be examined, it will appear that our progress is none the less rapid, in comparison with other countries. In the same 20 years, the deliveries to our manufactories have advanced 325 per cent., viz. from 127,000 bales to 539,000; while, in the same time, the advance of Great Britain has been only 125 per cent., viz. from 653,000 bales to 1,472,000. In each one of these periods, our rate of progress has been more than twice as rapid as hers; and though the absolute amount of our consumption is yet far below that consumed by the English manufacturers, yet, in the last five years, our increase has been 176,000 bales, while theirs has been only 180,000. At present, our consumption is 37 per cent. of the English, while twenty years ago it was only 19 per cent.

France, during all this period, has remained nearly stationary. Twenty years ago, her consumption was 257,000 bales; now, it is only 368,000. In the last five years, she has gone backward, the decline having amounted to 58,000 bales. From 1825 to 1830, the deliveries to her manufactories were double those of the United States; now, they are 33 per cent. less than ours. Her rank, compared with Great Britain, and with nearly every other country in Europe, has also declined. In Spain, Belgium, Germany, Holland, and Russia, the increase has been nearly as rapid as in the United States. In the last five years, their advance (Table III.) has been 46 per cent.; ours, 49 per cent. Their rank in the cotton-consuming countries is yet low, but their rapid progress will soon bring them to a more important position. At present, their consumption is 34 per cent. of that of Great Britain, and the time is not far distant when, taken together, will equal her. Twenty years ago, the comparative rank of the United States, Great Britain, France, and the rest of the continent, was in proportion to the numbers 11, 55, 22, and 12; in the last five years, the percentage of each has been 19, 51, 13, and 17. If France be left out of the comparison, the rank of each, twenty years ago, was as 13, 70, and 17; now, it is as 21, 59, and 20. Although Great Britain requires for her manufactories more than half of all the cotton worked up in Europe and America, the amount actually used by her people, including all that is exported to India, British America, Australia, and all the colonial dependencies of Great Britain, is less than the amount used in the United States. This has been shown to be true for the last four years; and the present year, although it exhibits an apparent decline in our home consumption, forms no exception to this result. The enlarged imports of cotton goods imported into our seaports, compensate, in part, for the falling off of the wants of our factories. If we compare the progress in the demand and supply, it will be seen that, during the last five years, the consumption has increased much faster than the production—the one having advanced 19 per cent. and the other only 9. This might be inferred from the decline in the stocks, but it will be more satisfactory to consider the average production and consumption of the last ten years. The average amount taken by the manufacturers, from 1840 to 1845, was 2,414,000 bales, and, from 1845 to 1850, 2,869,000 bales, showing an increase of 465,000 bales; while the supply advanced from 2,561,000 bales to 2,791,000, with an increase of only 230,000 bales. When it is remembered that the last period embraces the year 1847, when, from the revolutions in Europe, the consumption declined over 600,000 bales, and the years 1845 and 1849, when the American crop so far exceeded its usual average, this result will be more striking and important. The table of stocks (Table IV.) confirms and establishes this same result. At the end of 1844, the cotton on hand in Europe was 1,101,000 bales; at the end of 1849, it was only 646,000 bales.

It may be further observed that the increase in the supply, during the last five years, has been slower than the natural increase of laborers. The advance in the one has been only 9 per cent., and in the other 12 or 13. As many new hands have been brought to the Southern States during this period, the rate of increase in the working force of the cotton-growing States has been still greater than 12 or 13 per cent. This excess has occurred at no former period. From 1825 to 1850, the increments for each period of five years have been 18, 32, 33, and 9 per cent.; always above the increments of population, except in the last interval. It follows, from this, that labor and capital have found other modes of employment more attractive and profitable than the raising of cotton. It is well known that this has been to some extent true in the United States, but it has been more evident and striking in India and Brazil. In these countries, the crop has declined 16 per cent. in the last five years. From Brazil, it has declined regularly for the last twenty years, and the recent advance in coffee will tend still more to divert labor from the production of cotton. The abolition of the discriminating duty in favor of East India cotton, by Sir Robert Peel, and the very low prices which have recently prevailed, have not only stopped any increase in the imports of Surat and Madras, but turned the current in the opposite direction. The advance in the fifteen years before 1845 was 10, 80, and 60 per cent., in each interval of five years; but, from 1845 to 1850, the decline has been 24 per cent. It may fairly be deduced, from this, that the prices of the last five years have not afforded sufficient encouragement to production, and that the planters may now look for a permanent improvement in prices. The table of prices (Table V.) shows that for the last five years the average price at the seaports of the United States has been seven cents and three mills; and it may be expected, with confidence, that they will not rule so low hereafter—that the average rates will not merely experience a temporary rise, as if caused by the short crop and the small stocks of the present year, but a permanent and continued advance.

The table of stocks (Table IV.) represents the amounts on hand in the seaports of Europe continually increasing from 1840 to 1850, while during the four years ending 1849, they have been nearly stationary. Comparing them with the wants of the manufacturers, as is done in the column which contains the number of weeks that the stocks would supply the consumption of the factories, the supply was a trifle lower at the close of 1849, after the receipt of the largest crop ever brought to market, than it had been during the last ten years. The number of bales was a little greater than at the close of 1848; but the time this stock would supply the wants of the manufacturers was a little less. After this review of the history of the trade in cotton for the last ten years, if we remember that the production of 1850 has been much below the average of the last five years, and that the prospects of the next year's crop are but a little better, it is evident that the present advance in cotton is founded upon no speculative basis, but on the unchangeable laws of supply and demand. Two short crops are succeeding each other, while the stocks on hand are very much reduced. To this, it may be added, that every thing is favorable to a large consumption. Peace everywhere prevails, except in the unimportant Duchies of Schleswig Holstein. Money is abundant, and the currency everywhere undisturbed. Food is very cheap. The present harvest of Europe, as well as the last, is much above an average. Thus, while stocks are low, and the supply small, the demand is large. Prices, therefore must maintain a high level, unless commotions in France, or some unforeseen event of commanding importance, interferes with the regular operation of commerce. In considering the supply and demand of the coming year, we must, therefore, base all our estimates on high prices. The receipts from India and Brazil, and the consumption in Europe and America, will all be affected by this fact. If the advance were slight, it would not experience any sensible check; but when the price has risen to its present rate, (13½ cents for middling fair, Savannah, October 23d,) an advance of 85 per cent. over the average of the last five years, the amount purchased even in our country may be expected to decline. The supply for 1851 will probably exceed that of 1850, not only from the United States, but from India and Brazil.

The past season here has been unfavorable for the growth of cotton; but its disasters, especially in the West, have not been as severe as in the preceding year. In South Carolina and Georgia, there will be a decided decline. The late cold spring, and the long drought in June and July, left the plants small, and the bolls few and scattering. The severe storm on the 24th of August blew out on the ground much open cotton, and prostrated and twisted the stalks so much that there has been no late crop of forms to mature in October. September was a beautiful season for gathering, and so was much of October. There are some plantations where the crop is very fine. The hot summer favored a rapid growth, and repaired, in part, the injury done by a late spring. The general drought was, at some places, relieved by local showers, which brought out some superior crops. The amount of land planted was greater than ever. The receipts at Charleston and Savannah will also be increased by the extension of the Georgia Railroad to the Tennessee River. Were it not for this last cause, a falling off of 100,000 bales might be anticipated. With this, the deficiency will not probably exceed 70,000 or 80,000; and the receipts of these two ports may be expected to reach 650,000 bales. From Alabama, the reports have not been so disastrous. The spring was late, and the stand poor; but the dry summer prevented the ravages of the worm, which had done so much damage the preceding year. The river floods had also done harm the last season; and these they have escaped. The prairie lands have not suffered so much with rust as before. On the Tombigbee, and also on the Black Warrior, the prospects of the planters are very much above those of last year. On the Alabama, the promise is about the same as last year. Still, the disasters have been severe, and the crop will be below an average. An increase of 90,000 or 100,000 bales in the receipts at Mobile, including the Montgomery shipments to New Orleans, may, with confidence, be anticipated. From Florida, a slight increase may be looked for. The amount of land planted has been considerably enlarged, and the drought has not been as general as in the eastern part of the cotton region. At New Orleans and in Texas a gain may be looked for. The failure, last year, was so great, that it is almost impossible to expect a like deficiency again. From Louisiana, Arkansas, and the greater part of Mississippi, the reports have been better than last year. The early frost of October 6th injured not a little of the cotton as far north as Memphis; but in general, even in Tennessee, the plant remained green and flourishing, till the general frost at the close of the month. The production of Tennessee and North Alabama will fall below that of last year, and a portion of this will not reach New Orleans. The crop was everywhere backward, but the hot, dry summer helped to repair this damage, and by keeping off the caterpillar and bollworm, permitted the forms to mature. The severe storms, that did so much harm in Florida and the Atlantic States, did not extend so far to the west. The season for gathering has been very fine, and the time of frost late enough to mature nearly every boll that could make cotton. The average receipts at New Orleans, for four years past, have been 943,000 bales; and this period includes two short and two full crops. For the present year, I would estimate them at 850,000 bales. Combining these estimates, the whole supply from the United States will amount to 2,200,000 bales, (see Table VI.) which is about 100,000 in advance of the last five years. The receipts from India have increased very much during the present year, under the stimulus of high prices, and they are destined to advance still more for the coming season.

The purchases now making in Bombay for the English market are reported to be large; and when the new crop begins to arrive at the seaports, the current will turn still more strongly towards England. Not only is their production enlarged by high prices in Europe, but a larger portion of the crop is diverted from China, and from domestic use, for the Western markets.

The average imports into Great Britain for the last 3 years have been 211,000 bales; but for the first 9 months of the present year, they have reached 128,000 bales for Liverpool alone; and for the whole year, for all the ports, they will probably reach 300,000 bales. For 1851 not less than 325,000 bales may be anticipated. This is higher, much higher than any former year. The year 1841 was the largest before 1850, and then the amount was 275,000 bales. The high prices that are now prevailing, and that are likely to prevail for the present season, authorize us to expect an increase even over the present year. (Table VII.)

From Brazil, Egypt, and other places, an advance over the usual average may also be looked for. The average imports into England from 1845 to 1849 were 175,000 bales; but for the present year, the amount will exceed 260,000 bales, and for 1851 will be still larger. (Table VIII.) If we estimate them at 275,000, the whole supply from all these sources (Table IX.) will reach 2,800,000 bales. In reference to the consumption, we may remark that the purchases for our home manufactories have declined during the present year over 30,000 bales. The high price of the raw material, the low duties on foreign goods, and the immense imports of cotton fabrics from England, have caused this retrograde movement. In 1849, there was a falling off of 14,000 bales, so that our consumption is now 44,000 bales below that of 1848. Doubtless the stocks in the hands of the manufacturers are very small, and a slight advance in goods would set all the mills at work again. The universal prosperity of the country forbids us to expect the extension, or even the continuance of this depression. For 1851, I would estimate the demand at 500,000 bales, which is 11,000 above the consumption of the present year, (Table X.) and 18,000 below the average of the last year. In Great Britain, the falling off in the purchases of the manufacturers have been very slight, (Table XI.) and as the reported purchases last year were 80,000 or 90,000 bales above the actual deliveries to the manufacturers, the real deficiency is less than the apparent. For the present year, the consumption in Great Britain will not be below 1,500,000 bales, against 1,588,000 in 1846, and 1,491,000 in 1848. Every thing has been favorable to a large consumption, except the price of the raw material. Money has been abundant—food of all kinds cheap—and labor well rewarded. These elements of prosperity have not been confined to Great Britain, and therefore her exports of cotton goods have been unprecedentedly large. The home and foreign demand being both good, the factories have run full time, in spite of the high price of cotton. This never occurred before, and cannot be expected again with any considerable confidence. At every former period, an advance in the raw material has checked the demands of the factories, and lessened the purchases of the consumers. For the coming year, every thing is fully as favorable as the last; and, if these favorable tendencies have counteracted the tendency of high prices in the raw material, it will be proper to expect the same for 1851 as for 1850. We may, therefore, set down 1,500,000 bales as the probable English consumption for the next year.

In France, there has been a decided decline (Table XII.) in the deliveries to the manufacturers. Our exports have fallen from 368,000 bales to 290,000, and the stocks on hand the 1st of October were almost exactly the same as last year. The purchases at Havre for the first 9 months of the present year have been 249,000 bales, against 290,000 in 1849. From these figures, we cannot estimate the consumption of American cotton for the present year higher than 300,000 bales, against 351,000 for 1849. No advance on this can be expected for the next year, nor is there any reason to anticipate any appreciable decline. For the rest of Europe, we have the exports from the United States for the present year, 194,000 bales, and the exports from Liverpool up to October 11th, 198,000 bales. The whole English exports of 1849 were 254,000 bales, and as their amount on October 12th was 21,000 more this year than last, the whole exports for the year from all the ports will probably reach 275,000 bales, making the total supply from these two countries of 469,000 bales. As the stocks on hand on the continent last year were very low, it is impossible to reduce them much lower. They are now, however, at several ports, lower than last year, so that the consumption will probably exceed 469,000 bales. As this is a decline of over 100,000 bales from 1849, it is not to be expected that so low a limit can be reached for the year 1851. Heretofore, their progress has been forward and rapid, and, were it not for high prices, this would continue. If we estimate their wants for 1851 at 500,000 bales, we have the total consumption (Table XIII.) of 2,800,000 bales—the same as the supply. As the stocks are now much lower than last year, (Table XIV.) and as they were then very low, they will bear no further reduction without a material advance in prices. On the contrary, any decline in price would immediately permit the consumption to expand, not only in France and the rest of the continent, but even in England. We may expect, therefore, that the present high range of prices will be maintained.

The review that has been taken of the supply and the demand shows that the present advance in cotton is the result of no speculative movement, but that it is based on the immutable laws of trade. The long prevalence of low prices has stimulated consumption and diminished production, until the stocks on hand have fallen to an extremely low limit. Exactly at this point, an unfavorable season has lessened the crop, and an abundant harvest and every other element of general prosperity have encouraged the demand. We congratulate the planters on the handsome returns they are receiving for their crops, and we may extend our congratulation to the whole country, for what benefits them is a benefit to all.

TABLE I.—*Supply of Cotton, (in thousand bales.)*

YEARS.	U. S. Crop brought to Seaports.	U. S. consumed in the South.	Total United States Crop.	East India Imports into Great Britain.	Brazil, etc. Imports into Great Britain.	Brazil, etc. Imports into other places.	Total besides United States.	Total, all kinds.
1840	2178	50	2228	216	146	111	474	2701
1841	1635	55	1690	275	166	128	569	2259
1842	1684	55	1739	255	124	166	545	2284
1843	2379	60	2439	182	165	176	523	2962
1844	2030	60	2090	184	197	80	511	2601
1845	2395	65	2460	150	201	105	461	2921
1846	2101	70	2171	95	155	69	319	2490
1847	1779	80	1859	254	185	122	481	2340
1848	2348	90	2438	228	187	86	401	2839
1849	2729	100	2829	182	245	111	538	3367
Average from 1825 to 1830	838	10	848	78	211	99	382	1231
" " 1830 to 1835	1055	20	1075	81	186	108	375	1450
" " 1835 to 1840	1440	35	1475	144	196	104	444	1919
" " 1840 to 1845	1981	56	2037	232	160	132	524	2561
" " 1845 to 1850	2270	81	2351	177	175	88	440	2791
Increase per cent. in 20 years	171	......	177	142	17	......	15	117
" " 15 years	115	......	119	118	8	......	17	99
" " 10 years	58	......	59	28	11	......	1	40
" " 5 years	15	......	15	24	9	......	16	2

TABLE II.—*Consumption of United States, Great Britain, France, and of Europe and America, (in thousand bales.)*

YEARS.	United States, north of Richmond.	United States, Total for.	Total for Great Britain.	United States Cotton in France.	Total for France.	Total for these three.	Total for Europe and America.
1840	295	345	1271	374	440	2056	2370
1841	297	352	1158	368	422	1932	2252
1842	268	323	1207	364	442	1972	2310
1843	325	385	1385	351	409	2179	2578
1844	347	407	1438	385	392	2237	2564
1845	389	454	1574	351	419	2447	2918
1846	423	498	1574	360	408	2470	2968
1847	428	508	1181	252	293	1982	2296
1848	532	622	1491	276	303	2416	2901
1849	518	618	1588	351	399	2605	3264
Average from 1825 to 1830	117	127	658	......	257	1037	1187
" " 1830 to 1835	175	195	876	......	269	1340	1540
" " 1835 to 1840	240	275	1069	......	349	1693	1948
" " 1840 to 1845	307	368	1292	......	421	2076	2414
" " 1845 to 1850	458	539	1472	......	363	2374	2869
Increase per cent. in 20 years	290	325	125	......	41	129	142
" " 15 years	161	176	68	......	35	77	86
" " 10 years	91	96	38	......	4	40	48
" " 5 years	59	49	14	......	14	14	19

TABLE III.—*Consumption of Europe and America, omitting England, France, and United States, (in thousand bales.)*

YEARS.	Exports from United States.	Exports from Great Britain.	Direct Imports from Egypt.	Stock, Jan. 1.	Stock, Dec. 31.	Consumption.
1840	182	128	49	72	112	314
1841	106	116	74	112	88	320
1842	132	133	88	88	108	338
1843	194	119	118	108	145	394
1844	144	141	23	145	26	237
1845	85	122	37	126	99	471
1846	205	194	26	99	26	498
1847	169	215	81	26	87	404
1848	255	192	9	87	58	485
1849	322	254	63	58	88	659
Average from 1840 to 1845	......	......	......	......	......	338
" 1845 to 1850	......	......	......	......	......	495
Increase per cent. in five years	......	......	......	......	......	46

TABLE IV.—*Stock 31st December, (in thousand bales.)*

Years.	Liverpool.	Great Britain.	Week's Consumption in Great Britain.	Havre.	France.	Rest of the Continent.	Whole of Europe.	Week's Consumption.
1840	366	464	18	80	97	112	673	17
1841	430	538	24	90	135	88	761	21
1842	457	561	24	109	138	108	807	21
1843	654	786	9	101	125	145	1056	25
1844	745	897	32	58	78	126	1101	26
1845	885	1057	35	52	65	99	1221	26
1846	439	547	18	25	47	26	620	18
1847	364	451	16	43	53	87	591	17
1848	398	498	17	20	31	58	587	18
1849	468	559	18	38	49	38	646	18

TABLE V.—*Amount, Value, and Price of American Cotton.*

Years.	Exports, in millions of pounds.	Value, in millions of dollars.	Price of Exports.	Whole Crop of United States.	Value of United States.	Liverpool Prices of Uplands, in pence.
1840	744	64	8.6	891	77	6
1841	530	54	10.2	684	70	6[illegible]
1842	577	48	8.1	704	58	5[illegible]
1843	817	49	6.0	988	59	4[illegible]
1844	664	54	8.1	857	69	4[illegible]
1845	873	52	6.0	109	61	4[illegible]
1846	548	43	7.9	901	71	4[illegible]
1847	527	53	10.1	771	78	6[illegible]
1848	814	62	7.6	1011	77	4[illegible]
1849	1027	66	6.5	1174	76	5[illegible]
Average from 1825 to 1830	219	28	12.8	288	37	7[illegible]
" 1830 to 1835	312	34	10.9	387	42	7[illegible]
" 1835 to 1840	446	64	14 4	560	81	8[illegible]
" 1840 to 1845	666	54	8.1	825	67	5[illegible]
" 1845 to 1850	754	55	7.3	972	71	5[illegible]

TABLE VI.—*United States Crop.*

	RECEIPTS.			ESTIMATE.
	1848.	1849.	1850.	1851.
Texas, bales	40,000	39,000	31,000	50,000
New Orleans	1,191,000	1,094,000	782,000	850,000
Mobile	436,000	509,000	351,000	440,000
Florida	154,000	200,000	181,000	190,000
Georgia	255,000	391,000	344,000	300,000
South Carolina	262,000	458,000	384,000	350,000
Other places	10,000	28,000	24,000	20,000
Total	2,348,000	2,729,000	2,097,000	2,200,000

TABLE VII.—*English Imports from East Indies.*

	Imports.	Remarks.
	Bales.	
1835 to 1840, average	144,000	High prices.
1840 to 1845 "	282,000	Chinese war.
1845 to 1850 "	177,000	Peace, and low prices.
1848, Oct. 6, to Liverpool	98,000	Moderate prices.
1849, Oct. 5, "	69,000	Low prices.
1850, Oct. 4, "	128,000	High prices.
1848, whole year	228,000	Moderate prices.
1849, "	182,000	Low prices.
1850, estimate whole year	300,000	High prices.
1851, " "	325,000	High prices.

TABLE VIII.—*English Imports from Brazil, Egypt, etc.*

Years.	About 1st October. Liverpool.	Whole Year. Great Britain.
	Bales.	Bales.
1846	121,000	155,000
1847	75,000	135,000
1848	94,000	187,000
1849	178,000	245,000
1850	208,000	260,000
1851	....	275,000

TABLE IX.—*Supply of Cotton.*

	1849.	1850.	1851.
	Bales.	Bales.	Bales.
Crop of United States	2,729,000	2,097,000	2,200,000
English imports from East Indies	182,000	300,000	325,000
" " other places	245,000	270,000	275,000
Total from these sources	3,156,000	2,667,000	2,800,000

TABLE X.—*United States Consumption.*

Years.	Amount Consumed.	Average for 3 years.	Inc. per cent. per annum.	Inc. per cent. for 3 years.
1846	423,000	386,000	9.0	23
1847	428,000	413,000	7.0	32
1848	532,000	461,000	11.5	30
1849	518,000	493,000	7.0	28
1850	488,000	515,000	4.0	24

TABLE XI.—*Deliveries to the Trade at Liverpool.*

	1849.	Consumption each week.	1850.	Consumption each week.
	Bales.	Bales.	Bales.	Bales.
March 8	324,000	36,000	227,000	26,222
April 12	438,000	30,929	338,000	24,148
May 10	562,000	31,222	501,000	27,838
June 21	748,000	31,167	672,000	28,000
July 6	835,000	30,926	742,000	28,222
August 9	1,037,000	32,206	907,000	28,942
September 6	1,141,000	31,694	981,000	28,029
October 4	1,220,000	30,500	1,886,000	27,150
November 11	1,287,000	31,390	1,116,000	27,219

TABLE XII.—*Deliveries to the Trade at Havre.*

	1849.	Consumption each month.	1850.	Consumption each month.
	Bales.	Bales.	Bales.	Bales.
May 1	120,141	30,035	104,728	26,182
July 1	193,971	32,328	167,658	27,942
August 1	243,040	34,720	200,650	28,664
September 1	279,541	37,442	332,190	29,024
October 1	290,585	36,328	249,707	27,528

TABLE XIII.—*Consumption.*

	1849.	1850.	1851.
Great Britain, all kinds	1,588,000	1,500,000	1,500,000
France, of American cotton	351,000	300,000	300,000
The rest of the Continent	596,000	470,000	500,000
Total	2,535,000	2,270,000	2,300,000

TABLE XIV.—*Stocks at Recent Dates.*

	1849.	1850.
	Bales.	Bales.
Liverpool, October 12	583,000	482,000
Havre, October 9	46,000	46,000
United States, September 1	155,000	168,000
Hamburg, October 1	5,000	2,000
Total	788,000	698,000

[*Merchants' Magazine.*

THE POTATO-ROT.

WE find the following article in the Boston Journal:—

"From all quarters of the State, we hear of the prevalence of the potato-rot. It seems to be more virulent in its operation and injurious in its effects than in former years; for now, in large fields, scarcely a potato can be found that is sound. One man, in Newton, lately offered a field of three acres for $5, and could not find a purchaser. In several towns in Middlesex county, there is not a field where the potatoes are untainted. We have already mentioned that in Essex county, and in the western part of the State generally, the potato is found to be very generally rotten; so much so as to threaten its almost entire destruction, unless the disease is soon arrested."

In Plymouth county, also, the blight has appeared, it is said, in nearly every farm in the upper part of the county. The Plymouth Memorial says:—

"It is confined principally to one or two varieties: the Chenangoes and the pink-eyes, or calicoes, are nearly all which have yet, to our knowledge, been affected. The former has, ever since the first appearance of the rot, some years since, been the most affected, and we should think it advisable to relinquish its culture, at least, for the present."

In Barnstable county, likewise, this mysterious rot has made its appearance. The Sandwich Observer says:—

"The potato rot has reappeared in this town, and is thought to be doing greater injury than it has done in any preceding year. The potatoes, in some fields, will hardly pay for the digging. When they come out of the ground, many of them look fair and sound, but an inside inspection shows their rottenness."

We have, also, accounts of the prevalence of the disease in New Hampshire:—

"In Rockingham county, N. H., the rot has suddenly taken hold of the potatoes, and the crop is very seriously injured, if not totally cut off. One patch of eight acres, which was calculated to produce 2000 bushels, is wholly lost. In Greenland, some potato fields are being ploughed up. In Rye and Newington, the disease is felt to the same extent."

The Portsmouth (N. H.) Journal says:—

"The loss of potatoes, in towns adjoining this city, cannot be much short of $100,000, should the crop utterly fail, as the present prospect seems to indicate."

From Rhode Island, we have a similar report. The Providence Journal says:—

"We regret to learn that this disease has suddenly appeared in this quarter. A few days ago, the potatoes looked finely. But now, we hear of their decay in all directions, and many fields, which promised a large yield, will not be worth digging."

SUGAR-CLEANSING MACHINE.

The New Orleans "Crescent" thus describes the operation of "Hurd's Patent Centrifugal Machine," which is represented to be an important invention to sugar-planters, both in the saving of time and sugar, as well as improving its quality.

The machinery is propelled by steam. The process is as follows:—The dark mixture of sugar and syrup, just as it is taken from the sugar-house coolers, is placed in a cylindrical tub, made of iron, the bottom of which is tight; but the sides or circumference is pierced full of small holes, which are covered over by fine wire-gauze. The cylinder is so arranged that it can be made to revolve on a stationary axle with great rapidity, making from 1000 to 1500 revolutions in a minute—or a speed of 2 or 3 miles per minute. The sugar, as soon as the machine begins to revolve, gradually leaves the bottom of the cylinder and attaches itself to the circumference. The motion continues; and if the wire-gauze were not strong enough, the sugar would break it and escape. The crystals, however, are retained by the fine network of the wire, but the molasses or syrup is driven by centrifugal force through the wire, and is projected with power and rapidity into an outside case, arranged to retain and collect it. In the course of a short time, varying from 5 to 10 minutes, the molasses has been thrown off, and the sugar is drained and fit for shipping, being much drier than when usually put on board. The syrup is now ready to be boiled a second time, before the air or heat has had any influence upon it, and another crop of crystals can be obtained, which can be subjected to the action of the machine; and the syrup coming from this second operation can be treated a third time, until its strength is exhausted.

ANALYSIS OF THE APPLE.

BY J. H. SALISBURY, M. D.

This examination was entered into with the view of throwing some light upon the composition of the apple. To determine whether or not it contained a sufficient percentage of nutritious matter to render it profitable as food for stock. That it has been used with a good degree of success in many instances, for several years, is well known; but it is by no means generally conceded that the apple is so nutritious as it actually is. Those who have had some experience in feeding good varieties, will find in the following analysis the reason of their favorable opinion of this valuable product of the farmer—valuable, because, if properly managed, the crop is sure, large, rich, and attended with less labor and expense than almost any other.

It was the intention to have analyzed several varieties of sweet apples; but, owing to the lateness of the season before the examination was commenced, and the scarcity of these varieties, I was unable to obtain any except the Tolman Sweeting.

Percentage of Water, Dry Matter, and Ash.

	Pulp of the Swaar.	Skin or Epidermis of the Swaar.
Percentage of Water	84.75	61.20
" Dry matter	15.25	38.80
" Ash	0.26	0.72
" Ash calcined on dry matter	1.705	1.856

Percentage of Water and Dry Matter.

	Tolman Sweeting.	Roxbury Russet.	Kilham Hill.	English Russet.	R. Island Greening.
Percentage of Water	81.52	81.35	86.31	79.21	82.85
" Dry matter	18.48	18.65	13.69	20.79	17.15

*The above results were obtained the 1st of March. The per centage of water in the six varieties examined, ranges from 79.21 to 86.31 per cent. The Kilham Hill contains the most; the Swaar stands next; the Greening third; and the English Russet has the least. The percentage mean from the six results is 82.664.

The percentage of inorganic matter in the apple is small, not much exceeding that of the richer grains. Like the ash of wheat and corn, it is obtained free from coal with some difficulty, on account of its fusing at a low red-heat.

Composition of the Ash.

	Swaar.		Kilham Hill.	
	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.
Carbonic acid	17.62	......	16.17	......
Silica	1.43	1.750	1.34	1.698
Phosphate of iron	1.82	2.227	1.52	1.888
Phosphoric acid	11.51	14.088	11.51	13.922
Lime	4.05	4.956	2.48	2.999
Magnesia	1.46	1.786	1.14	1.379
Potash	34.34	42.016	29.62	35.821
Soda	15.77	19.295	21.40	25.826
Chlorine	1.71	2.092	1.93	2.334
Sulphuric acid	5.44	6.656	6.52	7.898
Organic matter thrown down by nitrate of silver	4.20	5.139	5.20	6.290
	99.35	100.000	98.84	100.000

Composition of the Ash.

	ROXBURY RUSSET.		ENGLISH RUSSET.		R. ISLAND GREENING.	
	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.
Carbonic acid	14.11	......	10.12	......	18.08	......
Silica	1.95	2.278	0.94	1.051	1.15	1.412
Phosphate of iron	1.34	1.564	0.96	1.062	1.04	1.277
Phosphoric acid	13.81	15.057	9.94	11.110	9.49	11.664
Lime	4.16	4.857	2.92	3.268	3.60	4.421
Magnesia	1.63	1.908	0.97	1.068	1.80	2.211
Potash	29.51	34.958	34.27	38.323	31.31	38.440
Soda	21.18	25.178	27.20	30.408	18.56	22.781
Chlorine	1.97	2.300	1.65	1.848	1.85	2.272
Sulphuric acid	5.84	6.889	5.98	6.648	6.53	8.019
Organic matter thrown down by nitrate of silver	4.30	5.021	4.64	5.187	6.11	7.508
	99.75	100.000	99.59	100.000	99.46	100.000

The analyses are inserted both with and without the carbonic acid. They were calculated without it, in order to show the real composition of the inorganic matter of the fruit. The carbonic acid is formed during the combustion of the inorganic matter, and hence cannot be regarded as a constituent part of the apple, except in very minute quantity.

In silica the apple is by no means rich, containing, in the varieties examined, from about 1 to 2.3 per cent. The mean percentage of the five results is 1.637. The phosphate of iron ranges from about 1 to 2.2 per cent.; the phosphoric acid, from 11 to 15 per cent.; the lime, from about 3 to 5 per cent.; the magnesia, from about 1 to 2.2 per cent.; the potash, from about 35 to 42 per cent.; the soda, from 19.3 to 30.4 per cent.; the chlorine from 1.85 to 2.33 per cent.; and the sulphuric acid, from 6.66 to 8.02 per cent.

The percentage of ash in the apple is small, yet rich in phosphoric and sulphuric acids, potash, and soda. 100 pounds of apple-ashes, deprived of carbonic acid, contain, according to the mean of the foregoing results, about 13 lbs. of phosphoric acid, 7 lbs. of sulphuric acid, 38 lbs. of potash, and 25 lbs. of soda. In other words, these four bodies make up about 83 per cent. of the whole ash.

1000 lbs. of fresh apple contain about 827 lbs. of water, 170.4 lbs. of organic matter, destroyed by heat, and 2.6 lbs. of inorganic matter or ash. 1000 lbs. of dry apple contain between 17 and 18 lbs. of ash.

Mean of the five foregoing Analyses.

	With carbonic acid.	Without carbonic acid.
Carbonic acid	15.210	......
Silica	1.362	1.637
Phosphate of iron	1.336	1.598
Phosphoric acid	11.252	13.267
Lime	3.442	4.199
Magnesia	1.400	1.669
Potash	31.810	37.610
Soda	20.810	24.799
Chlorine	1.822	2.169
Sulphuric acid	6.062	7.229
Organic matter thrown down by nitrate of silver	4.890	5.828
	99.396	100.000

Proximate Organic Analysis.

	TOLMAN SWEETING.		SWAAR.		KILHAM HILL.	
	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple
Cellular fibre	33.90	190.620	18.80	126.685	29.90	229.453
Glutinous matter, with a little fat and wax	3.52	19.798	1.18	7.276	1.73	13.276
Dextrine	28.96	162.890	28.54	192.352	21.72	166.681
Sugar and extract	99.05	557.178	81.04	546.618	59.30	455.069
Malic acid	2.50	14.061	3.82	25.737	3.46	26.552
Albumen	8.96	50.452	13.08	88.125	13.17	101.066
Casein	0.89	5.006	1.96	13.205	1.03	7.904
Dry matter	177.79	1000.000	148.42	1000.000	130.31	1000.000
Water	815.20	......	847.50	......	863.13	......
Loss	7.01	......	4.08	......	6.56	......
	1000.00		1000.00		1000.00	

Proximate Organic Analysis.

	ROXBURY RUSSET.		ENGLISH RUSSET.		R. ISLAND GREENING.	
	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple.	1000 parts fresh apple.	1000 parts dry apple.
Cellular fibre	81.20	178.623	44.78	220.929	33.58	204.000
Glutinous matter, with a little wax and fat.	1.70	9.460	2.22	10.952	1.32	8.019
Dextrine	36.22	210.558	41.11	202.828	32.07	194.888
Sugar and extract	90.27	502.337	93.46	461.099	76.37	464.061
Malic acid	3.23	17.975	2.98	14.702	3.04	18.485
Albumen	15.08	83.689	16.13	79.579	16.37	99.459
Casein	2.06	11.408	2.01	9.916	1.89	12.088
Dry matter	179.70	1000.000	202.69	1000.000	164.64	1000.000
Water	813.45	....	792.11	....	828.46	....
Loss	6.85	....	5.20	....	6.90	....
	1000.00		1000.00		1000.00	

Besides the above-mentioned bodies, the apple contains a small quantity of tannic and gallic acids. Of the varieties examined, they were found in larger proportion in the Russets than in either of the others. To these acids this fruit owes that peculiar astringency, so strikingly developed in some varieties, and easily detected in all, by the taste and by the black color struck through them when cut with a knife, or any instrument made of iron.

Liebig states that starch is found in the unripe apple. I have not been able to detect it in the ripe fruit, except in the Tolman Sweeting, which give a very faint blue with iodine.

A small quantity of white wax is found, which is derived mainly from the epidermis, over which it is spread, imparting to it, in many varieties, a smooth, greasy feel. A little fatty matter is also present, together with a respectable percentage of gluten. The glutinous matter differs from that of the grains, in being less adhesive when moist, and more granular when dry.

The foregoing analyses were made during the months of March and April. The Tolman Sweeting was somewhat shrivelled, and rather past its season: the other varieties were fresh and in good eating order. The Tolman Sweeting, English Russet, and Kilham Hill, were furnished by E. P. Prentice, Esq., of Mount Hope.

Mean of the Six foregoing Analyses.

	1000 parts of fresh Apple.	1000 parts dry Apple.
Cellular fibre	32.08	190.879
Glutinous matter, with a little fat and wax	1.94	11.463
Dextrine	31.44	186.805
Sugar and extract	83.25	497.627
Malic acid	8.17	19.585
Albumen	13.79	83.720
Casein	1.64	9.921
Dry matter	167.26	1000.000
Water	826.64	....
Loss	6.10	....
	1000.00	....

The ripe apple is rich in sugar, and a body analogous to gum, called *dextrine*, which has the same composition as starch, but differs from it in being soluble in cold water, and not colored blue with iodine. It derives its name from the action of its solution on polarized light, it causing the plane of polarization to deviate to the right; hence its name, *dextrine*.

Dextrine and gum should not be confounded with each other. They differ very materially in many respects. The former possesses the property of being converted into grape sugar, by sulphuric acid, and by diastase, while the latter does not. Dextrine belongs to the class of bodies which are susceptible of nourishing the animal body. All the starch taken as food is converted into dextrine before it is assimilated by the system. The acid of the stomach possesses the property of converting starch into this body.

In the fresh apple, 100 lbs. contain about 3.2 lbs. of fibre; 0.2 of a lb. of gluten, fat, and wax; 3.1 lbs. of dextrine; 8.3 lbs. of sugar and extract; 0.8 of a lb. of malic acid; 1.4 lb. of albumen; 0.16 of a lb. of casein, and 82.66 lbs. of water.

In the dry apple, 100 lbs. contain about 19 lbs. of fibre; 1.1 lb. of gluten, fat and wax; 18.7 lbs. of dextrine; 49.8 lbs. of sugar and extract; 2 lbs. of malic acid; 8.4 lbs. of albumen, and 1 lb. of casein.

In the fresh potato, 100 lbs. contain about 9.7 lbs. of starch; 5.8 lbs. of fibre; 0.8 of a lb. of gluten; 0.08 of a lb. of fatty matter; ¼ of a lb. of albumen; 0.45 of a lb. of casein; 1.27 lb. of dextrine; 2.64 lbs. of sugar and extract; and 79.7 lbs. of water.

In the dry potato, 100 lbs. contain about 48.5 lbs. of starch; 29 lbs. of fibre; 1 lb. of gluten; 0.4 of a lb. of fatty matter; 1.25 lb. of albumen; 2.25 lbs. of casein; 6.32 lbs. of dextrine; and 13.2 lbs. of sugar and extract.

By comparing the composition of the apple with that of the potato, it will be noticed; first, that the former contains, according to the above analyses, about three per cent. more of water than the latter. Second, that dextrine and sugar, in the apple, take the place of starch, dextrine, and sugar, in the potato. Of the former, 100 lbs. of good fruit contain of dextrine, sugar, and extract, 11.4 lbs.; the latter has, in the same amount of fresh tubers, 13.61 lbs. of starch, dextrine, sugar, and extract. In the dry fruit, 100 lbs. contain of dextrine, sugar, and extract, 68.5 lbs.; in the same quantity of dry potato, there is, of starch, dextrine, sugar, and extract, 68.02 lbs. The above proximate principles are the main bodies in the apple and potato which go to form fat. In the aggregate amount of fat-producing products, it will be seen that the apple and the potato do not materially differ. It would be natural, however, to infer that 50 lbs. of dextrine and sugar would, if taken into the system, be more likely to make a greater quantity of fat, in a given time, or, at least, to make the same amount in a shorter period, than an equal weight of starch; for this reason, that the two former bodies, although nearly the same in composition with the latter, yet are physically further advanced in organization, and hence probably approximate nearer the constitution of fat. If this view be taken, then the apple, if of good quality, may be regarded equally, if not more rich, in fat-producing products, than the potato. Thirdly, that the apple is richer in nitrogen compounds than the potato. 100 lbs. of fresh apple contain of albumen 1.38 lb; the same amount of fresh potato has ¼ of a lb.; 100 lbs. of dry apple contain 8.37 lbs. of albumen, and an equal weight of dry tubers has 1¼ lb. 100 lbs. of fresh fruit contain of casein 0.16 of a lb.; and an equal weight of fresh tubers, 0.35 of a lb. 100 lbs. of dry apple have 1 lb. of casein; and the same amount of dry potato contains 2¼ lbs. Hence it will be observed that 100 lbs. of fresh apple contain of albumen and casein 1.54 lb.; and the same quantity of fresh potato, 0.7 of a lb. 100 lbs. of dry fruit have of albumen and casein 9.37 lbs.; and an equal amount of dry tubers, 3.50 lbs.

From the above, it will readily be seen that, in albumen, the apple is richer than the potato, while in casein the reverse is the case. That the aggregate amount of albumen, casein, and gluten, in good varieties of the apple, is more than double that of the same bodies in the potato; hence the former may be regarded richer than the latter, in those bodies which strictly go to nourish the system, or, in other words, to form muscle, brain, nerve, and, in short, assist in building up and sustaining the organic part of all the animal body.

The juice of the apple forms what was regarded, not long ago, a favorite and almost necessary appendage to the farmer's stock of winter luxuries. It is now, however, looked upon by him with comparative indifference as a beverage, he having found a far better and more profitable use for his apples, that of converting them into fat, instead of alcohol. The juice of the apple, after being fermented, is called cider, and contains much of the nutritive matter of the fruit. Cider contains alcohol, sugar, gum or dextrine, malic acid, and the phosphates and sulphates of the alkalies, with a little tannic and gallic acids. The juice, before being fermented, has, in addition to the above ingredients, albumen and casein.

For the purpose of comparing the composition of the apple with that of several other kinds of fruit, it may not be uninteresting to introduce their proximate organic analyses here, in connection with those of the apple. M. Berard has examined the unripe and ripe cherry, the unripe and ripe peach, the ripe pear, and the unripe and ripe gooseberry, and arrived at the following results:—

	Peach.		Pear.		Cherry.		Gooseberry.	
	Unripe.	Ripe.	Ripe and Fresh.	Kept for some time.	Unripe.	Ripe.	Unripe.	Ripe.
Chlorophyl and coloring matter	0.04	1.10	0.08	0.01	0.05	......	0.08	......
Sugar	trace.	16.48	6.45	11.52	1.12	18.12	0.52	6.24
Dextrine	4.10	5.12	8.17	2.07	6.01	8.28	1.36	0.78
Fibre	3.61	1.86	3.80	2.19	2.44	1.12	8.45	8.01
Albumen	0.76	0.17	0.08	0.21	0.21	0.57	1.07	0.86
Malic acid	2.70	1.80	0.11	0.08	1.75	2.01	1.80	2.41
Citric acid	......	......	......	......	......	......	0.12	0.31
Lime	trace.	trace.	0.08	0.04	0.14	0.01	0.24	0.29
Water	89.39	74.87	86.28	88.83	88.28	74.85	86.41	81.10
	100.00	100.40	100.00	99.65	99.00	90.00	100.00	100.00

ANALYSIS OF RHUBARB.

BY J. H. SALISBURY, M. D.

General Remarks.—Of rhubarb, the following are the principal species and varieties in cultivation. The *Rheum rhaponticum*, (common pie-plant,) a native of Asia, introduced into Europe in 1575; *Rheum undulatum*, a native of China, introduced in 1734; Elford rhubarb, or scarlet variety; *Rheum hybridum*, a native of Asia, cultivated in 1778; Giant rhubarb, a variety of the *rhaponticum*; *Rheum palmatum*, or Turkey rhubarb; *Rheum compactum*, and *Rheum australe*.

Besides the above, there are several varieties cultivated in this country, principally derived from the *rhaponticum*. The first five kinds are cultivated entirely for their petioles. Several attempts have been made in the western part of Europe, and in this country, to cultivate the root of the first and last three mentioned sorts, for medicinal purposes; but without any degree of success. I do not see, however, if the composition of the root and the rest of the plant were well known, together with its habits, mode of culture, time of gathering, &c., why success might not attend its cultivation in the United States as well as in China and Turkey. The root of good Turkey rhubarb commands now in market from $3 to $4 the pound. If it could be successfully cultivated here, it would constitute one of our most valuable and lucrative articles of trade.

Uses.—The large succulent petioles are highly esteemed for making tarts, pies, jelly, preserves, wine, &c., which resemble much those made of apple and gooseberries. The root of several species is highly esteemed in medicine as a cathartic, possessing mild tonic and astringent properties. Among the species used in medicine are the *Rheum rhaponticum*, *R. palmatum*, *R. compactum*, and *R. australe*. The *R. rhaponticum* and several varieties derived from it, are mostly cultivated in this country for their very fine flavored petioles. The root grown in the western part of Europe and the United States is less firm, and acquires much less medicinal value than the root of the same species grown in China, Turkey, and Russia. The reason of this difference is not well known, but is probably owing to soil, climate, time of gathering, and mode of culture.

Composition of the several parts of the plant.—In this country, the several species of rhubarb are cultivated mostly for the petioles, or leaf-stalks. The texture and flavor of these vary greatly with the soil, mode of culture, and climate.

We should naturally infer that the soil in which rhubarb thrives (from its size and rapid growth) must be richly supplied with those materials, in a soluble form, which are found in the various organs and tissues of the plant. It is necessary to know, then, the composition of the plant, before we can positively decide what kind of soil is best fitted to its growth. The following analyses were made with the view of throwing some light upon this subject.

The Giant rhubarb, a very fine variety of the rhaponticum, cut June 1st. Plant in flower. Stout growth. The roots were very compact, and remarkably large. Furnished by Mr. C. N. Bement, of Albany.

Percentage of Water, Dry Matter, and Ash, in the several parts of the plant.

	Root.	Stalk.	Petioles.	Leaf-blades.	Flowers and pedicels.
Percentage of Water	82.000	89.500	93.465	88.00	86.900
" Dry matter	18.000	10.500	6.535	12.00	13.100
" Ash	0.925	1.130	0.940	1.52	1.320
" Ash calcined on dry matter	5.194	10.762	14.384	12.75	10.076

The percentage of water in all parts of the plant is large, amounting to from 82 to 93 per cent. The dry matter of the several parts is richly supplied with ash. The petioles contain the greatest proportion, and the root the least.

Inorganic Analysis of the several parts of the plant.

	Root.		Stalk.		Petioles or leaf-stalk.		Leaf-blades.		Flowers and pedicels.	
	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.	With carbonic acid.	Without carbonic acid.
Carbonic acid	12.050	......	9.400	......	9.480	......	14.900	......	6.050	......
Silicic	3.950	4.595	0.450	0.511	1.400	1.557	7.600	8.928	5.600	6.147
Phosphates	30.050	34.788	17.200	19.528	22.200	24.702	19.400	22.792	27.500	29.786
Lime	4.785	5.414	3.574	4.056	2.476	2.754	5.740	6.744	1.464	1.607
Magnesia	2.920	3.375	0.200	0.227	0.204	.227	1.160	1.363	0.102	0.112
Potash	7.217	8.349	8.096	9.189	5.287	5.883	7.870	9.247	9.185	10.812
Soda	24.736	28.607	33.261	33.750	33.260	37.015	27.360	32.143	24.471	26.561
Sodium	0.144	0.166	0.978	0.111	1.651	1.837	2.110	2.479	2.110	2.316
Chlorine	2.22	0.255	1.480	1.679	2.516	2.799	3.210	3.772	3.210	3.524
Sulphuric acid	5.155	5.957	10.723	12.171	5.274	5.868	4.270	5.017	10.860	11.891
Organic matter thrown down by nitrate of silver*	7.350	8.494	12.150	13.778	15.600	17.358	6.400	7.515	6.600	7.244
	98.579	100.000	97.507	100.000	99.298	100.000	100.020	100.000	97.152	100.000

* In the essay on Indian corn will be found the method followed in obtaining the organic matter from the ashes of plants. This organic matter, in the paper referred to, is set down as organic acids. This was done from the fact that it seems to be combined with the inorganic bases of the ashes, after the manner of acids. It does not discolor the ashes in the least, and is so firmly united with them, that it is quite impossible to expel it entirely, unless they (the ashes) are kept for some time at a temperature above their point of fusion.

As there has been some objection raised to the name used in the paper referred to above, we will—till it has undergone a more thorough examination—call it organic matter thrown down by nitrate of silver. It may not be improper to state here that some chemists have doubted the presence of this matter in the ashes of plants. We do not blame them—for several reasons—for doing so; but would kindly ask them, before they make their opinions more public, (for their own sakes as well as ours,) to give the subject at least a cursory examination. We seek only for truth, and when it is clearly shown that there is no organic matter in the ashes of plants, which can be determined by the method described in the aforesaid paper, then we will be most willing to acknowledge frankly that we have heedlessly fallen into the ditch of error, our friends kindly endeavoring to keep us out notwithstanding.

The analyses have been calculated without the carbonic acid, (this is not a constituent of the plant, but is formed during the combustion,) to show the real composition of the inorganic matter which actually exists in the plant and is necessary to its constitution. The stalk and petioles contain but a small percentage of silicic acid, while the leaves, flowers, pedicels, and root contain a respectable quantity. All portions of the plant are rich in phosphates, ranging from 19 to 34 per cent. in the several parts. The root contains the most; the flowers and pedicels stand next in order; the petioles next; the leaves fourth; and the stalk contains the least. The lime ranges, in the several parts, from 1½ to 6.7 per cent.; the magnesia from one-tenth of 1 per cent. to 3.3 per cent.; the potash from 5.8 to 10.8 per cent.; the soda from 26.5 to 38.75 per cent.; and the sulphuric acid from 5 to 12 per cent.

The analyses show that the ash of this plant is in a great measure made up of the phosphates and sulphates of the alkalies; these making up from 69 to 79 per cent. of the entire inorganic matter of the plant.

It will be seen from the above, that a soil well suited to nourish and sustain vigorously the rhubarb plant, must be peculiarly rich in the phosphates and sulphates of the alkalies. Bone-dust, plaster, salt, and ashes afford the inorganic bodies required by this plant. Besides these, decomposing animal and vegetable manures are also needed to warm and loosen the soil, and facilitate the decomposition, and consequently the solubility of the inorganic materials.

Proximate organic analysis of the petioles.—Petioles, or leaf-stalks, taken from the plant the first of September: very large and succulent: 1½ inches in diameter, and 2½ feet long. A variety of the rhaponticum, furnished by Mr. Y. Rathbone, of Kenwood.

Percentage of Water, Dry Matter, and Ash.

Percentage of water	87.79
" dry matter	12.23
" ash	2.27
" ash, calculated on dry matter	18.56

Proximate Organic Analysis.

	With water.	Without water.
Fibre, with a little starch and chlorophyl	1.265	9.894
Malic acid and extract, with a little tartaric and oxalic acids	5.710	44.622
Dextrine	0.550	4.302
Fibre	3.235	25.303
Matter separated from fibre by a weak solution of potash, gives the characteristic color of albumen with sulphuric acid	1.605	12.554
Albumen	0.270	2.112
Casein	0.150	1.173
Water	87.770	......
	100.555	100.000

The above specimen is larger and firmer than the one examined the 1st of June, and contains less water and a greater percentage of inorganic matter. The leaves contain a little oxalic and malic acids. The oxalic acid is probably in the form of binoxalate of potash and soda. The petioles or leaf stalks have a mild, pleasant acid taste. They contain a large quantity of malic acid, with considerable oxalic, and a little tartaric acid. These acids are most likely in the form of acid salts of the alkalies.

The well-known and highly valued medicine called *rhubarb* is the root of several species of Rheum. It has been analyzed by Schrarder, Brande, Hornemann, M. Ossian Henry, Schlossberger, and Dopping. (*Pereira's Materia Medica, Liebig's Annalen, Thompson's Vegetable Chemistry, U. S. Dispensatory, &c.*)

It contains *Rhein*, (Syn. Rhabarbaric acid, Rhubarb Yellow, Rheumin.) This is a yellow granular crystalline body, somewhat analogous to chrysophanic acid. It is extracted nearly pure from the root by hot sulphuric ether. On carefully evaporating the solution, it is obtained in small crystals, which are quite tasteless, and insoluble in cold water. It imparts to concentrated sulphuric acid a beautiful carmine color: to solutions of ammonia and potash, a fine red; and to soda and lime, a light red hue. It is soluble in ether, alcohol, and acetic acid, to all of which it imparts a deep yellow color: it is less soluble in cold nitric acid, and but slightly soluble in hydrochloric and oxalic acids, all of which it colors yellow. On boiling these latter acids, more is taken up, but is again precipitated on cooling. It is thrown down from an alkaline solution by sulphuric acid in the form of a deep yellow powder, which is nearly or quite insoluble in water. It is precipitated by the acetate of lead on standing for some time. The neutral salt throws it down in the form of light yellow flocs, leaving a clear solution slightly tinged with yellow. The basic salt throws it down in the form of a red flocculent precipitate, leaving a slightly turbid light-red solution.

Aporetin.—A resinous body of a black color, brittle, decomposed at a temperature below its point of fusion.

Erythroretin.—$C_{20}H_9O_7$. A light yellow crystalline, resinous body, soluble in ether and alcohol, and volatilized partially by heat without decomposition. It affords a dull red solution with concentrated sulphuric acid, from which it is thrown down in the form of a flocculent precipitate by water.

Phæoretin.—$C_{16}H_8O_9$. A yellowish brown powder, quite insoluble in ether and water, but readily soluble in alcohol. With the alkalies, it forms a deep red solution, from which it is precipitated by the mineral acids.

Rhaponticin.—A yellow, tasteless, crystallizable body, insoluble in ether, but soluble in a large excess of dilute alcohol. Besides the above, the root also contains chrysophanic acid, a trace of oil or fatty matter, starch, gum, mucilage, sugar, woody fibre, pectin, tannic, gallic, oxalic, sulphuric, and phosphoric acids, together with chlorine, lime, magnesia, silica, iron, potash, and soda.

OXYGEN PER CENT. IN THE OXIDES OF THE INORGANIC ELEMENTS OF PLANTS.

1st.—*Oxygen per cent. in the oxides of the inorganic elements of plants.*

	Oxygen per cent.		Oxygen per cent.
Sulphurous acid	49·85	Alumina	46·70
Sulphuric "	59·86	Silica	51·96
Phosphoric "	56·04	Protoxide of iron	22·77
Potash	16·95	Peroxide "	30·66
Soda	25·58	Protoxide of magnesia	22·43
Lime	28·09	Sesquioxide "	30·25
Magnesia	38·71	Peroxide "	36·64

2d.—*Chlorine or sulphur per cent. in the chlorides and sulphurets.*

	Chlorine per cent.		Sulphur per cent.
Chloride of potassium	47·77	Sulphuret of potassium	29·11
" sodium	60·34	" sodium	40·88
" calcium	63·36	" calcium	44·00
" magnesia	73·65	" iron	37·33
First chloride of iron	56·62	Bisulphuret of iron (iron pyrites)	47·08
Second "	66·19		

3d.—*Composition per cent. of the saline combinations above described.*

	Acid.	Base.	Water.
Carbonate of potash	31·91	68·09	
Bicarbonate "	48·38	51·62	
Sulphate "	45·93	54·07	
Nitrate "	53·44	46·56	
Binoxalate " (salt of sorrel)	52·64	34·29	13·07
Bitartrate " (cream of tartar)	70·28	24·96	4·76
Phosphate "	43·06	56·94	
Biphosphate "	60·20	39·80	
Carbonate of soda (dry)	41·42	58·58	
" " (crystallized)	15·43	21·81	62·76
Bicarbonate "	58·58	41·42	
Nitrate "	63·40	36·60	
Sulphate " (dry)	56·18	43·82	
" " (crystallized)	24·85	19·38	55·77
Phosphate "	53·30	46·70	
Biphosphate "	69·54	30·46	
Carbonate of lime	43·71	56·29	
Sulphate " (gypsum)	46·31	32·90	20·79
" " (burned)	58·47	41·53	
Nitrate "	65·54	34·46	
Phosphate " (apatite)	45·52	54·48	
Biphosphate "	71·48	28·52	
Earth of bones	48·45	51·55	

	Acid.	Base.	Water.
Carbonate of magnesia	51·69	48·31	
Bicarbonate "	68·15	31·85	
Sulphate " (Epsom salts)	32·40	16·70	50·90
Nitrate "	72·38	27·62	
Phosphate "	63·33	36·67	
Sulphate of alumina	70·07	29·93	
Phosphate "	67·57	32·43	
Silicate of potash (soluble)	49·46	50·54	
Bisilicate " "	66·19	33·81	
Silicate of soda "	59·63	40·37	
Bisilicate " "	54·71	25·29	
Silicate of lime	61·85	38·15	
" magnesia	69·08	30·92	
" alumina	72·95	27·05	
Carbonate of iron	38·63	61·37	
Sulphate " (crystallized)	31·03	27·19	41·78
Carbonate of manganese	38·27	61·73	
Sulphate " (crystallized)	32·20	29·54	37·26

VIII. STATISTICAL INFORMATION.

LAKE TRADE OF THE UNITED STATES.

The following table, derived from an official source, affords a pretty good idea of the magnitude of a portion of the internal trade of the United States. The aggregate valuation of our lake trade, for the year 1850, (imports and exports,) amounts, it will be seen, to the large sum of $186,484,905; or more, by $40,000,000, than the whole foreign export trade of the country. The aggregate tonnage employed on the lakes of the United States is equal to 203,041 tons, of which 167,137 tons is American, and 35,904 tons British.

Total Value of Exports and Imports.

The commerce of Lakes Erie, Huron, Michigan, Ontario, Champlain, and St. Clair, is as follows:—

Erie	$115,785,048	Ontario	$28,141,000
Huron	848,152	Champlain	16,750,700
Michigan	24,820,481	St. Clair	639,524

Showing a total value of $186,484,905, as above stated. To this must be added the passenger trade of the lakes, valued at $1,000,000.

The aggregate value of the tonnage of Lake Erie is	$5,808,085
" " " Lake Huron	75,000
" " " Lake Michigan	564,435

EXPORTS OF ICE FROM BOSTON, IN 1850.

The following table exhibits the total amount of ice, in tons, exported to the under-mentioned ports, during the year ending December 31st, 1850, and the total amount for the five previous years:

East Indies	8,897	Demarara	1,077
Port Louis, Mauritius	616	Matanzas	548
Liverpool	505	St. Johns, Port Royal	365
Havana	5,521	South America	50
Kingston, Jamaica	2,525	Vera Cruz	259
Rio Janeiro	915	Sisal	179
St. Thomas	1,177	Nassau	100
Pernambuco	240	Bermuda	80
Barbadoes	709	Martinique	36
St. Vincents	205	San Francisco	1,299
St. Jago	450	Sacramento City	260
Trinidad	282	Southern ports	43,579
Neuvitas	406	Total	69,623

1845......48,422 | 1846......57,293 | 1847......54,625 | 1848......57,507 | 1849......66,808

EXPORTS OF BOOTS AND SHOES FROM BOSTON.

This branch of Massachusetts manufactures appears to have been unusually active and prosperous during the year 1850, as will be seen by the subjoined table, in the increase of exports over previous years. This increase is attributed, for the most part, to the large shipments to California, either direct from Boston, or via New York, Philadelphia, and Baltimore. The clearances at the custom-house have been as follows :—

	Cases.		Cases.		Cases.
1845	90,782	1847	72,424	1849	101,371
1846	67,887	1848	79,118	1850	147,769

VALUE OF BREADSTUFFS, ETC., EXPORTED FROM THE UNITED STATES.

Statement, exhibiting the aggregate value of Breadstuffs and Provisions, exported annually, from 1821 to 1850, inclusive.

Years.	Value.	Years.	Value.	Years.	Value.
1821	$12,341,901	1831	$17,538,227	1841	$17,196,102
1822	13,886,856	1832	12,424,703	1842	16,902,876
1823	13,767,847	1833	14,209,128	1843*	11,204,123
1824	15,059,484	1834	11,524,024	1844	17,970,135
1825	11,634,449	1835	12,009,399	1845	16,743,421
1826	11,303,496	1836	10,614,130	1846	27,701,121
1827	11,685,556	1837	9,588,359	1847	68,701,921
1828	11,461,144	1838	9,636,659	1848	37,472,751
1829	13,131,858	1839	14,147,779	1849	38,155,507
1830	12,075,030	1840	19,067,535	1850	26,051,373
		Total			$535,207,285

COMMERCE OF CONNECTICUT.

During the year ending June 30, 1850, there were built, in Connecticut, 3 ships, 7 brigs, 27 schooners, 9 sloops and canal-boats, 1 steamer; total 47; tonnage, 4,820.

The tonnage of the several districts in Connecticut is as follows :—

	Registered.	Enrolled.	Total.
Middletown	96.55	12,033.72	12,129.82
New London	23,364.23	17,120.62	40,484.85
Stonington	13,188.47	6,724.03	18,912.50
New Haven	4,994.65	10,736.70	15,981.40
Fairfield	868.35	13,960.27	14,828.62
Total			103,336.69

FOREIGN COMMERCE OF CHARLESTON, SOUTH CAROLINA.

The exports of Charleston, to foreign countries, during the year 1850, amounted to $12,394,497; being an increase of nearly $1,500,000 over the exports of 1849, and of $4,500,000 on those of 1848. It is gratifying, also, that this increase of exports has been attended with a corresponding increase of imports, as will be seen by the following comparative statement of the duties collected on foreign imports during the years specified :—

* For nine months ending June 30th, 1843.

Duties for the year 1851	$533,706.95
" " 1849	421,774.68
" " 1848	327,898.42
Increase of year 1850 over 1849	$111,932.27
" " 1840	205,818.53

If the goods in the public warehouse had been taken into consumption, the aggregate amount for the past year would have been considerably over $600,000, as the quantity of goods similarly situated at the close of last year was comparatively trifling.

DEPOSITES AND COINAGE AT THE UNITED STATES MINT, PHILADELPHIA.

The coinage at the United States Mint, at Philadelphia, for the year 1850, as stated by E. C. Dale, Esq., Assistant Treasurer, has been as follows :

Gold Coinage.

	Pieces.	Value.
Double Eagles	1,170,261	$23,405,220.00
Eagles	291,451	2,914,510.00
Half Eagles	64,491	322,455.00
Quarter Eagles	252,923	632,307.50
Dollars	481,953	481,953.00
Total	2,261,079	$27,756,445.50

Silver Coinage.

	Pieces.	Value.
Dollars	7,500	$7,500.00
Half Dollars	227,000	113,500.00
Quarter Dollars	190,800	47,700.00
Dimes	1,931,500	193,150.00
Half Dimes	955,000	47,750.00
Total	3,311,800	$409,600.00

Copper Coinage.

	Pieces.	Value.
Cents	4,022,644	$40,226.44
Half Cents	39,812	199.06
Total	4,062,456	$40,525.50
Whole amount coined	9,635,335	$28,206,471.00

Deposites for the Year 1850.

Total gold deposites		$33,150,000
Of which, from California	$31,500,000	
Other sources	1,651,000	
		$33,150,000
Total silver deposites		$428,000
The deposites for the month of December, from California, are about		$4,500,000

The number of gold and silver pieces, and the value of the same, coined at the United States Mint, Philadelphia, for the month of December, 1850, was as follows :—

Gold Coinage.

	Pieces.	Value.
Double Eagles	189,821	$3,796,420.00
Quarter Eagles	45,000	112,500.00
Dollars	78,098	78,098.00
Total	312,919	$3,987,018.00

Silver Coinage.

	Pieces.	Value.
Quarter Dollars	66,800	$16,700.00
Dimes	115,000	11,500.00
Half Dimes	290,090	14,500.00
Total	471,800	$42,700.00

Copper Coinage.

	Pieces.	Value.
Cents	794,847	$7,948.47
Whole amount coined	1,579,566	$4,087,666.47

The bales of cotton taken for consumption are reported in the annual returns of the New York Shipping List, as follow. These we have converted into yards, and averaged them on the population:

Years.	Cotton Consumed.	Equal to Yards.	United States Population.	Yards per head.	Increase per cent.
1830, bales	126,512	151,814,400	12,966,020	11½	....
1840 "	295,193	354,221,600	17,067,453	21	9½
1850 "	595,269	684,322,800	21,000,000	32½	11½

Three times the cotton cloth, per head, is made now, in the United States, that was produced 20 years since, and the production has been very steady in its increase. It was 9½ yards per head in the 10 years ending with 1840, and 11½ yards in the last 10 years, assuming the current estimate for the population. Now, the consumption of cotton by the people of Great Britain, as given in Du Fay's circular, was 136,420,765 lbs. in 1849, which averages 4½ lbs. per head. The consumption, in the United States, is 11 lbs. per head. Thus, in the United States, the inhabitants consume, per head, nearly three times as much as the inhabitants of Great Britain. We may now make another comparison, which is this, viz. to take a year when Great Britain consumed as much cotton as the United States took in 1850, and compare the exports:

	Great Britain.		United States.	
	Cotton Consumed. Pounds.	Value of Cotton Exports.	Cotton Consumed. Pounds.	Value of Cotton Exports.
1827	249,804,896	$85,000,000	59,806,400	$1,259,457
1849	626,710,160	180,000,000	288,107,600	4,784,424

Now, then, two important truths are manifest here; namely, in 1827, the United States consumed a quarter as much cotton as Great Britain. In 1849, we consumed three-eighths as much; thus, we have gained 50 per cent. upon England. Again, we manufactured, last year, as much as did England in 1827, but we exported only $4,784,424, or $80,000,000 worth per annum less. England sold all she made; the United States consume all they make: deducting the cost of material, which, in 1827, was 7*d*., or, in the aggregate, $35,000,000, she sold $50,000,000 of her labor for articles other than cotton. Her cotton, last year, cost $60,000,000, and she sold $70,000,000 of her labor. Now, if the people of the United States, instead of consuming two yards each more than the English consume, should

sell that for other things, our external cotton trade would be as large as that of England was in 1827; but our manufacturers have exclusively a home trade—what the English manufacturers never have had. The larger consumption of cotton in the United States keeps the prices higher, and, by so doing, absorbs all the home make, and the quantities imported also. This home market has been overdone. It is glutted, and the prices were naturally depressed. The annual returns of the Secretary contain the values of dry goods imported. These, as compared with previous years, are as follow:—

Imports of Dry Goods into the United States.—Fiscal Years.

	1848.	1849.	1850.
Woollens.			
Cloths and Cassimeres	$6,846,145	$4,995,957	$6,184,190
Merino Shawls	1,857,129	1,196,876	934,848
Blankets	1,146,587	1,161,429	1,244,875
Worsted stuffs	8,858,416	4,070,185	5,004,250
Hosiery	731,009	718,794	718,185
Other Woollens	1,140,410	1,068,807	1,880,526
Total Wool	$14,597,696	$18,211,548	$15,965,824
Cottons.			
Prints and Colored	$12,490,501	$10,286,894	$18,640,291
White	2,487,256	1,488,635	1,773,802
Tamboured	495,576	702,631	1,267,286
Hosiery	1,888,871	1,815,788	1,558,178
Yarn and Thread	727,422	770,509	799,156
Other Cotton	836,963	1,240,889	858,422
Total Cotton	$18,421,589	$15,754,841	$19,896,680
Silks.			
Piece Goods	$10,762,801	$7,588,822	$14,450,560
Hosiery	427,708	468,393	616,217
Tamboured	1,026,235	1,045,216	1,131,462
Other Silk	2,671,868	4,873,336	872,380
Silk and Worsted	2,456,652	2,452,289	1,658,809
Total Silk	$17,845,259	$16,428,056	$18,724,428
Linen	$6,012,197	$5,156,924	$7,063,184
Other Flax	611,451	750,318	1,031,638
Grand total	$56,988,192	$51,501,667	$62,681,704

The classification is not so extended as would have been desirable, but the general heads indicate the nature of the transactions. The aggregate increase is, as compared with 1848, $5,836,781, of which each description partakes in nearly equal proportions. The increase in silk piece-goods seems to have been greater than any other single article, but some different classification has, no doubt, varied the figures. It would seem to be the case, that the quantities of dry goods increase far less than the internal increase of trade.

BALTIMORE.—ARRIVALS IN 1850.

The annexed table presents a complete view of the foreign commerce of the port of Baltimore, during the year 1850. It comprises monthly statements of the arrivals, clearances, aggregate tonnage, and value of cargoes.

	Foreign Arrivals.	Foreign Clearances.
Ships	60	95
Barques	85	91
Brigs	208	206
Schooners	105	119
Total	467	511

The vessels cleared during the year were destined to the following countries, viz. to England and Ireland, 33; Holland, 18; Bremen, 29; France, 6; Peru, 4; Mexico, 3; Russia, 2; Africa, 4; Spain, 4; Brazil, 45; Venezuela, 5; New Grenada, 3; Spanish Main, 4; Buenos Ayres, 2; Austria, 1; Portugal, 1; Quebec, 1; Chili, 2; to the various West India Islands and British Provinces, 269; and to California, 51.

	Aggregate Tonnage.	No. of Men employed.
January	11,962	459
February	10,948	442
March	9,827	417
April	10,162	449
May	12,540	511
June	13,727	447
July	12,065	490
August	12,053	470
September	7,658	333
October	11,527	482
November	7,885	222
December	10,238	480
Total	130,587	5,202

FOREIGN EXPORTS.

	Total Value of Foreign Exports.	Value of Exports to California.
January	$677,319.00	$250,000.00
February	707,402.71	234,962.00
March	752,656.28	226,002.65
April	665,532.23	128,171.29
May	653,989.05	86,950.93
June	743,681.74	75,198.10
July	617,691.59	105,724.72
August	601,240.25	86,964.24
September	588,849.94	134,504.55
October	765,697.93	256,309.80
November	776,497.21	262,987.69
December	647,840.57	230,215.54
Total	$8,278,418.45	$2,027,986.54

The receipts from "duties" at the custom-house, from the 1st January to 31st December, 1850, amounted to $1,008,633.28, being larger than for any previous year. The total receipts into the depository at Baltimore, during the year, were $1,026,340.97, and the disbursements, during the same period, $1,029,965.51; the latter exceeding the former by $3,624.54, and leaving on hand, 1st inst., $16,681.70, against a balance, 1st January, 1850, of $20,286.24.

It is impossible to ascertain the precise value of the imports during the year, for the reason that a large portion of them are non-duty-paying articles. In this latter class, we note nearly 200,000 bags coffee.

The value of merchandise exported, during the year 1850, to foreign countries, including California, was $8,278,418.45. Of this amount, exports to the value of $2,027,986.54 were sent to California.

Vessels built in 1850.

	No.	Tons.
Ships	9	5,641.05
Barques	5	1,465.17
Brigs	2	340.78
Steamboats	2	231.16
Schooners	39	3,497.91
Total	57	11,176.17

IMPORTATIONS.

Coffee.

The imports during 1850 and 1849 were—

	1850.	1849.
	Bags.	Bags.
From Rio Janeiro	149,845	166,386
" Laguayra	24,129	23,646
" Porto Rico	5,358	1,741
" Maracaibo	2,754	——
" Jamaica	1,448	268
" Cuba	927	——
" St. Domingo	407	1,413
" Rotterdam	447	——
" Guayaquil	91	——
Total	184,906	193,454

Cotton.

The receipts during the year 1850 were—

From Charleston	5,838	bales.
" New Orleans	3,549	"
" Savannah	2,130	"
" Mobile	1,477	"
" Apalachicola	1,290	"
Total	14,084	"

Cattle and Hogs.

The number of beef cattle weighed at the State live-stock scales, from the

1st November, 1848, to 1st November, 1849, was 26,807 cattle, weighing 26,650,174 lbs.

The number from 1st November, 1849, to 1st November, 1850, was 31,437 cattle, weighing 29,144,095 lbs.

The number of hogs from November, 1848, to November, 1849, was 135,375, weighing 27,057,644 lbs.

The number from November, 1849, to November, 1850, was 98,753, weighing 20,174,872 lbs.

Grain.

The imports in 1850, were—

Wheat	2,275,000	bush.
Corn	3,250,000	"
Oats	600,000	"
Rye	140,000	"
Peas	30,000	"
Beans	4,000	"
Total	6,299,000	"

Hides.

The number imported during 1850, was:—

From Buenos Ayres	76,694
" Rio Grande	64,731
" Rio de Janeiro	32,551
" Laguayra	14,887
" West Indies	6,634
" Maracaibo	4,554
" Pacific	3,393
" Coastwise	30,727
Total, 1850	234,171
Total, 1849	227,589

Molasses.

The import in 1850 was—

Barrels and Casks	12,984
Hogsheads and Tierces	9,017

Rice.

The receipts during 1850 were—

Tierces and Casks	3,277
Barrels	514

Sugar.

The import in 1850 was—

Hogsheads	18,537	Boxes	3,057
Barrels	6,649	Bags	11,263

Imports of Sugar and Molasses from New Orleans, for Three Years, the Year commencing 1st November.

	Sugar.		Molasses.		
	Hhds.	Bbls.	Hhds.	Tcs.	Bbls.
1848	10,279	3,269	721	554	12,703
1849	9,851	2,884	......	251	11,066
1850	8,962	2,661	77	244	14,715

Imports from West Indies, the Year ending 31st December.

	Sugar.		Molasses.		
	Hhds.	Bbls.	Hhds.	Tcs.	Bbls.
1848	14,841	2,393	6,608	852	247
1849	12,590	5,654	5,883	499	112
1850	11,454	1,426	6,815	527	294

INSPECTIONS.

Salted Fish.

The following is the amount of salted fish inspected during 1850:—

	No. 1.	No. 2.	No. 3.	Condemned.	Total.
Mackerel, barrels	1,348	1,257	20,948	1,021	24,569
Mackerel, half barrels	670	954	1,538	206	3,363
Shad, barrels	6,820	249	......	194	7,263
Shad, half barrels	747	161	......	18	926
Herrings, barrels	27,268	896	......	1,908	29,262
Herrings, half barrels	875	......	......	43	918
Salmon, barrels	24	......	......	......	24
Salmon, half barrels	5	......	......	......	5
Codfish, barrels	165	......	......	......	165
Codfish, half barrels	32	......	......	22	54
Bluefish, barrels	15	......	......	......	15

Flour and Meal.

Inspections of flour, corn meal, and rye flour, for the last 10 years:—

	Flour.	Corn Meal.			Rye Flour.
	Bbls.	Hhds.	Bbls.	Hf. Bbls.	Bbls.
1841	628,974	459	10,786	84	8,842
1842	558,282	715	7,772	487	5,458
1843	560,481	585	18,859	821	8,424
1844	499,501	245	25,054	1,525	9,904
1845	576,745	631	23,949	1,450	6,580
1846	850,116	1,076	40,942	1,744	5,402
1847	959,456	984	105,842	1,298	6,690
1848	786,441	333	60,225	1,322	7,578
1849	764,519	428	51,772	2,051	8,011
1850	896,592	272	42,403	3,369	5,430

Tobacco.—Inspections, &c. in 1850.

The stock on hand, in 5 warehouses, 1st January, 1850, was	19,628	hhds.
Amount inspected in 1850	41,833	"
Total	61,461	"
Exported and consumed in 1850	50,844	"
Leaving on hand, 31st December, 1850	10,617	"

The kinds inspected were as follow:—

Maryland	27,086 hhds.
Ohio	13,965 "
Kentucky	756 "
Virginia	15 "
Pennsylvania	12 "
Total	41,883 "

From the above it will be seen that the stock, 1st January, 1850, was 10,617 hhds; same period of 1850, 19,628 hhds.; and of 1849, 32,690 hhds.

The stock on hand on the 1st January, for 20 years past, has averaged	13,927 hhds.
For 10 years past	17,881 "
For 5 years past	25,510 "

The crops to come to market in the year 1851, are estimated as follows:—

Virginia, about	30,000 hhds.
Kentucky, Tennessee, and Missouri, about	50,000 "
Maryland, about	22,000 "
Ohio, about	14,000 "

Whiskey.

The amount inspected during 1850, was 1,067 hhds. and 31,323 bbls., of which 665 hhds. and 7,837 bbls. were received by the Tidewater Canal, and 928 bbls. from New Orleans.—*Baltimore American.*

Table of Tobacco Inspections for the last 10 *Years.*

	Maryland.	Ohio.	Virginia, and other kinds.	Total.
1850	27,084	13,965	783	41,888
1849	30,689	13,664	1,248	45,601
1848	23,491	9,702	708	33,906
1847	34,580	15,219	772	50,571
1846	41,416	29,626	754	71,896
1845	39,538	26,696	1,755	67,989
1844	32,249	15,464	1,244	48,957
1843	29,354	13,465	4,877	47,696
1842	33,759	11,278	1,439	46,476
1841	29,980	7,692	1,479	39,151

Exports of Tobacco from the Port of Baltimore, for the last 10 *Years.*

	Bremen.	Rotterdam.	Amsterdam.	France.	All other Places.	Total.
1850	15,864	7,814	5,973	8,177	6,540	44,368
1849	18,821	13,783	8,725	9,562	1,033	51,924
1848	12,787	7,910	3,103	4,959	131	38,890
1847	22,967	7,819	11,888	9,418	1,895	33,482
1846	24,404	9,498	6,181	6,371	3,037	49,491
1845	26,832	18,171	10,944	7,183	2,880	66,010
1844	17,139	11,864	7,095	7,212	1,594	44,904
1843	16,990	6,525	7,825	7,932	3,822	42,594
1842	17,719	10,874	8,109	4,682	2,379	43,763
1841	16,378	7,918	5,169	6,022	2,519	38,001

Exports of Flour from Baltimore, for 1850.

	American Vessels.	Foreign Vessels.
	Bbls.	Bbls.
Swedish West Indies	925	....
Danish West Indies	15,817	2,574
Holland	150	504
Hanse Towns	2	1,498
England	45,706	4,570
British Guiana	12,987	5,818
British West Indies	62,788	25,914
British N. A. Colonies	9,785	9,817
Cuba	162	....
Porto Rico	1,854	....
Hayti	1,540	....
New Grenada	1,025	825
Venezuela	10,466	....
Brazil	97,892	....
Montevideo	1,521	....
Buenos Ayres	450	2,856
Chili	400	....
Bolivia	40	125
Liberia	408	....
Yucatan	1,000	....
Madeira	....	550
Mexico	450	....
	264,808	58,091
	58,091	
Total	317,899	

[*Price Current.*

STATE OF NEW YORK.

Onondaga Salt.

The whole number of bushels of salt manufactured and inspected on the Onondaga Salt Spring Reservation, during the year ending December 31, 1850, is as follows:—

Syracuse, 1st Ward	2,175,711 bushels.
2d Ward	1,184,928 "
Liverpool	648,832 "
Geddes	259,448 "
Aggregate number of bushels	4,268,919 "
Amount manufactured and inspected in 1849	5,083,360 "
Diminution in 1850, from 1849	814,450 "

[*Albany Evening Journal.*

COMMERCE OF PORTLAND, MAINE.

Receipts of Flour and Corn.

	Flour.	Corn.
	Bbls.	Bushels.
1848.		
From New York	94,428	59,705
" Boston	16,969	20,040
" Southern Ports	8,908	152,378
Total	119,400	232,123
1849.		
From New York	114,388	86,047
" Boston	21,412	22,803
" Southern Ports	18,014	185,417
Total	153,814	194,267
1850.		
From New York	188,993	81,420
" Boston	4,288	10,062
" Southern Ports	138,998	131,159
Total	169,879	222,641

Above are the receipts of flour and corn at this place for the past three years, made as correct as circumstances will permit, but presumed to be rather less than more in quantity.—*Argus.*

Imports of Molasses and Sugar.

The following is the amount of molasses imported into this port:—

	Hhds.	Tcs.	Bbls.	Gallons.
In 1850	34,997	1,579	774	3,824,143
In 1849				2,864,511
Excess in 1850				959,632
Sugar, in 1850				1,039,759
" 1849				27,130
Excess in 1850				1,012,629

Arrivals and Clearances—Coastwise.

The number of arrivals, coastwise, at this port, for the quarter ending December 31st, 1850, is 53; tonnage, 8691[illegible]; men employed, 337.

The number of clearances, coastwise, during the same time, is 86; tonnage, 18,518[illegible]; men employed, 598; boys, 10.—*Advertiser.*

RESOURCES OF OHIO.

In a late number of the Cincinnati Gazette, we find some statistical information in regard to the resources of Ohio, from which we glean a few items:—

It is well known, that two or three counties in this State have produced upwards of a million of bushels each of wheat, and that others, not deemed first-rate wheat counties, have produced half a million each. Now there are in Ohio 87 counties, and we shall be within bounds to say they have produced thirty millions of bushels in 1850. This crop does not appear in the census returns, but it is nevertheless a reality. Now there are, in round numbers, two millions of people; and six bushels each is an abundant allowance for consumption. We have, then, this result:—

Wheat crop of 1850	30,000,000 bush.
" " consumed	12,000,000 "
Surplus for export	18,000,000 "

At 75 cents per bushel, the surplus is worth $13,500,000.

This is the money value; but look at it in another view, as a food-supplying State, for people who cannot supply themselves. Then the problem runs thus:—

30,000,000 bushels feed	5,000,000 people.
12,000,000 " "	2,000,000 at home.
18,000,000 surplus, feed	3,000,000 abroad.

Thus, we find Ohio giving fine wheat flour to three millions of people out of her own domain!

No grain is as much the agricultural glory of our country as Indian corn. Its value as an article of commerce is hardly greater than its beauty as a plant. We are speaking of bread. We happen to have the return of Indian corn (in 1850) for two counties—one (Pickaway) a first-class county for corn, and the other (Greene) only a second-class one. The comparison of these, with the return of the same counties in 1840, may serve to give an idea of progress in corn.

	1840.	1850.
Pickaway county	1,323,809	3,323,000 bush.
Greene county	659,296	1,161,082 "
Total	1,963,180	4,484,082 "
Increase		125 per cent.
Amount for each person		100 bushels.

This increase and result seem almost incredible, and yet there can be no doubt of its truth. Let us suppose, however, that the increase for the entire State is but three-fourths the increase for these counties, viz. 93 per cent., and look at the result. In 1840, the States producing the most Indian corn, in order, were—Tennessee, 44,986,184; Kentucky, 39,847,120; and Ohio, 33,668,144. If Ohio, as the returns indicate, has increased the corn production 90 per cent., then the crop of 1850 is sixty-four millions of bushels.

Looking to the consumption of this vast crop, the surplus is chiefly used in fattening cattle and hogs for exportation, and no export of corn and meal. Both these we know very nearly, and the result is:—

Corn crop	64,000,000 bush.
Consumed for stock	42,000,000 "
Exported in fat animals	20,000,000 "
Exported in bulk	2,000,000 "

The last two items give an exported surplus of twenty-two millions of bushels. If we add to the value of this corn the labour of packing, cooperage, commissions, &c., on the export of animal products, we have at least ten millions of dollars for this surplus. Thus, we find, that the surplus food of Ohio, in two leading articles, will come to twenty-five millions of dollars—and, in raw material, is enough to feed another population equal to her own.

PORK TRADE OF THE WEST.

We give below returns from the West, as far as received, including those previously published—keeping each State separate. In giving the number packed at Terre Haute this season, in our last number, we understated it by 10,000 head. This error we correct below.

	1851.	1850.
Ohio.		
Previously reported, exclusive of Cincinnati	64,027	152,990
Cincinnati	324,529	401,755
Total	388,556	558,745
Indiana.		
Previously reported, exclusive of Terre Haute	274,549	320,175
Terre Haute	65,548	60,000
Fort Wayne	2,000	none.
Huntington	500	900
Lagro	1,500	2,000
Wabashtown	1,000	4,500
Americus	700	900
Durkee's Ferry	5,000	4,500
Darwin	1,200	3,300
York	1,500	1,000
Frankfort	2,500	1,900
Armiesburgh	2,000	3,500
Carlisle	2,500	......
Evansville	12,000	14,000
Total	372,497	416,675
Illinois River.		
Beardstown	35,000	37,000
Alton	25,000	40,000
Meradocia	9,000	9,000
Maples	4,000	6,500
Peoria	30,000	21,000
Pekin	19,000	28,000
Canton	12,000	24,000
Liverpool	2,400	400
Springfield	8,000	19,500
Chillicothe	4,000	3,800
Lacon	13,000	11,600
Peru	4,000	15,000
Total	165,400	215,800

	1851.	1850.
Mississippi River.		
St. Louis, about	85,000	124,000
Hannibal	17,000	24,000
Quincy	20,000	29,000
Keokuk	22,000	19,000
Burlington	19,000	29,000
Total	161,000	225,000

Recapitulation.

	1850–51.	1849–50.
Ohio	388,556	558,745
Indiana	372,497	416,675
Illinois	165,400	215,800
Mississippi	161,000	225,000
Cumberland Valley	30,000	40,000
Kentucky	205,414	201,000
Total	1,322,867	1,652,220 1,322,867
Deficiency in number		329,352

There are yet a great many points in Missouri, Illinois, and Iowa, to hear from.—*Cincinnati Price Current, Jan.* 29, 1851.

ANALYSIS OF THE ASHES OF THE HOP.*

The 2 lbs. of hops, when dried at a steam-heat, lost 3 oz. of moisture, and left 1 lb. 13 oz. of dry hops. The dry hops were burned to ashes in a large earthen crucible, and furnished 1282 grs. of ashes, being at the rate of $\frac{3}{10}$ per cent.

These ashes were analyzed in the usual manner, and every hundred parts contained as follows:—

1. *Ashes of the Hop.*

Silica (or pure sand)	20.95
Chloride of Sodium (common salt)	7.05
Chloride of potassium	1.63
Potash	24.50
Lime	15.56
Magnesia	5.63
Sulphuric acid (oil of vitriol)	5.27
Phosphoric acid	9.54
Phosphate of iron	7.26
Carbonic acid	2.61
	100.00

2. *Analysis of the Ashes of the Leaves of the Hop Plant.*

The $9\frac{3}{8}$ oz. of leaves, dried at a steam-heat, lost $1\frac{1}{8}$ oz. of moisture, and left $8\frac{1}{4}$ oz. of dried leaves. The dried leaves, burned to ashes as before, gave 572 grs., being at the rate of $16\frac{1}{3}$ per cent.

The ashes were of the following composition in the hundred parts:—

* In the following tables, the loss is previously deducted.

Ashes of the Leaves of the Hop Plant.

Silica	10.14
Chloride of sodium, (common salt)	7.92
Soda	0.82
Potash	12.48
Lime	41.46
Magnesia	1.90
Sulphuric acid	4.20
Phospharic acid	2.02
Phosphate of iron	2.98
Carbonic acid	16.54
	100.00

3. *Analysis of the Ashes of the Hop Bind or Stalk.*—The 1 lb. 2½ oz. of the bind, dried at a steam-heat, lost 1⅞ oz. of moisture, and left 1 lb. .0⅝ of dry bind. The dry bind, burned, gave 353 grs. of ashes, being at the rate of nearly 5 per cent.

The ashes gave the following results in the 100 parts :—

Ashes of the Bind of the Hop.

Silica	4.64
Chloride of sodium, (common salt)	4.95
Chloride of potassium	7.38
Potash	18.62
Lime	29.59
Magnesia	8.15
Sulphuric acid	2.63
Phosphoric acid	5.22
Phosphate of iron	0.81
Carbonic acid	23.51
	100.00

4. *Composition and percentage of the Ashes separated from the Carbonic Acid.*—The carbonic acid, combined with the lime, &c. in the ashes, was produced, during the burning of the plant, by the oxidation of the carbon of the vegetable matter. It is, therefore, not a mineral ingredient of the soil; and, in order to arrive at the real percentage of inorganic matter, it is necessary to withdraw the carbonic acid from the foregoing tables.

This has been done in the following tables :—

TABLE 1.—*Quantity per cent. of Mineral Ingredients in the Hop, Leaves of Hop, and Bind, dried at the temperature of Boiling Water.*

	Hop.	Leaves.	Bind.
Percentage	9.87	13.6	3.74

TABLE 2.—*Composition in 100 parts of the Inorganic Matter.*

	Hop.	Leaves.	Bind.
Silica	21.50	12.14	6.07
Chloride of sodium, (common salt)	7.24	9.49	6.47
Chloride of potassium	1.67	......	9.64
Soda	......	0.89	......
Potash	25.18	14.95	24.35
Lime	15.98	49.67	38.73
Magnesia	5.77	2.89	4.10
Sulphuric acid	5.41	5.04	3.44
Phosphoric acid	9.80	2.42	6.80
Phosphate of iron	7.45	3.51	0.40
	100.00	100.00	100.00

5. *Quantity of Inorganic Matter taken from the Land by 4 hills of Farnham Hops.*—In order to obtain practical benefit from the foregoing analysis, it will be necessary, in the next place, to ascertain the whole amount of inorganic matter removed by the 4 hills of hops; and, likewise, the amounts of the separate ingredients.

The following table gives us the actual weight, in grains troy, of the various ingredients removed from the soil by 4 hills of hops :—

Actual Weight of Mineral Ingredients removed from the Soil by 4 hills of Hops.

	Hops.	Leaves.	Bind.
Silica	268.11	54.24	16.68
Chloride of sodium	90.28	46.31	17.78
Chloride of potassium	20.82	......	26.41
Soda	......	1.90	......
Potash	314.00	72.96	66.72
Lime	199.27	242.89	106.12
Magnesia	71.95	11.66	11.23
Sulphuric acid	67.46	24.60	9.43
Phosphoric acid	122.121	11.81	18.68
Phosphate of iron	92.90	17.18	1.10
Total weight	1247.00	488.00	274.00

6. *Amount of Mineral Ingredients removed from the Soil by an Acre of Hops.*—The number of hills of hops to an acre varies in different localities. In some places 1000, in others 1260, in others 1440 hills go to the acre.

In the present instance, I believe about 1000 to be the number of hills contained in an acre.

Therefore, by multiplying the numbers in the preceding table by 250, we shall have the actual weight of the various inorganic ingredients of the soil removed from an acre of land by the hop.

For the convenience of agriculturists, I give, in the following table, these weights in pounds and ounces avoirdupois :—

Amount of various Mineral Ingredients removed from an Acre of Land by the Farnham Hop.

	300 lbs. of Hops.		143⅜ lbs. of Leaves.		229 lbs. of Bind.		Total in Hops, Leaves, & Bind.	
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Silica	9	9	2	2	0	9½	12	4½
Chloride of sodium	3	3½	1	10	0	10	5	7½
Chloride of potassium	0	12	0	0	0	15	1	11
Soda	0	0	0	1	0	0	0	1
Potash	11	8½	2	10	2	6	16	8½
Lime	7	1¾	8	10	3	13	19	8¾
Magnesia	2	9	0	6	0	6½	3	5½
Sulphuric acid	2	6¼	0	14	0	5¼	3	10
Phosphoric acid	4	6	0	7	0	9¾	5	6¾
Phosphate of iron	3	5	0	10	0	0¾	3	15¾
Sum total	44	8	17	6	9	11½	71	9½

TRADE OF ST. LOUIS.

The St. Louis Republican of the 1st January contains an elaborate statement of the trade of that city for the year 1850, from which we make the following extracts:

Tobacco.

The article is classed among the most important agricultural productions of our State, and, since 1838, has attracted considerable attention for export. While the receipts for 1850 fall short 609 hhds., compared with the receipts for the previous year, they still slightly exceed the receipts of 1848.

Total receipts in 1850	9,055
Receipts of 1849	9,664
Decrease in 1850	609

	Prices in 1849.*		Prices in 1850.*
March	$1.50 to $7.00	March	$3.00 to $12.00
April	1.50 to 7.50	April	4.45 to 7.75
May	1.20 to 8.00	May	3.00 to 12.00
June	2.50 to 9.00	June	4.15 to 13.20
July	2.50 to 9.50	July	4.45 to 8.45
August	2.50 to 8.00	August	5.50 to 10.50
September	1.50 to 7.00	September	5.00 to 13.50
October	1.25 to 6.50	October	5.45 to 9.35
November	1.25 to 6.50	November	6.00 to 15.00
December	1.25 to 6.50	December	4.75 to 8.30

* January and February, no sales.

Hemp.

Receipts of hemp during the past year greatly exceed those of any year since 1847, when they reached over 72,222 bales; a circumstance, however, measurably owing to the non-reception during the preceding year of the crop due, the receipts of 1846 having been less than 34,000 bales. The market throughout 1849 was marked by more firmness than during the past year, and the rates were higher, having ranged between $1.20 and $1.26, varying a little from January to December. At the close of 1849, the stock in store was 893 bales. The stock in store and on sale at the close of 1850 is about 2,000 bales. The market during January was inactive at the figures of the previous year, and declined in February to $90 to $105 per ton. The ruling rates for the balance of the year were $80 to $95.

Total	60,862
Receipts of 1849	46,290
Increase of 1850 over 1849	14,572

Lead.

The production of this article has been gradually declining since 1845; receipts, per rivers, since that time, having fallen off from 750,877 pigs to

873,502. In the mean time, the demand for home consumption has materially increased, and very little has been exported. In consequence of this decline in production, prices have gone up, and, during the last two years, have ranged much higher than for many years previous. For the greater part of the past year, the price of upper-mines lead has been over $4.25, and the market closes firm at $4.37½ to $4.40 per 100 pounds.

Monthly Receipts per Rivers, Upper and Lower Mines inclusive.

	Pigs.		Pigs.
January	3,421	July	57,660
February	3,542	August	38,466
March	43,340	September	56,268
April	75,264	October	56,568
May	88,626	November	64,684
June	84,594	December	1,079

Total	578,592
Received, per rivers, in 1849	590,298
Falling off of 1850 from 1849	16,701

Actual Product of Upper Mines, for the last two Years.

In 1850	567,946 pigs, or	37,589,728 pounds.
In 1849	625,468 "	42,581,634 "
Decrease	57,967 "	4,941,906 "

Actual Product of Lower Mines for 1850.

Richmond mines	11,872 pigs, or	832,430 pounds.
Other mines	74,104 "	5,167,570 "
	85,976	6,000,000 "

Monthly Prices during 1850.

January	$3.92 @	3.95
February	3.95	4.00
March	4.37½	4.50
April	4.70	4.75
May	4.58	4.60
June	4.25	4.35
July	4.15	4.20
August	4.10	4.15
September	4.15	4.10
October	4.25	4.30
November	4.25	4.30
December	4.35	4.40

Monthly Prices during 1849.

January	$3.75 @	3.80
February	3.80	3.85
March	4.00	4.10
April	3.80	3.85
May	3.95	4.00
June	4.00	4.05
July	4.05	4.10
August	4.20	4.25
September	4.20	4.25
October	4.05	4.10
November	3.90	3.92
December	3.92½	3.95

Wheat.

Receipts of this article, during the year just closed, have slightly exceeded those of last year, but fall short of those of 1846, 1847, and 1848. The last year has, doubtless, been a better wheat year than 1849, but owing to a generally entertained opinion that the article must advance, farmers and shippers held back, until threatened by closing navigation. This will account for the heavy receipts during November, compared with other months in the year.

Monthly Receipts per Rivers.

	Sacks.	Barrels.		Sacks.	Barrels.
January	10,013	123	July	29,144	287
February	14,941	68	August	70,651	264
March	60,659	1,452	September	118,878	1,384
April	83,135	1,036	October	132,177	2,662
May	60,180	227	November	208,139	4,605
June	43,971	144	December	45,365	488
Total				876,758	12,856

Receipts per rivers, in 1850	1,792,074	bushels.
Receipts per rivers, in 1849	1,762,535	"
Increase of 1850 over 1849	29,539	"

Monthly Prices, per Bushel, for 1849.

January	80 @	85 cts.	July	85 @	97½ cts.
February	80	85	August	85	87½
March	76	80	September	85	90
April	75	78	October	90	93
May	83	85	November	93	96
June	83	85	December	98	115

Flour.

Receipts by rivers, in 1850	292,718
Received by rivers, in 1849	301,933
Decrease	9.215

Receipts per Wagons, during 1850.

From Centre Mills, (new,) Illinois, since 30th September	1,833
" Hope Mills " 1st January	1,485
" Planet Mills " 1st January	1,735
" Harmony Mills " 1st January	2,495
" Harrison's Mills " and other sources	24,944
Total	32,352
Add receipts per rivers	292,718
Total of all receipts for 1850	325,070

Monthly Prices during 1850.			*Monthly Prices during 1849.*		
January	$4.75 @	5.12½	January	$4.20 @	4.25
February	4.20	5.25	February	4.25	4.50
March	5.37½	5.50	March	4.20	4.25
April	5.00	5.37½	April	3.70	3.75
May	5.62½	6.00	May	3.75	3.80
June	6.00	6.35	June	3.80	3.87½
July	4.25	5.25	July	4.10	4.25
August	3.75	4.00	August	4.25	4.30
September	4.30	4.45	September	4.30	4.45
October	4.50	4.60	October	4.50	4.60
November	4.50	4.75	November	4.50	4.75
December	5.75	5.12½	December	4.75	5.12½

Corn.

While the receipts of corn for the last year have almost quadrupled those of the year preceding, the ruling rates have almost doubled those of that

year. The demand has been active throughout, and the remaining stock on sale at the close is by no means large.

Total receipts by river, 1850	484,014
Receipts of 1849	142,182
Increase of 1850 over 1849	341,832

Monthly Prices during 1850.			*Monthly Prices during 1849.*		
January	38 @	40 cts.	January	30 @	32 cts.
February	37	40	February	30	32
March	45	48	March	25	27
April	44	45	April	23	24
May	56	60	May	26	28
June	60	62½	June	36	38
July	58	64	July	36	38
August	56	61	August	36	39
September	50	52	September	35	38
October	52	55	October	36	39
November	46	48	November	35	38
December	50	55	December	38	40

Castor Beans.

Under light receipts, prices have been highly remunerative. The season opened at the high price of $2.20, but in April prices ranged to $2.60 to $2.65 per bushel. From this, the article gradually declined to the close of the year, and we now quote at $1.25, and few arriving.

January	$2.20 @	2.37½	July	$1.70 @	1.75
February	2.26	2.50	August	1.60	1.70
March	2.50	2.60	September	1.45	1.50
April	2.60	2.65	October	1.35	1.40
May	2.55	2.60	November	1.25	1.30
June	1.75	1.80	December	1.30	1.35

Flaxseed.

The demand has been active throughout the year, and prices have been proportionably high. The following have been the monthly rates, per bushel:—

January	$1.45 @	1.50	July	$1.30 @	1.35
February	1.40	1.50	August	1.25	1.30
March	1.50	1.55	September	1.10	1.20
April	1.55	1.60	October	1.25	1.30
May	1.50	1.55	November	1.45	1.50
June	1.30	1.35	December	1.60	1.65

Pork.

The receipts of the last year vary but little from those of 1849; but our monthly table will show that the bulk of the sum total was the product of 1849, very little having been received since the present packing-season commenced. The high price of corn induced growers to send forward that staple, rather than to apply it to fattening, and hence few hogs have been prepared for slaughtering. Up to the present date of the last packing-season, the number of hogs slaughtered in this city alone was nearly 115,000; and at points above, and throughout the West, the number was also large. So far as we are informed, with regard to the present season, only 55,000 hogs have been killed in this city, and a corresponding falling off is observed throughout the country. This deficiency must advance the price of pork, but whether sufficient to remunerate dealers for the high prices paid for hogs, is doubtful. The hog market opened timidly, at figures approximating to $3, but, since the commencement, has steadily advanced, until within a few days, since which it has been less firm; and few sales are now effected beyond $4, for hogs weighing 220 lbs., though drovers are contending for $4.15 to $4.20.

	Tcs.	Bbls.
Total receipts, 1850	1878	101,562
	1745	111,164

The following have been the monthly prices for mess pork, per bbl., during 1850, prime and clear mess having the usual average differences, below and above:—

January	$8.87½ @	8.50	July	$10.00 @	10.50
February	8.87½	8.50	August	10.50	11.00
March	8.25	8.87½	September	nominal.	
April	8.87½	8.50	October	"	
May	9.25	9.50	November	"	
June	10.60	11.00	December	10.25 @	11.00

Lard.

Receipts of lard, for the last year, have about equalled those of the year previous. Prices have not materially varied from those of the previous year, and the market has been active.

Monthly Prices, per 100 lbs., in 1850.

January	$4.50 @	5.50	July	$6.00 @	7.00
February	4.50	5.50	August	6.25	6.75
March	5.25	6.50	September	5.50	6.12½
April	4.50	5.80	October	5.62½	6.25
May	4.75	6.00	November	6.00	7.00
June	6.85	6.75	December	6.00	7.00

Receipts at this port of the principal articles of Produce, for the last two years.

	1849.	1850.
Wheat, sacks	881,428	927,846
Flour, barrels (per rivers)	301,988	298,231
" " (per wagons)	......	32,452
Corn, sacks	142,182	784,014
Oats, sacks	126,835	848,716
Barley, sacks	44,618	84,744
Pork, barrels	113,909	101,562
" tierces	......	1,878
Salt, sacks	289,580	261,280
" barrels	22,557	19,158
Hemp, bales	45,227	60,862
Lead, pigs	591,851	578,502
Tobacco, hogsheads	9,664	9,055
Beef, barrels	14,837	6,049
" tierces	8,121	2,686
Dry Hides	68,895	94,228
Whisky, barrels	28,741	25,259
Sugar, hogsheads	23,814	25,796
" bins	8,000	5,084
" boxes	3,064	12,388
Coffee, sacks	58,702	73,678
Molasses, barrels	81,217	29,518
Lard, barrels	64,615	61,585

	1849.	1850.
Lard, tierces	11,041	17,925
" kegs	15,512	14,549
Bacon, tierces	2,195	7,087
" casks	21,764	28,248
" barrels	1,646	8,019
" boxes	2,268	1,880
" pieces	......	46,978
" pounds	......	82,496
" bagged hams	......	2,598
Bulk Pork, casks	......	1,096
" " boxes	......	100
" " pieces	......	801,381
" " pounds	12,889,360	1,841,747

Tonnage.

The number of steamboats arrived during the year was as follows:—

	1849.	1850.
From New Orleans	813	303
Ohio River	401	498
Illinois River	686	788
Upper Mississippi	806	635
Missouri River	855	890
Cairo	122	75
Other points	217	215
Total	2,900	2,599

It appears that 246 different boats arrived at the port during the year.

WHALE FISHERY.

ANNUAL REPORT.

Review of the Whale Fishery for 1850.

We present to our readers a full and reliable review of the whale fishery for the last year, as compared with previous years. By this, it will be seen at a glance, that the past has been a year of great prosperity in the trade. The number of ships returning with full cargoes has been large, while prices have risen to an unprecedented height. Nevertheless, the importation of oil in 1850 will be found to fall short of that of 1849 about 7000 bbls. sperm, and 48,000 bbls. whale, and the number of arrivals is less by 6 sperm and 19 right whalers, yet the stock on hand is about the same as on the 1st January, 1850. This discrepancy, as regards whale oil, is undoubtedly owing to a diminished consumption, arising from the very high figure at which oil has been held, which has forced many substitutes into the market, and seriously impaired exportations.

The number of vessels employed in the fishery is about the same as that of last year. Of the fleet, 145 have cruised in the Russian and Arctic seas, during the last season, with great success; indeed, the average quantity of oil taken is larger than in any previous year.

We regret to say, that accounts from the sperm whalers in the Pacific are not at all encouraging. The old cruising grounds are pretty well exhausted for the present, and very light catchings are to be expected. If we are to judge by present indications, importations of sperm oil, for the coming year, will hardly exceed 75,000 bbls., while that of whale oil will not, probably, fall short of 275,000 bbls.

Perhaps no better evidence can be offered of the confidence felt by business men, than the fact that no less than 14 first-class vessels are in process of construction, or are under contract, all intended for the business, from this district alone, while 5 or 6 will be added to the New London fleet.

Importations of Sperm and Whale Oil, and Whalebone, into the United States, in 1850.

Ports.	Sperm.	Whale.	Bone.
	Bbls.	Bbls.	Lbs.
New Bedford	39,298	91,627	1,081,500
Fairhaven	8,812	10,559	477,900
Dartmouth	266	7	....
Westport	3,607	324	....
Mattapoisett	2,689	81	....
Sippican	43	1,453	9,300
Wareham	250	2,719	38,100
Holmes's Hole	1,208	4,960	56,800
Edgartown	2,164	184	1,700
Nantucket	17,989	1,828	133,000
Yarmouth	68	18	....
Provincetown	3,205	501	....
Boston	3,845	786	3,700
Beverley	368	....	....
Truro	140	....	....
Warren	1,035	....	....
Providence	112	3,368	23,600
Stonington	900	15,226	179,600
Mystic	251	1,588	3,000
New London	2,349	86,545	203,000
Sag Harbor	718	26,478	193,100
Greenport	505	828	4,900
Cold Spring	776	763	....
New York	2,054	1,810	460,000
Orleans	240	....	....
Total in 1850	92,892	200,608	289,200
1849	100,944	248,492	2,281,100
1848	107,976	280,656	2,003,000
1847	120,753	313,150	3,341,680
Average for 10 years	130,721	236,029	2,407,150

Exports of Whale Oil from New Bedford, in 1850.

To Hamburg	40,617 gallons.
Cowes, and a market	59,874 "

Exports from Boston, in 1850.

	Sperm, bbls.	Whale, bbls.	Bone, lbs.
To England	70,738	26,974	17,475
Scotland	1,600	....	....
Holland	....	....	15,000

Statement of the Average Prices of Sperm and Whale Oil, and Whalebone, for 4 Years.

	Sperm.	Whale.	Bone.
1850	120$\frac{7}{16}$ cts.	49$\frac{1}{16}$ cts.	34$\frac{4}{16}$ cts.
1849	108$\frac{9}{16}$	39$\frac{9}{16}$	31$\frac{4}{16}$
1848	100$\frac{1}{2}$	36	30$\frac{3}{8}$
1847	87$\frac{7}{8}$	33$\frac{3}{4}$	34

Number of Ships engaged in the North Pacific Fishery, for the 4 last Years, and the Average Quantity of Oil taken.

	Ships.	Average.	Total.
1847	177	1,059 bbls.	187,443
1848	159	1,164	185,256
1849	155	1,334	206,850

In 1850, the North Pacific fleet consisted of 145 ships, (as nearly as can now be ascertained,) 110 of which only have yet been heard from, having taken an average of 1748 bbls. this season.

Statement of Sperm Oil, Whale Oil, and Whalebone on hand in the United States, January 1, 1851.

	Sperm.	Whale.	Bone.
	Bbls.	Bbls.	Lbs.
New Bedford District	2,300	13,812	22,000
Nantucket	750	150	......
Sag Harbor	......	150	70,000
Provincetown	560	......	......
New York	......	......	150,000
January 1st, 1851	3,610	14,062	242,000
1850	3,760	13,000	440,000
1849	10,147	20,986	994,600
1848	5,606	29,126	921,500

Comparative Statement of Tonnage of Vessels employed in the Whale Fishery, 1st January.

	1850.	1851.		1850.	1851.
	Tons.	Tons.		Tons.	Tons.
New Bedford	76,858	81,442	Boston	......	261
Fairhaven	14,735	14,480	Truro	......	143
Westport	2,817	2,963	Orleans	......	115
Dartmouth	111	111	Somerset	187	None.
Mattapoisett	1,760	1,822	Warren	4,487	4,669
Sippican	265	None.	Providence	842	865
Wareham	374	374	Fall River	646	646
Falmouth	1,106	1,106	Newport	1,382	1,548
Holmes's Hole	949	949	Stonington	5,877	5,391
Edgartown	1,360	1,360	Mystic	3,384	3,009
Nantucket	19,732	18,697	Greenport	3,059	2,965
Provincetown	1,232	3,095	New London	15,099	16,586
Quincy	100	None.	Sag Harbor	7,935	4,758
Beverly	162	326	Cold Spring	2,878	2,878
Lynn	720	720	New Suffolk	227	227
Yarmouth	90	None.	Total, 1st January	171,484	171,971

Recapitulative Table of Vessels employed in the Whale Fishery, Jan. 1, 1851.

Ports.	Ships and Barques.	Brigs.	Schooners.	Tons.
New Bedford	215	8	1	81,442
Fairhaven	45	......	......	14,480
Westport	11	5	......	2,968
Dartmouth	......	1	......	111
Mattapoisett	7	2	......	1,822
Wareham	1	......	......	874
Falmouth	3	......	......	1,106
Holmes's Hole	3	......	......	949
Edgartown	5	1	......	1,860
Nantucket	58	1	1	18,697
Provincetown	2	6	19	3,095
Truro	......	1	......	148
Orleans	......	......	1	115
Boston	1	......	......	265
Lynn	2	......	......	720
Beverly	......	2	......	326
Warren	15	......	......	4,669
Providence	2	......	......	865
Fall River	2	......	......	646
Newport	4	......	......	1,548
Stonington	17	......	......	5,891
Mystic	9	......	1	3,009
New-London	44	......	4	16,586
Sag Harbor	14	1	......	4,758
Greenport	9	1	......	2,985
Cold Spring	7	......	......	2,878
New Suffolk	1	......	......	227
Total, Jan. 1, 1851	502	24	27	171,974
Same time, 1850	410	20	18	171,484

Showing a diminution in the number of ships of 8, and an addition of 4 brigs and 14 schooners during the year; also, an increase in the aggregate tonnage of 487 tons.

MISSOURI.

Imports into St. Louis for the Year 1850.

Apples, barrels	9,559
Bale Rope, coils	22,681
Bagging, pieces	1,266
Beans, (white,) barrels	1,085
" " sacks	744
" (castor,) sacks	2,974
Bran and Shorts, sacks	72,788
Beef, tierces	8,983
" barrels	8,047
Bacon, casks	20,497
" barrels and boxes	1,878
" pieces	20,567
Butter, barrels	1,489
" kegs, jars, &c	8,081
Beeswax, barrels	268
" packages	878
Barley, sacks	34,022
Corn, sacks	512,500
Rye, sacks	3,280
Coffee, sacks	74,636
Cheese, boxes	21,508
Dried Apples and Peaches, bbls	6,845
" " " sacks	15,429
Flour, barrels	822,408
Flaxseed, barrels	587
" sacks	2,867
Feathers, sacks	1,298
Hemp, bales	68,835
Hides, bales	78,832
Hay, bales	24,335
Iron, (pig,) tons	8,872
Lead, pigs	608,069
Lard, tierces	24,864
" barrels	62,226
" kegs	14,148
Molasses, barrels	31,140
Nails, kegs	38,361
Oats, sacks	315,595
Onions, barrels	351
" sacks	15,295

Oil, (lard,) barrels	182
" (castor,) barrels	386
" (linseed,) barrels	1,189
Pork, barrels	182,827
" casks and tierces	28,041
" boxes	6,612
" pieces	648,622
Potatoes, barrels	2,281
" sacks	112,214
Sugar, hogsheads	25,580
" barrels and boxes	28,400
Salt, (Liverpool,) sacks	158,686
" (Ti, &c.) bags	95,945
" (Kenawha, &c.) barrels	28,974
Tobacco, hogsheads	9,259
" boxes	3,831
Tallow, tierces	393
" barrels	831
Wheat, barrels	12,843
" sacks	920,248
Wool, bales and sacks	1,170
Whisky, barrels	30,109

[*St. Louis Price Current.*

NAVIGATION.

Statement, showing the number and class of Vessels built, and the Tonnage thereof, in each State and Territory of the United States, for the year ending June 30, 1849.

States and Territories.	Ships.	Brigs.	Schooners.	Sloops and Canal boats.	Steamers.	Total number Vessels built.	Tons. 95ths.
Maine	119	107	105	6	7	344	82,255.56
New Hampshire	8	......	4	......	......	12	6,265.89
Vermont	......	......	......	......	......	......	....
Massachusetts	38	7	65	9	1	115	23,888.48
Rhode Island	3	3	4	8	......	18	2,760.28
Connecticut	2	1	38	14	1	56	5,066.26
New York	17	8	64	155	21	265	44,104.26
New Jersey	......	1	57	27	2	87	8,025.55
Pennsylvania	3	2	27	102	63	197	24,207.73
Delaware	1	......	16	5	......	23	1,880.36
Maryland	9	9	129	......	5	152	17,462.93
District of Columbia	......	......	......	22	......	22	609.20
Virginia	1	2	32	1	2	38	3,094.65
North Carolina	1	1	24	3	......	29	3,032.27
South Carolina	......	......	6	......	2	8	655.57
Georgia	......	1	......	......	1	2	756.37
Florida	......	......	1	......	......	1	119.88
Alabama	......	......	2	1	......	3	106.54
Mississippi	......	......	......	......	......	......	....
Louisiana	......	......	1	4	4	21	1,755.48
Tennessee	......	......	......	......	2	2	242.79
Kentucky	......	......	......	......	34	34	8,428.33
Missouri	......	......	......	8	11	19	2,886.51
Illinois	1	8	9	......	......	18	2,210.84
Ohio	......	2	9	8	44	63	12,816.92
Michigan	......	......	15	2	8	25	5,148.66
Texas	......	......	......	......	......	......	....
Oregon	......	......	......	......	......	......	....
Total	198	148	623	370	208	1547	256,577.47

It is seen that, in point of amount of tonnage, Maine is highest; New York, second; Pennsylvania, third; Massachusetts, fourth; Maryland, fifth; Ohio, sixth; Kentucky, seventh; New Jersey, eighth.

Of the inland States, Ohio has built the largest amount.

The amount built in the several States was as follows:—

	Tons.
Ohio	12,816
Kentucky	8,428
Michigan	5,148
Missouri	2,886
Illinois	2,210
Tennessee	242
Total	31,726

In addition, there were built, at Pittsburgh, Pennsylvania, about 60 steamers. We have no means at hand of ascertaining the proportion of the New York tonnage built on the lakes.

The tonnage of the principal ports of the United States was as follows:—

Ports.	Tons. 95ths.	Ports.	Tons. 95ths.
New York	776,491.79	Norfolk, Va.	23,016.26
Boston	296,890.04	Mobile	25,067.79
New Bedford	123,911.57	Buffalo	40,667.34
Bath	88,820.84	Pittsburgh	35,770.68
Portland	84,568.80	Detroit	38,466.94
Philadelphia	188,057.21	St. Louis	32,225.06
Baltimore	134,025.66	Cuyahoga	30,047.11
New Orleans	240,206.24	Oswego	22,151.68
Charleston, S. C.	29,285.48	Chicago	17,832.48
Wilmington, N. C.	10,641.87	Cincinnati	16,897.74

From this it is seen that the registered tonnage of twelve sea-port cities, including New Orleans, is 2,049,477 tons, against 228,585 tons at eight inland cities. Of the latter, 84,922 tons belong to Cincinnati, Pittsburgh, and St. Louis.

The value of some of the principal articles of agriculture and manufactures exported, we compare with the exports of 1849:

Articles.	Values.	
	1848.	1849.
Beef, tallow, hides, and horned cattle	2,474,208	2,058,858
Butter and cheese	1,068,087	1,654,157
Pork, (pickled,) bacon, lard, and live hogs	8,888,884	9,245,885
Wheat	1,681,975	1,756,848
Flour	11,668,669	11,282,582
Indian corn	1,186,668	7,966,869
Indian meal	945,081	1,169,625
Tobacco	8,478,270	5,804,207
Hemp	....	8,458
Soap, and tallow candles	680,041	627,280
Snuff, and tobacco	695,914	613,084
Iron, pig, bar, and nails	122,225	149,358
Cotton, printed, and colored	380,549	466,574
" white	1,978,031	8,955,117
" nankeen	818,189	3,206
" twist, yarn, and thread	81,318	92,555
All manufactures of cotton	255,799	415,680

The greatest increase, in any article of agriculture, was in the product of the hog. In the exports of cotton goods, the figures show a most satisfactory increase.

In order to show the comparative extent of our commerce with the several nations, we give the total value of the exports to some of the principal countries.

Russia	$987,557	British West Indies	3,985,884
Prussia	84,760	Canada	2,820,828
Sweden and Norway	725,281	France, on the Atlantic	11,646,612
Danish West Indies	727,197	" Mediterranean	877,147
Hanse Towns	2,710,248	Spain	1,619,428
Holland	2,155,828	Cuba	4,641,145
Belgium	2,448,064	Mexico	1,047,999
England	60,161,992	Brazil	2,888,889
Scotland	3,549,960	Chili	1,722,457
Ireland	8,916,842	China	1,460,945

The value of the exports to England, Ireland, and Scotland exceed, by $20,891,529, the exports to all other countries.

PHILADELPHIA.

The following statement, showing the capital invested in manufacturing, the value of the raw material consumed, the number of hands employed, the wages paid, and the value of the annual product of this branch of industry, in the city and county of Philadelphia, during the year ending June 30th, 1850, is taken from the census returns furnished to A. E. Roberts, Marshal of the Eastern District of Pennsylvania.

Name of Ward or District producing Articles to the Annual Value of $500.	Capital invested in Real and Personal Estate.	Value Raw Material used, including Fuel.	Average number of Hands employed.		Wages.		Value of Annual Product.
			Male.	Female.	Average monthly cost of Male labor.	Average monthly cost of Female labor.	
CITY.							
North Mulberry	$584,400	$301,661	839	194	$18,775	$1,945	$1,066,431
South Mulberry	167,085	157,969	217	119	5,841	1,384	317,980
North	1,340,150	348,177	683	86	17,747	286	1,048,575
Locust	46,295	56,500	119	56	3,004	544	153,900
Middle	1,486,125	1,197,586	1,359	709	37,738	8,167	2,148,025
South	401,650	204,540	486	87	15,838	985	554,800
Lombard	102,800	189,285	307	148	4,750	685	188,021
Spruce	89,450	44,899	61	19	1,628	226	93,900
Cedar	625,400	477,588	540	427	10,689	4,871	798,800
New Market	207,700	301,542	351	117	9,797	1,421	628,843
Pine	164,700	481,899	296	289	7,786	2,986	559,260
Dock	400,400	797,660	686	291	16,520	3,404	1,416,980
Walnut, (incomplete)	....	....	......	......	....	....	....
Chestnut	2,710,075	3,599,408	4,556	3,528	119,556	39,804	6,606,495
High	1,265,300	1,482,542	2,341	1,152	55,920	10,924	3,256,990
Lower Delaware	1,860,675	1,490,880	2,041	1,626	48,845	14,022	3,508,342
Upper Delaware	371,100	542,723	678	151	18,822	1,417	1,115,250
	....	....	......	......	....	....	....
NORTHERN LIBERTIES.							
First Ward	$1,231,300	$1,128,393	951	156	$24,494	$1,606	$1,797,800
Second Ward	477,300	604,336	328	54	8,712	806	966,600
Third Ward	677,050	640,616	962	264	25,762	2,929	1,207,350
Fourth Ward	184,400	78,808	288	16	6,664	304	405,260
Fifth Ward	405,906	467,206	518	382	19,471	3,747	1,295,365
Sixth Ward	186,400	196,967	327	49	8,185	379	404,422
Seventh Ward	759,400	656,518	824	261	22,369	2,840	1,126,365
	$3,922,521	$3,764,841	....	....	....	....	$7,078,028

Name of Ward or District producing Articles to the Annual Value of $500.	Capital invested in Real and Personal Estate.	Value Raw Material used, including Fuel.	Average number of Hands employed. Male.	Female.	Wages. Average monthly cost of Male labor.	Average monthly cost of Female labor.	Value of Annual Product.
SPRING GARDEN.							
First Ward	$396,900	$467,783	277	102	$2,629	$1,193	$704,595
Second Ward	76,200	185,663	846	120	8,278	1,522	387,255
Third Ward	207,250	238,240	816	146	7,418	1,478	428,627
Fourth Ward	636,695	952,818	1,186	90	21,432	989	1,448,019
Fifth Ward	231,336	188,438	389	43	8,890	884	487,634
Sixth Ward	752,995	578,709	1,188	30	29,490	490	1,088,940
Seventh Ward	612,070	489,565	672	828	15,866	3,532	987,710
	$2,913,445	$3,046,216	....	....	....	....	$5,876,781
KENSINGTON.							
First Ward	$621,450	$883,403	588	52	$20,598	$542	$1,809,100
Second Ward	533,950	604,716	715	166	16,187	1,345	969,651
Third Ward	501,950	1,321,112	1,297	506	24,357	3,716	1,789,283
Fourth Ward	261,200	975,930	348	166	9,524	1,430	1,804,580
Fifth Ward	692,850	760,907	1,393	66	48,195	495	1,587,278
Sixth Ward	852,800	995,525	1,455	688	26,054	3,815	1,458,557
Seventh Ward	611,811	468,657	515	176	12,660	1,836	1,154,260
Eighth Ward	180,200	205,821	412	120	10,490	100	511,250
	$3,755,711	$6,165,971	....	....	....	....	$10,088,904
SOUTHWARK.							
First Ward	$108,050	$324,669	264	89	$6,863	$320	$506,780
Second Ward	386,550	385,068	885	12	11,669	120	689,960
Third Ward	106,650	206,520	197	89	5,177	358	326,686
Fourth Ward	39,185	129,039	175	47	4,206	190	218,819
Fifth Ward	1,143,360	811,018	481	11	16,476	180	1,348,613
Sixth Ward	387,320	341,088	587	19	15,680	220	699,472
	$2,171,065	$2,197,847	....	....	....	....	$3,734,780
MOYAMENSING.							
First Ward	$28,150	$82,655	74	1	$1,835	$120	$122,815
Second Ward	12,050	27,919	42	42	877	504	55,495
Third Ward	121,464	188,919	398	202	5,564	1,885	318,170
Fourth Ward	117,700	104,229	189	22	2,708	210	154,778
Fifth Ward	251,000	176,515	1,829	21	35,889	153	647,948
	$530,864	$575,237	....	....	....	....	$1,299,201
Passyunk	$4,100	$4,199	20	1	$528	$10	$19,800
Kingsessing	48,400	47,257	74	18	1,868	194	81,260
West Philadelphia	375,650	490,982	400	57	8,768	336	807,580
Blockley	181,600	378,424	286	118	5,104	1,085	511,986
Penn District	1,980,580	185,366	476	62	9,555	648	370,524
North Penn	122,575	105,892	160	48	3,486	625	185,150
Roxborough	199,200	285,001	97	17	1,808	196	398,490
Manayunk, one Ward*	882,400	808,701	691	661	12,686	6,258	1,546,767
Germantown	212,450	642,750	753	508	14,981	3,781	1,068,239
Bristol	154,100	279,342	298	229	1,926	1,678	551,225
Unincorp. N. Liberties	10,700	62,445	139	....	3,248	....	106,740
Frankford Borough	439,450	770,859	725	105	16,676	989	1,080,248
Oxford	151,500	282,400	159	47	3,645	600	391,150
Lower Dublin	199,550	484,955	242	16	6,318	289	610,945
Byberry	48,750	44,948	84	....	709	....	380,278
Moreland	1,175	1,018	5	....	114	....	2,400
Richmond District	1,383,650	670,564	1,288	28	28,124	255	1,164,987
Bridesburg Borough	290,350	120,230	242	....	5,856	....	229,396
Aramingo	105,500	62,878	130	41	2,635	606	185,136
Whitehall	42,650	24,135	112	....	2,460	....	52,600
	....	....	....	....	....	....	....

* Incomplete.

IMPORTATIONS OF COFFEE

Into the United States since the establishment of the Government, inclusive of the fiscal year ending 30th June, 1850.

Years.	Quantity, lbs.	Years.	Quantity.	Value.
			Lbs.	Dollars.
1790	4,150,754			
1791	2,588,970	1821	81,273,650	†4,489,970
1792	4,769,450	1822	25,782,390	5,552,689
1793	11,287,717	1823	37,334,732	7,098,119
1794	6,085,608	1824	30,224,296	5,437,009
1795	14,674,726	1825	45,090,630	5,250,818
1796	*	1826	37,349,497	4,156,558
1797	13,511,877	1827	50,051,986	4,461,391
1798	4,178,321	1828	55,194,697	5,192,335
1799	10,800,482	1829	51,488,538	4,588,585
1800	7,408,196	1830	51,488,242	4,221,021
1801	7,471,396	1831	81,851,886	6,317,666
1802	6,724,220	1832	91,722,329	9,099,864
1803	8,495,260	1833	99,955,000	10,567,299
1804	6,101,191	1834	89,105,366	8,762,637
1805	4,810,274	1835	103,199,777	10,715,466
1806	17,345,188	1836	93,790,507	9,653,053
1807	11,016,419	1837	88,140,403	8,657,760
1808	30,895,495	1838	88,130,720	7,648,217
1809	6,649,298	1839	10,093,992	9,744,103
1810	5,352,062	1840	94,996,065	8,386,222
1811	17,848,398	1841	114,984,783	10,444,782
1812	16,150,176	1842	112,865,027	8,938,638
1813	8,202,072	1843	92,914,557	6,399,189
1814	6,528,238	1844	160,461,948	9,764,554
1815	14,238,319	1845	107,860,911	6,821,271
1816	17,301,018	1846	132,611,596	6,404,958
1817	21,900,104	1847	3,404,622	225,408
1818	19,198,403	1848	150,559,188	8,599,129
1819	26,825,896	1849	165,384,700	9,053,352
1820	18,291,857	1850	144,986,892	11,215,090

* Excess of exports over imports this year.
† Prior to 1821, the amounts are not given on which duties accrued.

HOG STATISTICS.

[From the Louisville Courier.]

We subjoin the following statistics in regard to the product of the hog, which have been accurately and carefully compiled from authentic sources, and will prove serviceable to the mercantile community. It gives the exact number of hogs slaughtered, around Louisville, for the last two years; also, the actual weight of hogs, the weight of lard, and the quantities of pork made, together with the deficiencies and gains, here and elsewhere. The list embraces full returns from Kentucky, Tennessee, and the hogs driven South, and shows a total deficiency of 131,800 hogs, this season.

This table will be valuable for future reference.

	Hogs slaughtered.	Hogs packed.	Average Weight per Hog.	Aggregate Weight, (lbs.)	Aggregate Weight of Lard.	Number of Barrels Pork.
1849-50.						
Adams & Co. (Allen's house)	41,545	41,524	218$\frac{15}{100}$	8,852,898	1,782,210	19,755
A. S. White & Co.	34,017	30,924	210$\frac{5}{15}$	6,404,040	1,360,680	12,984
Huffman, Maxcy & Sherley	30,363	26,411	218	5,772,288	775,919	10,868
M. D. Walker	35,600	33,000	207	6,831,000	1,479,218	13,820
McDonald & Day	11,000	11,000	188	2,068,000	352,000	2,815
Clifton, Atkinson & Co.*	66,580	25,000	208	5,200,000	625,000	3,200
Robert Ernst	none.	none.	none.	....	495,000	none.
Bailey	none.	7,000	175	1,225,000	154,000	none.
	179,106	174,859		36,442,726	6,974,022	68,487
1850-51.						
Jackson, Owsley & Co.	41,752	41,260	195$\frac{4}{15}$	8,056,015	1,484,286	14,489
A. S. White & Co.	31,778	30,755	180	5,535,900	1,048,408	10,952
Huffman, Maxcy & Sherley	24,600	23,783	192$\frac{8}{15}$	4,568,228	586,976	8,757
W. Jarvis & Co.	25,691	25,103	194$\frac{1}{3}$	4,878,349	975,189	9,102
Brannin, Bacon & Cobb	27,550	26,768	195	5,219,760	927,669	9,541
Clifton, Atkinson & Co.*	25,178	25,178	185	4,657,950	558,816	8,360
McDonald & Day	13,870	13,870	177	2,366,490	361,000	3,681
Key & Garner (estimated)	5,500	5,500	175	962,500	147,500	1,900
Robert Ernst	none.	none.	......	....	370,000	none.
	195,414	191,717		36,245,182	6,454,795	66,782

* Number of hogs slaughtered exact, but the product is estimated.

Recapitulation.

Deficiency in hogs driven	69,800
Deficiency in hogs packed in Lower Kentucky and on Tennessee River	61,820
Deficiency in weight, around the Falls, equal to	1,180
Total deficiency in hogs	131,800
Deficiency in barrels of pork, around the Falls	1,705
Deficiency in pounds of lard, around the Falls	519,227
Equal, in barrels, to	2,360

Packing of Lower Kentucky and Tennessee, and Kentucky River.

	1849-50.	1850-51.
Bowling Green and vicinity	15,000	9,000
Clarksville	15,000	6,000
Canton	5,271	1,700
Nashville, Tenn.	13,476	5,382
Gallatin, Tenn.	6,800	895
Woodsonville, Ky.	4,000	1,000
Owensboro', Ky.	3,500	none.
Brandenburgh	2,100	600
Rock Haven	5,300	1,300
Salt River (in flat boats)	6,000	1,200
On Kentucky River	15,000	7,000
	91,447	34,077
	34,077	
Deficiency	57,370	
To which add deficient weight of fully 22 lbs. per hog, equal to, (hogs,)	3,950	
Total deficiency, (hogs,)	61,320	

Comparison of the number of Hogs driven South from Kentucky and Tennessee.

	1849-50.	1850-51.
Through Cumberland Gap	43,000	21,000
Through Asheville, N. C., embracing hogs	81,000	40,000
	124,000	61,000
	61,000	
Deficiency	63,000	
To which add deficiency in weight, equal to	6,800	
Total, (hogs,)	69,800	

IMPORTS AND EXPORTS OF GALENA.

The following is a statement of the imports and exports at this place for the last 4 years:—

Imports.

	1847.	1848.	1849.	1850.
Steamers arrived	268	268	270	382
Lumber	3,251,700	5,611,818	2,820,319	3,514,767
Shingles	2,218,000	3,005,118	3,800,000	[illegible]
Lath	382,000	1,192,000	1,389,000	558,000
Long lumber	36,585	26,576	18,620	28,700
Cord wood	....	7,988	8,078	4,131

Exports.

	1847.	1848.	1849.	1850.
Lead, pigs	778,469	681,969	626,934	568,300
Copper, casks	70,000	45,823	11,746	....
Flour, barrels	....	13,491	20,262	32,722
Wheat, bushels	....	16,985	15,422	3,000
Hides, number	5,700	7,128	10,162	6,000
Barley, bushels	....	3,467	11,388	13,450
Oats "	....	....	15,756	71,000
Potatoes "	....	....	....	22,400
Pork	....	....	....	3,595
Bacon	....	....	....	362,000
Lard	....	....	....	143,150

Office of the Commercial Advertiser, Buffalo, January 15, 1851.

Statement of property first cleared at the Collector's office at Lower Black Rock, on the Erie Canal, during the year 1850; showing the quantity, and average value of each article, and also the whole amount of tolls received at the office, on boats, passengers, and property, during the same period:—

ARTICLES.	Quantity.	Value.
THE FOREST.		
Fur and Peltry, lbs	6,225	$6,225
Product of Wood.		
Boards and Scantling, M ft.	12,844,257	154,131
Shingles, M	311,000	622
Timber, c. ft.	68,919	8,270
Staves, lbs	550,860	1,653
Wood, cords	4,233	8,466
Ashes, Pot and Pearl, bbls	470	11,750
AGRICULTURE.		
Product of Animals.		
Pork, bbls	116	1,160
Beef	1,121	10,089
Bacon, lbs	54,989	3,299
Cheese	617,575	37,054
Butter	116,733	14,008
Lard	7,450	522
Lard Oil, gallons	1,072	1,072
Wool, lbs	98,869	29,660
Vegetable Food.		
Flour, bbls	187,958	845,911
Wheat, bushels	181,916	118,724
Corn	14,363	7,182
Oats	10,818	4,111
Bran and Shipstuff, lbs	2,578,972	20,592
Peas and Beans, bushels	675	675
Potatoes	1,255	628
Dried Fruit, lbs	126,847	7,611
All other Agricultural Products.		
Clover and Grass Seed	11,429	914
MANUFACTURES.		
Domestic Spirits, gallons	14,776	3,694
Beer, bbls	25	125
Oil Meal and Cake, lbs	155,100	1,551
Starch	8,535	854
Leather	49,386	8,889
Furniture	89,148	8,914
Agricultural Implements	900	135
Pig Iron	4,000	60
Machines, and parts thereof	17,600	1,760
Bloom and Bar Iron	90,967	3,184
Iron Ware	1,468	73
Domestic Salt	800	1
MERCHANDISE.		
At 8 Mills, lbs	420	168
Other Merchandise.		
Sugar, lbs	985	79
Nails and Spikes	600	30
Crockery and Glass Ware	5,642	677
Other Articles.		
Live Cattle, Hogs, and Sheep, lbs	1,550	62
Stone, Lime, and Clay	686,404	686
Mineral Coal	8,000	16
Fish	23,806	952
Sundries	840,759	33,630
Total tons	60,899	Total value $1,359,869

Tolls.

Boats	$1,476.00
Passengers	1.00
The forest	8,355.00
Agriculture	57,222.00
Manufactures	1,001.87
Total	$68,456.87

Statement of property left at Lower Black Rock, on the Erie Canal, or which was left between that place and the Collector's office next in order on the canal; showing the quantity and average value of each article during the year 1850:—

ARTICLES.	Quantity.	Value.
THE FOREST.		
Product of Wood.		
Boards and Scantling, ft.	100,000	$1,200
Timber, c. ft.	58,176	5,818
Staves, lbs.	1,102,540	1,208
Wood, cords	1,493	2,986
AGRICULTURE.		
Product of Animals.		
Pork, bbls	12	24
Bacon, lbs.	132	8
Hides	181,002	14,480
Vegetable Food.		
Flour, bbls.	152	684
Wheat, bushels	562,576	506,818
Corn	12,556	6,283
MANUFACTURES.		
Leather, lbs	2,700	486
Furniture	11,965	1,197
Pig Iron	157,461	2,862
Castings	300	15
Bloom and Bar Iron	8,575	143
Domestic Salt	35,420	142
MERCHANDISE.		
At 8 Mills, lbs.	29,552	11,820
Other Merchandise.		
Sugar, lbs.	28,011	2,241
Molasses	18,791	690
Coffee	2,642	264
Nails and Spikes	21,808	1,090
Iron	117,364	1,760
Crockery and Glass Ware	4,386	526
Other Articles.		
Live Cattle, Hogs, and Sheep, lbs	1,000	40
Stone, Lime, and Clay	3,774,290	3,774
Mineral Coal	160,000	320
Fish	2,180	87
Flint Enamelled Ware	5,602	1,401
Sundries	521,491	20,860
Total tons	25,379	Total value $587,823

Collector's Office, New York,
December 24th, 1850.

Absalom Bull, *Collector.*

Lumber Trade.—An English writer, in speaking of the various lumber marts in the world, sets down Albany as one of the most important, if not the largest, on the globe. Of the truth of this remark, we have no means at hand to substantiate the assertion; but, that a very large business has been done here, in lumber, every year since 1836, no one, who is conversant with the trade, will deny. A considerable amount of the lumber sold here has been brought down the Champlain Canal, and entered the Hudson River at West Troy, from whence it is brought down the river in canal-boats, by means of small steam-tugs, which ply between this city and Troy during the season of canal navigation. Nor is lumber the only article which reaches us in that way. Several of the Oswego and Buffalo lines of canal-boats, which have run directly from here to those cities, have ascended and descended the canal at West Troy, so that in no way can an accurate statement be made of the business of this place, except by a resort to the books of the shipping and receiving houses in this city.

The six mill tolls, besides other expenses in the way of towing, is no small item to forwarders, who are compelled, by ruinous competition, to take property frequently at about, or only a fraction over canal tolls.

The best and most costly lumber sold in this market is from the neighborhood of the Genesee Valley and Chemung Canals.

We have prepared the subjoined tables, giving the receipts at tide-water of boards and scantling, timber, shingles, and staves, and their estimated value for the year named. In submitting these tables, we do not pretend to assert that this amount of property has been sold here. We are willing to yield a suitable proportion to our friends up the river; but to give them all that a writer in Hunt's Magazine claimed for them, viz. all that entered the Hudson at West Troy, is more than any forwarding merchant would venture to claim. What we do maintain belongs justly to Albany is the entire receipts of lumber at this place, and at least a third, if not a half, of that coming into the Hudson at West Troy. The figures for the year just closed, show that more than one-half the entire receipts of boards, &c. at tide-water, came to this city by the Erie, while the exhibit of staves show that three-fourths the entire receipts were taken in at this place.

Years.	Boards and Scantling, (ft.)	Value.	Timber, (Cubic ft.)	Value.
1836	189,116,847	$3,782,336	1,445,408	$289,181
1837	133,385,757	1,867,400	624,188	81,144
1838	151,114,100	2,191,154	695,600	90,428
1839	141,494,033	2,384,671	301,420	124,311
1840	124,173,383	1,985,774	784,310	156,862
1841	177,720,349	3,021,245	1,028,576	216,000
1842	150,657,900	1,958,552	361,589	65,086
1843	177,402,600	2,749,741	586,013	125,993
1844	140,891,000	2,395,147	917,295	159,873
1845	237,924,666	4,044,720	2,492,668	498,584
1846	260,335,271	4,422,936	1,798,198	251,096
1847	299,078,633	5,078,564	1,613,943	169,160
1848	262,279,116	3,981,277	1,510,777	212,598
1849	297,481,140	4,459,157	1,497,627	119,598
1850	425,095,436	6,365,728	3,080,588	440,490

In glancing over the foregoing figures, which exhibit the trade for the past 15 years, we find that the smallest receipts of boards, &c. was in 1840, and the largest in 1850; and that, compared with the former dates, the business has increased more than threefold. The receipts of timber were the lightest in 1842, and heaviest in 1850.

Years.	Shingles, (M.)	Value.	Staves, (lbs.)	Value.
1836	30,792	$ 92,376	41,063,060	$328,264
1837	59,052	175,182	66,887,990	531,108
1838	47,327	165,644	75,133,400	525,933
1839	46,087	196,651	69,646,284	417,877
1840	55,084	220,136	48,996,000	293,976
1841	46,385	185,540	110,542,859	552,714
1842	36,765	119,466	55,268,500	193,439
1843	62,387	210,244	56,768,700	227,074
1844	77,763	233,289	96,356,100	381,424
1845	72,120	234,390	189,754,800	628,896
1846	69,822	244,378	106,152,500	1,518,532
1847	101,527	405,548	95,104,000	1,289,677
1848	104,270	338,861	114,246,000	514,109
1849	51,258	156,774	154,159,339	693,701
1850	57,906	262,668	262,224,450	908,613

The largest receipt of shingles was in 1848, and the smallest in 1836. The receipts of staves were the smallest in 1836, and the largest in 1850. Since 1847, there is, apparently, a great falling off in their estimated valuation; for, notwithstanding the receipts of the following year were much larger than that named, their estimated value is set down at a sum less by more than one-half the valuation of 1847. It appears, however, that, with the exception of 1846 and 1847, their valuation has been pretty uniform; and probably this apparent discrepancy can be easily explained by those who were then engaged in the trade.—*Albany Evening Journal.*

SURFACES OF STATES AND TERRITORIES.

Table, showing the Estimate Surface of Territories of the United States North and West of the regularly organised States of the Union, and the portions of territory thereof situated North and South of the parallel of 36 deg. 30 min. north latitude.

Territories.	Sq. miles north of the parallel of 36° 30′.	Sq. miles south of the parallel of 36° 30′.	Total sq. miles.
Oregon Territory, bounded on the north by the parallel of 49° north latitude, south by the parallel of 42° north latitude, east by the Rocky Mountains, and west by the Pacific Ocean	341,463	....	341,463
Territory north and west of the Mississippi River, bounded on the north by the parallel of 49° north latitude, east by the Mississippi River, south by the State of Iowa and the Platte River, and west by the Rocky Mountains	723,248	....	723,248
Wisconsin Territory, bounded east by the Mississippi River, and north by the State of Wisconsin,—being the balance remaining of the old North-west Territory	22,336	....	22,336
Indian Territory, situated west of the States of Missouri and Arkansas, and south of the Platte or Nebraska River; held and apportioned, in part, for Indian purposes	190,505	58,346	248,851
Territory in Upper California and New Mexico,* situated west of the Rio Grande, to its source, and of a meridian line thence to the parallel of 42° north latitude. Ceded to United States by the treaty with Mexico, of 1848	321,695	204,383	526,078
Total	1,599,247	262,729	1,861,976
* This estimate excludes all that part of Texas which lies outside of its limits, as designated by the yellow shaded lines on Disturnell's Map of Mexico. The part of Texas which lies east of the Rio Grande and west of the Nueces River, from the mouth of the former river up to a line drawn from a point a short distance north of Paso, to the source of the Ensenada River, is estimated at	....	52,018	52,018
And the part which lies north of Paso and the Ensenada River, up to latitude of 42° north	43,537	81,396	124,933
†Making together	43,537	133,414	176,951

† This estimate, as will be seen, limits our acquisitione of territory from Mexico, by the late treaty, exclusively to those portions of country lying west of the Rio Grande.

Texas in Three Divisions.

		Sq. miles.
1st.	Between the Sabine and Nueces Rivers, south of Ensenada River, (Texas proper)	148,569
2d.	Between the Nueces and Rio Grande, south of Ensenada River	52,018
3d.	North of Paso and the Ensenada River, (Santa Fe county)	124,933
	Total	325,520

1st.	Number of miles of coast acquired by the annexation of Texas, from the mouth of the Sabine to the Rio Grande	400
2d.	Number of miles of coast on the Pacific, including Oregon and California. In California, 970; Oregon, 500; Straits of Juan de Fuca, 150	1,620
	Total, including Texas	2,020

Table exhibiting the Areas of the several States and Territories of the United States, in Square Miles and Acres.

	Square Miles.	Acres.
FREE STATES.		
Maine	35,000	22,400,000
Vermont	8,000	5,120,000
New Hampshire	8,030	5,139,000
Massachusetts	7,250	4,640,000
Rhode Island	1,200	768,000
Connecticut	4,750	3,040,000
New York	46,000	29,440,000
New Jersey	6,851	4,384,640
Pennsylvania	47,000	30,080,000
Ohio	39,964	25,576,960
Indiana	33,809	21,637,760
Illinois	55,405	35,459,200
Michigan	56,243	35,995,520
Iowa	50,914	32,584,960
Wisconsin	53,924	34,511,360
Total of the Free States	454,340	290,777,600
SLAVE STATES.		
Delaware	2,120	1,356,800
Maryland	11,000	7,040,000
Virginia	61,352	39,265,280
North Carolina	45,500	29,120,000
South Carolina	28,000	17,920,000
Georgia	58,000	37,120,000
Kentucky	37,680	24,115,200
Tennessee	44,000	28,160,000
Louisiana	46,431	29,715,840
Mississippi	47,147	30,174,080
Alabama	50,722	32,462,080
Missouri	67,380	43,123,200
Arkansas	52,108	33,406,720
Florida	59,268	37,931,520
Total of the Slave States	610,798	390,910,720
Texas	325,520	208,332,800
District of Columbia	50	32,000

Territory North and West of the Mississippi River, and East of the Rocky Mountains.

	Square Miles.	Acres.
Bounded north by 49° north latitude, east by Mississippi River, south by State of Iowa and Platte River, and west by Rocky Mountains	723,248	462,878,720
Indian Territory, situated west of the States of Arkansas and Missouri, and south of the Platte River	248,851	159,264,640
Old Northwest Territory, balance remaining east of the Mississippi River, and north of Wisconsin	22,336	14,295,040
Total of old Territory organised into States	994,435	636,438,400

Territory, exclusive of Old Territory, East of the Rocky Mountains.

	Square Miles.	Acres.	Square Miles.	Acres.
Oregon	841,468	218,536,820	a 454,840	299,777,600
California	448,691	287,162,240	b 610,798	890,910,720
New Mexico*	77,887	49,527,680	c 50	82,060
Texas*	825,520	208,332,800	d 994,435	636,438,400
Total	1,193,061	763,559,040	2,059,623	1,318,158,720

* Taking the Rio Grande as the boundary.

Length of the Atlantic coast, to the mouth of St. Mary's River	1,450 miles.
Length of the Atlantic coast from St. Mary's River to Cape of Florida	450
Length of the Gulf coast to the mouth of Sabine	1,200
Total	3,100

The new States are larger than some of the old ones.

The area of the State of California, according to an estimate made on Preuss's Map, of 1848, is 158,500 square miles.

Estimated surfaces of other States:—

California is about 3½ times larger than	Louisiana	46,431	square miles.
" " 2½ " "	Missouri	67,380	"
" " 4½ " "	Kentucky	37,680	"
" " 2½ " "	Virginia	61,352	"
" " 3½ " "	New York	46,000	"
" " 3½ " "	Pennsylvania	47,000	"

The average distance of the seacoast from the eastern boundary of the new State of California, is	212 miles.
Total length, from north to south	764 "
Length of seacoast	970 "

The surface of Utah, estimated on Preuss's map, as follows:—

Part situated in Oregon	20,000 square miles.
Part situated in California Territory	340,000 "
	360,000 "
Part within proposed limits of State of California	70,270 "
Total	430,270 "

UNITED STATES CENSUS......1850.—[OFFICIAL.]

STATE OF NEW YORK.

Counties.	Number of Dwellings.	Number of Families.	White Population. Males.	Females.	Total Whites.
Albany	12,747	17,311	45,534	46,576	92,110
Allegany	6,968	7,297	19,408	18,280	37,688
Broome	5,651	5,840	15,545	14,696	30,241
Cattaraugus	5,750	6,898	20,940	17,908	38,848
Cayuga	9,259	9,978	28,123	26,801	54,924
Chatauque	9,074	9,828	25,820	24,538	50,358
Chemung	5,095	5,206	14,616	13,921	28,537
Chenango	7,572	7,775	19,962	20,089	40,051
Clinton	6,718	7,051	20,547	19,388	39,935
Columbia	6,919	7,683	20,977	20,799	41,776
Cortland	4,580	4,778	12,685	12,418	25,103
Delaware	7,107	7,252	20,264	19,364	39,628
Dutchess	9,564	10,968	28,216	28,806	57,022
Erie	16,118	19,028	51,603	48,611	100,214
Essex	5,320	5,448	16,183	14,915	31,098
Franklin	4,288	4,318	13,195	11,848	25,043
Fulton	3,730	3,794	10,157	9,922	20,079
Genesee	5,014	5,363	14,404	14,012	28,416
Greene	5,748	5,989	16,486	15,746	32,232
Hamilton	407	418	1,208	978	2,186
Herkimer	6,664	6,976	19,557	18,505	38,062
Jefferson	11,927	12,082	34,745	33,226	67,971
Kings	15,808	25,950	65,436	69,461	134,897
Lewis	4,624	4,690	12,442	11,982	24,424
Livingston	7,172	7,378	20,901	19,789	40,690
Madison	8,198	8,488	21,570	21,218	42,788
Monroe	15,087	15,954	44,448	42,530	86,978
Montgomery	5,858	5,711	16,306	15,278	31,579
New York	87,670	93,608	248,118	253,909	502,027
Niagara	7,455	7,559	21,592	20,367	41,959
Oneida	16,754	17,627	50,098	48,820	98,918
Onondaga	15,836	15,879	44,613	40,672	85,285
Orange	9,686	10,372	27,419	27,364	54,783
Ontario	7,868	8,039	22,097	21,321	43,418
Orleans	5,278	5,819	14,624	13,775	28,399
Oswego	11,064	11,352	32,149	29,831	61,980
Otsego	9,084	9,477	24,076	24,405	48,481
Putnam	2,425	2,861	7,094	6,914	14,008
Queens	6,230	6,809	16,818	16,576	33,389
Rensselaer	10,952	13,565	35,782	36,555	72,337
Richmond	2,384	2,481	7,262	7,045	14,307
Rockland	3,011	3,297	8,702	7,666	16,368
St. Lawrence	11,702	11,914	34,997	33,584	68,581
Saratoga	7,892	8,501	22,548	22,523	45,066
Schenectady	3,194	3,421	10,168	9,499	19,667
Schoharie	5,898	5,986	16,706	16,386	33,092
Seneca	4,541	4,728	12,792	12,469	25,261
Steuben	11,210	11,426	33,092	30,317	63,409
Suffolk	6,745	7,414	17,396	17,413	34,809
Sullivan	4,355	4,491	13,281	11,715	24,996
Tioga	4,442	4,529	12,742	11,941	24,683
Tompkins	7,105	7,251	19,360	19,088	38,448
Ulster	10,215	10,794	30,092	27,712	57,804
Warren	2,974	3,290	8,863	8,289	17,152
Washington	8,043	8,817	22,638	21,764	44,402
Wayne	8,074	8,381	22,870	21,831	44,701
Westchester	8,754	10,886	29,028	27,188	56,216
Wyoming	5,718	6,017	16,201	15,784	31,985
Yates	3,784	3,986	10,432	10,010	20,442
Total	472,151	566,959	1,544,903	1,504,278	3,049,181

STATE OF NEW YORK.—[*Continued.*]

Counties.	Free Colored. Males.	Free Colored. Females.	Free Colored. Total Free Colored.	Total Free Population.	Number of Deaths.	Number of Farms.	Number of Productive Establishments.
Albany	537	632	1,169	93,279	1,710	2,841	395
Alleghany	68	57	125	37,808	368	3,178	291
Broome	211	208	419	30,660	295	2,497	229
Cattaraugus	46	56	102	38,950	412	3,755	299
Cayuga	287	247	534	55,458	786	4,228	507
Chatauque	71	64	135	50,493	598	5,163	510
Chemung	148	136	284	28,821	468	2,184	350
Chenango	122	138	260	40,311	542	4,471	565
Clinton	67	45	112	40,047	489	2,095	459
Columbia	596	701	1,297	43,078	526	2,512	210
Cortland	18	19	37	25,140	326	2,465	202
Delaware	110	96	206	39,834	333	4,747	433
Dutchess	985	1,035	1,970	58,992	1,185	3,208	415
Erie	405	374	779	100,993	2,160	4,880	698
Essex	35	15	50	31,148	208	1,878	199
Franklin	30	29	59	25,102	205	1,667	129
Fulton	39	53	92	20,171	174	1,361	238
Genesee	84	88	72	28,488	331	2,574	199
Greene	440	454	894	33,126	382	2,672	433
Hamilton	2		2	2,188	18	261	17
Herkimer	93	89	182	38,244	386	2,723	277
Jefferson	90	92	182	68,153	572	5,590	630
Kings	1,925	2,059	3,984	138,881	2,892	363	576
Lewis	25	15	40	24,464	146	2,374	77
Livingston	106	79	185	40,875	459	2,503	363
Madison	135	154	289	43,072	548	3,845	405
Monroe	828	349	677	87,650	1,995	4,123	526
Montgomery	218	195	413	31,992	321	1,883	267
New York	5,988	7,532	13,520	515,547	11,894	163	3,367
Niagara	164	137	301	42,260	432	3,074	336
Oneida	329	324	653	99,566	1,029	6,292	952
Onondaga	300	305	605	85,890	1,131	4,594	1,410
Orange	1,187	1,175	2,362	57,145	633	3,426	357
Ontario	230	269	499	43,917	438	3,059	205
Orleans	51	51	102	28,501	287	2,271	232
Oswego	109	109	218	62,198	830	4,497	640
Otsego	67	90	157	48,638	591	4,764	330
Putnam	75	55	130	14,138	289	989	89
Queens	1,694	1,750	3,444	36,833	374	2,308	89
Rensselaer	482	544	1,026	73,368	974	2,929	639
Richmond	307	279	586	14,898	939	212	87
Rockland	291	303	594	16,962	249	682	144
St. Lawrence	19	17	36	68,617	689	6,134	456
Saratoga	266	314	580	45,646	627	3,465	349
Schenectady	174	213	387	20,054	229	1,020	107
Schoharie	240	216	456	33,548	345	2,439	231
Seneca	85	95	180	25,441	311	1,555	240
Steuben	176	186	362	63,771	627	5,797	576
Suffolk	1,059	1,054	2,113	36,922	643	2,323	96
Sullivan	56	36	92	25,088	258	1,889	360
Tioga	104	93	197	24,880	215	2,026	354
Tompkins	160	138	298	38,746	394	3,194	484
Ulster	739	842	1,581	59,385	949	3,543	498
Warren	16	30	46	17,198	184	1,505	128
Washington	170	178	348	44,750	491	3,037	270
Wayne	113	139	252	44,958	485	3,957	250
Westchester	1,089	956	2,045	58,261	820	2,585	396
Wyoming	28	18	46	31,981	356	3,360	299
Yates	76	72	148	20,590	228	1,678	165
Total	22,965	24,949	47,914	3,097,095	46,651	170,698	23,985

STATE OF NEW YORK.—RECAPITULATION.

Dwellings in the State		472,151
Families in the State		566,959
White Males	1,544,903	
White Females	1,504,278	
Total Whites		3,049,181
Free Colored Males	22,965	
Free Colored Females	24,949	
Total Colored		47,914
Aggregate Population		3,097,095
Deaths during the year		46,651
Farms in cultivation		170,698
Manufacturing establishments producing $500 and upwards		23,985

STATE OF DELAWARE.

Counties.	Census of 1840. Free Whites.	Census of 1840. Free Colored.	Census of 1840. Total Free Population.	Census of 1840. Slaves.	Census of 1840. Total Population.	Census of 1850. Free Whites.	Census of 1850. Free Colored.	Census of 1850. Total Free Population.	Census of 1850. Slaves.	Census of 1850. Total Population.	Census of 1850. Fugitives.	Census of 1850. Manumitted.
Kent	13,618	5,827	19,445	427	19,872	16,119	6,350	22,469	347	22,816	7	...
New Castle	25,806	6,773	32,579	541	33,120	34,815	7,568	42,383	394	42,777	5	33
Sussex	19,137	4,319	23,456	1,637	25,093	20,348	4,039	24,387	1,548	25,935	7	141
Total	58,561	16,919	75,480	2,605	78,085	71,282	17,957	89,239	2,289	91,528	19	174

Representative population		90,612
Free Colored Males	705	
Free Colored Females	620	
Total Colored		1,325
Aggregate population		583,088
Deaths during the year		7,545
Farms in cultivation		46,760
Manufacturing establishments producing $500 and upwards		3,682

STATE OF MARYLAND.

Counties.	Number of Dwellings.	Number of Families.	Free Whites. Males.	Free Whites. Females.	Free Whites. Total Whites.	Free Colored. Males.	Free Colored. Females.	Free Colored. Tot. Free Colored.	Total Free Inhabitants.	Slaves.	Deaths.	Farms.	Productive Establishments.	Fugitives.	Manumitted.
Allegany	3,850	3,902	11,545	10,088	21,688	186	226	412	2[illegible],045	724	150	892	24	4	2
Anne Arundel	3,712	3,745	8,814	8,228	16,542	2,338	2,264	4,602	21,144	11,249	496	1,295	156	...	...
Baltimore City	28,980	28,685	71,109	70,062	141,171	10,682	14,306	24,937	1[illegible],108	2,946	3,680	28	2,480	8	4
Baltimore County	6,085	6,290	17,289	16,948	34,187	1,801	1,882	3,683	[illegible],820	3,772	617	1,627	189	26	27
Calvert	1,006	1,006	1,866	1,764	3,630	782	798	1,580	5,160	4,486	91	484	......	...	1
Caroline	1,526	1,526	3,029	3,069	6,096	1,378	1,410	2,788	8,884	808	76	780	......	2	1
Carroll	3,476	3,598	9,484	9,238	18,667	476	498	974	19,641	975	168	1,887	124	...	...
Charles	1,835	1,835	2,829	2,836	5,665	455	458	918	6,578	9,584	298	709	......	6	2
Cecil	3,056	3,114	7,951	7,521	15,472	1,369	1,254	2,623	18,095	844	227	1,208	176	...	...
Dorchester	2,705	2,709	5,450	5,338	10,788	1,832	1,975	3,807	14,595	4,282	187	1,049	12	2	80
Frederick	6,397	6,614	16,529	16,785	33,314	1,824	1,936	3,760	37,074	3,913	576	1,988	248	37	18
Harford	2,977	2,985	7,384	7,029	14,413	1,427	1,350	2,777	17,190	2,166	246	1,273	72	38	34
Kent	1,584	1,584	2,930	2,686	5,616	1,572	1,571	3,143	8,759	2,627	127	667	35	10	2
Montgomery	1,928	1,960	4,758	4,677	9,435	632	679	1,311	10,746	5,114	287	1,051	71	6	...
Prince George's	1,875	1,875	4,457	4,444	8,901	554	585	1,139	10,040	11,510	450	885	28	14	2
Queen Anne's	1,864	1,864	3,635	3,405	7,040	1,588	1,686	3,174	10,214	4,270	324	936	[illegible]	30	5
Somerset	3,158	3,158	6,655	6,730	13,385	1,741	1,742	3,483	16,868	5,588	526	1,485	76	...	...
St. Mary's	1,512	1,646	3,100	3,125	6,225	807	824	1,631	7,856	5,842	275	818	9	...	...
Talbot	1,751	1,776	3,578	3,502	7,080	1,278	1,319	2,597	9,677	4,134	240	798	85	22	7
Washington	5,052	5,182	13,467	13,462	26,929	855	974	1,829	28,758	2,090	862	1,292	170	15	...
Worcester	2,884	2,885	6,238	6,163	12,401	1,487	1,527	3,014	15,415	3,444	246	1,318	29	...	...
Total	81,708	87,384	211,495	207,095	418,590	34,914	39,163	74,077	492,667	90,368	9,594	21,860	3,868	215	185

Recapitulation.

Dwellings in the State		81,708
Families in the State		87,384
White Males	211,495	
White Females	207,095	
Total Whites		418,590
Free Colored Males	34,914	
Free Colored Females	39,163	
Slaves	90,368	
Total Colored		164,445
Aggregate population		583,035

Deaths in the year	9,594
Farms	21,860
Manufacturing establishments producing $500 and upwards	3,868
Slaves run away during the year	215
Slaves manumitted during the year	135

STATE OF MAINE.

Counties.	Dwelling-houses.	Families.	White. Males.	White. Females.	Free Colored. Males.	Free Colored. Females.	Total.	Deaths.	Farms.	Manufacturing Establishments.
Aroostook	2,083	2,045	6,725	5,804	3	3	12,585	114	1,228	59
Cumberland	12,762	15,285	39,226	39,780	296	297	79,549	1,362	5,352	644
Franklin	3,487	3,690	10,220	9,787	13	7	20,027	207	2,521	135
Hancock	5,550	5,839	17,762	16,581	16	13	34,372	329	2,271	205
Kennebec	10,162	11,296	31,359	31,020	81	61	62,521	812	5,256	381
Lincoln	12,176	13,120	38,537	36,079	139	120	74,875	969	4,975	526
Oxford	6,712	7,148	20,434	19,224	3	2	39,663	412	4,288	150
Penobscot	10,374	10,849	32,847	30,179	36	27	63,089	770	3,988	407
Piscataquis	2,589	2,634	7,802	6,980	2	1	14,735	162	1,779	61
Somerset	5,917	6,209	18,479	17,098	2	2	35,581	385	3,813	155
Waldo	7,681	8,272	24,167	23,024	23	16	47,230	608	4,415	347
Washington	5,885	6,874	19,926	18,758	71	55	38,810	477	1,875	310
York	10,564	11,096	29,151	30,914	20	16	60,101	938	5,004	852
Total	95,797	103,787	296,635	285,128	705	620	583,088	7,545	46,760	3,682

Recapitulation.

Dwelling-houses in the State		95,797
Families in the State		103,787
White males	296,635	
White females	285,128	
		581,763
Free colored males	705	
Free colored females	620	
		1,325
Total population		583,088
Deaths during the year		7,545
Farms in cultivation		46,760
Manufacturing establishments producing $500 and upwards, annually		3,682

NEW MEXICO.

The ages of the free inhabitants of New Mexico, as ascertained by the census, having been classified, we give below a table, showing the number in each county over 80 years of age. These facts prove the health of this Territory to be as good, if not better, than that of any other country in the world; and are interesting, as showing the extraordinary longevity to which many of the inhabitants have attained.

In Valencia county, Candelario Agular, a farmer, was 130 years old when the census was taken; Jose Ortado was 110; Rosa Billejos, 110; Rose Montallo, 106; Maria J. Pacheco, 103. The males seem to attain a greater age than the females, in proportion to their number.

Counties.	Persons over 80 years of age.			Persons over 90 years of age.			Persons over 100 years of age.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
Rio Arriba	35	22	57	12	5	17	2	5	7
San Miguel	26	16	42	12	2	14	5	4	9
Valencia	47	31	78	8	7	15	8	10	18
Santa Anna	17	4	21	4	3	7	...	...	...
Taos	35	12	47	14	2	16	2	...	2
Bernalillo	22	14	36	7	3	10	...	1	1
Santa Fé	15	18	33	5	6	11	...	3	3
Total	197	117	314	62	28	90	17	23	40

All which is respectfully submitted.

THOMAS EWBANK,
Commissioner of Patents.

APPENDIX.

Westfield, Chatauque County, N. Y., August 20th, 1851.

Hon. Thomas Ewbank:

Dear Sir:—In compliance with your request, I send you, herewith, a description of my recently imported sheep.

They are pure Merinos, were bred in France, and were selected from the best flocks by John A. Taintor, Esq., of Hartford, Connecticut, a gentleman widely known for his enterprise, liberality, and public spirit, in introducing into this country the choicest specimens of imported stock.

These sheep are of unusual size, and possess, to a remarkable degree, all the qualities to be desired in sheep, for mutton as well as for wool-growing purposes. From the nose to their feet, they are completely covered with a long, thick, and fine staple of wool, and they yield enormous fleeces, the ewes usually shearing from 15 to 20 pounds each of clear, unwashed wool; and I have known them to shear as high as 25 pounds each. The rams shear proportionably larger fleeces. Many of these sheep are encircled with large folds of loose skin around their necks and shoulders, giving them greater surface for the growth of wool. They have strong and hardy constitutions, are very prolific, and, as the ewes are excellent nurses, there is no difficulty in raising their lambs. I have never failed of raising more lambs than I have had ewes.

The sheep represented in the accompanying engraving were taken from life by R. H. Pease, Esq., of Albany, and are very correct likenesses of the animals.

Respectfully yours,
JOHN D. PATTERSON.

Clatsop Plains, mouth Columbia River, Oregon Territory, December 16th, 1850.

Dear Sir:—Having resided on these Plains for upwards of four years, and a cultivator of the land for my occupation, I can speak with a knowledge of the products of this section of the world, as far as my observations have extended. In reference to the dairy business, the average yearly product of butter per cow is estimated at 96 pounds. Cheese, double that amount. Comparative cost per pound for making, 6 cents. Mode of churning, with the common churn. Average price of butter per pound, \$1; cheese, 75 cents.

Neat Cattle.—Cost of rearing till 3 years old, is what they gather from the range themselves; scarcely fed any in winter; usual price at 3 years old, if sold for beef, is from 16 to 25 cents per pound. Value of good dairy-cows, $75 at any season of the year; we have but a few of the most approved breed of cattle.

Turnips.—Are raised here to great perfection. This year's crop, in manured ground, 300 bushels per acre of the common flat turnip, larger, in general, than any I ever saw raised in the States. The common weight of a turnip is from 10 to 15 pounds, some larger and some smaller.

Carrots and Beets.—The cultivation of these roots as a field crop is on the increase. The yield is usually good.

Irish Potatoes.—Average yield per acre, (manured ground,) 400 bushels. Cost of production per bushel, 10 cents. Most prolific and profitable, the kidney and common blue. Average price per bushel, (wholesale,) $2.75.

The cultivation of fruit-trees is receiving increasing attention.

The above prices may seem to be high, but owing to our section of country being so nigh the mining country, every thing that can be raised is in ready demand, and at a high rate.

Very respectfully, yours, &c.

O. C. MOTLEY.

Hon. Thomas Ewbank, *Commissioner.*

THE MOUNT AIRY AGRICULTURAL INSTITUTE.

BY JOHN WILKINSON, PRINCIPAL.

December, 1850.

This institution has now been in operation about 6 years, and its patronage has been gradually increasing, the students now numbering 32. The object of it is to combine science with judicious practice in agriculture, and to instruct its pupils in all the mysteries thereof. There are connected with the Institute about 70 acres of land, quite various in its natural characteristics, which is well adapted to the purposes of an agricultural seminary.

It is accessible several times a day from Philadelphia, by stage and railroad.

The tuition year is divided into two terms, of five months each; the summer term commencing on the first Thursday of April; the winter term on the first Thursday of October.

The charge per term is $100, payable in advance half-yearly.

The *practical course* consists of instruction in the practice and principles of agriculture, and the rotation of crops; the best modern modes of tillage; rearing, selecting, and feeding live stock; breaking and training horses and oxen; slaughtering and curing meats; horticulture, forestry, and floriculture; fencing, road-making, levelling, grading, seeding, and laying out ornamental grounds; the application of steam and other motive power; the construction and use of farm machinery, implements, &c. &c. A portion of every day is spent in the practical operations of the farm; the balance in the literary department, which consists of the following collateral branches, viz:—The natural sciences, as applied to agriculture; the classics, and modern

languages. Each student is required to lecture upon the science he is pursuing, to make surveys, with plots of the same, and also to keep a replete journal or diary of all experiments and farm operations. Two evenings of the week are spent in the discussion of practical subjects, on which full notes are preserved for reference. I now feel that I am no longer conducting an experiment, founded on the quicksands of contingency, but, stimulated by the happy results that have thus far attended my efforts, I proceed with promptitude and confidence towards the goal.

I anxiously look forward to the day when a thorough course of instruction in scientific and practical agriculture shall be considered an indispensable collateral branch of the classical course, preparatory to any of the learned professions.

My experience has proved to me that the addition of this branch to the common collegiate course will, while it adds but little to the time requisite to complete the diplomatic course, add very much to the health and happiness of the student, and greatly facilitate his progress, by insuring a vigorous, well-disciplined mind, which is the natural and happy result of proper moral and physical culture.

Besides this very desirable consequence of combining the agricultural with the literary course, are many others, no less important, among which is the advantage of a knowledge of this standard pursuit, to which the unfortunate or unsuccessful in other professions may resort to as a reliable support. So far from detracting from or interfering with the progress of the student in his literary pursuits, it, on the contrary, greatly facilitates his progress, by alternating the confining, feverish monotony of the class-room with the delightful and invigorating exercises of the field, garden, stable, and workshop, from which he returns with clearness and accuracy to master the most difficult mathematical solutions, or investigate and follow out the deep, complicated, and mysterious principles of science.

JOHN WILKINSON.

THE END.

STEREOTYPED BY L. JOHNSON AND CO.
PHILADELPHIA.

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS

VOL. 2, 1850

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS

VOL. 1, 1851

32d Congress, 1st Session. [HO. OF REPS.] Ex. Doc. No. 102.

REPORT

OF THE

COMMISSIONER OF U.S. PATENTS

FOR THE YEAR 1851.

PART I.

ARTS AND MANUFACTURES.

CONTENTS.

WASHINGTON:
ROBERT ARMSTRONG, PRINTER.
1852.

32d Congress, 1st *Session.*

[HO. OF REPS.]

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REPORT

OF THE

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LETTER

OF

THE COMMISSIONER OF PATENTS,

IN RELATION

To Arts and Manufactures for the year 1851

May 3, 1852.—Laid upon the table and ordered to be printed.
August 30, 1852.—Ordered that 50,000 extra copies be printed.
August 31, 1852.—Ordered that 10,000 extra copies be printed for the use of the Patent Office.

United States Patent Office,
March 13, 1852.

Sir: I have the honor of transmitting to you, with the view of its being laid before Congress, that portion of the Report of this Office for the year 1851 which relates to Arts and Manufactures. Its presentation has been delayed for the completion of a report on the World's Exposition, by Mr. Riddle, commissioner from the United States, which it was desirable to include.

The second or Agricultural section of the Report will shortly be submitted.

Very respectfully, your obedient servant,

THOMAS EWBANK.

Hon. Linn Boyd,
Speaker of the House of Representatives.

REPORT

OF THE

COMMISSIONER OF PATENTS.

I.

UNITED STATES PATENT OFFICE, *January*, 1852.

SIR: Before introducing the usual financial and statistical sections of the Report, I beg to submit some remarks and suggestions in relation to

THE PATENT OFFICE, ITS ADMINISTRATION, ETC.

1. *On the Supervision exercised by the Secretary of the Interior.*—There is in the business of the Patent Office nothing congenial with or allied to that which is transacted in the departments, while its very nature is such as to render exterior control often embarrassing. Whatever may have been expedient in the infancy of its organization, when it was little else than a clerkship under the Secretary of State, its position and requirements are very different now. To vest a controlling power over its administration in heads of departments who have no time to devote to it, and who, from education, habits, profession, and feelings, can have little or no active sympathies with interests represented in it, or with the class of citizens with whom it has most to do, can hardly prove otherwise than prejudicial. Hence there is an increasing desire among inventors and patentees, mechanics, manufacturers and others, whose feelings no less than their interests centre in the Patent Office, that its dependency on the department should cease.

On this subject I beg to quote from a communication addressed by me to the Secretary of the Interior on the 30th of January last:

"There is probably no question bearing more on the future usefulness and efficient administration of the Patent Office than the extent to which Congress designs it to be subject to any other department. Exclusively devoted to the progress of science and art, to the development of new elements of civilization, it should be protected in the prosecution of its mission, wholly freed from political influences; and it is believed that no administration can more readily command the approbation of reflecting citizens, of all parties, than by securing to it this immunity. It was designed, as generally understood, by the law of 1836, to be an independent bureau, with a very limited check vested in the department. Such was the avowed intention of those who drew up the law, and such, as has been always understood in the office, was the intention of Congress, as manifested in instructing the Commissioner to report his proceedings directly to both Houses; in special legislation for his guidance; and, contrary to the practice in any other department or bureau, requiring from him bonds for the faithful performance of his duties, and for the disbursement of moneys from the Patent fund.

"A difference of views between the office and the department elicited the opinion of the Attorney General, that, 'The general supervision and direction over the Patent Office, which is vested in you, (the Secretary of the Interior,) comprehends the appointment of such temporary clerks in that office as are authorized by law; and also the payment of their salary or compensation out of any money appropriated for the purpose. And, of course, that the Commissioner of the Patent Office, in the employment or appointment of clerks, and in the disbursement of money appropriated for their compensation, acts under the superintendency and subject to the control of the Secretary of the Interior; and that it makes no difference in the case whether the money so to be disbursed is appropriated out of the agricultural fund, the Patent Office fees, or out of any other fund.'

"Since this opinion was communicated to me, it has been invariably respected; but as long as it is enforced, this bureau can never fully accomplish the objects for which it was organized. Whatever may be the practice in other bureaus, it will be impossible for any Commissioner to carry on, with credit to the country and satisfaction to inventors and patentees, the peculiar, important and multitudinous affairs, and to reconcile the often conflicting interests committed to his charge, if he be not permitted to judge of the merits and qualifications of his assistants, or to remove such as are incompetent, or in other respects unfit: that is, if he is made responsible for the acts of those over whom he has no control. And again: if the department has the control of the disbursements, it is but reasonable that the Secretary should file the required sureties, and not the Commissioner.

"On subjects deemed vital to the integrity and usefulness of the Patent Office, there should be left no room for doubt; hence, I respectfully recall these to your consideration, and propose to submit them to Congress, with a view of having the powers and responsibilities of the office distinctly defined."

The arts and sciences have no affinities with, and should not be linked to, temporary politics. To suppose the business of this office can be carried on, if its desks are occupied, as in some departments, by persons even of general qualifications, instead of special fitness, is a great mistake. Mechanical inventions and discoveries, for which patents are issued, are based upon the great physical laws of nature, and are illustrations of them; hence it is in conformity with those laws that the decisions of the office must be made. But this requires close and undivided attention, and, above all, freedom from extraneous interruptions and influences. These are, and ever must be, detrimental in the highest degree. They not only embarrass the proper and harmonious working

of the institution, but are subversive of the great objects contemplated in its organization.

The duties of the Commissioner and examiners are of too purely scientific a nature for them to be subjected, with advantage, to heads and sometimes chief clerks of departments, who cannot be expected to enter into the peculiar business of the Patent Office, or appreciate the very serious evils of interference. If the Commissioner and chief officers are not competent to perform, or are not faithful in the discharge of their onerous tasks, they should be removed; but if they are able and honest, they ought not to be harassed with calls to answer complaints preferred to the Department of the Interior, and often to the President, by disappointed applicants and their friends; by parties stimulated with promises of large sums, made payable on the issue of a patent; and by agents and speculators, smarting under the loss of such contingent fees. Nor is there the slightest ground or reason for such attempts at coercion; since, if the office improperly refuse a patent, the law has provided a court of appeal, in which its decisions can be revised and reversed.

Dissatisfaction on the part of applicants is unavoidable, because of the number of old devices presented for patents; nor can this ever be prevented, unless by the publication of such an Index of Inventions as has been in previous reports, and again in this, recommended to the favorable attention of Congress. There is no disposition in the office to refuse patents; the feeling is the very reverse. Rejections are made only in performance of a duty imposed by law. This duty is an unpleasant and arduous one, often blighting the fond anticipations of ingenious and worthy men, and often necessitating a more or less elaborate defence of the grounds of action in the case; whereas, in granting a patent the office is relieved from these and other difficulties. Hence it is absurd to suppose that refusals are wantonly made, there being no possible motive to refuse a patent, but every inducement to grant one. When doubts exist, the benefit is always given to the applicant.

If systematic endeavors to overawe and overrule the Commissioner be not frowned down, they will, in time, affect the integrity of the Patent Office, and will make it a source of injustice to the public and of grievous wrongs to real inventors. Its judicial character requires that it be cordially sustained, and jealously protected from improper influences. It should be surrounded with the same safeguards that defend the independence of every United States court. What would be the condition of judges of the Supreme and of other courts, if they were constantly called upon to reopen carefully adjudicated cases, and answer complaints of defeated litigants, accompanied with insinuations and often direct charges of ignorance, imbecility, partiality, corruption, and kindred attributes? Few high minded men would accept and fewer would remain in office. In this bureau, everything is matter of record. No decision is made without communicating the reasons, in writing, to the parties concerned; they are placed on file, and become part of the public archives of the office. This, together with a court of appeal, secures the rights of applicants, and is an ample guarantee against unjust and arbitrary decisions.

It would, in my opinion, have been a dereliction of duty to have refrained from thus soliciting the attention of Congress to a subject so essentially affecting the character and usefulness of the Patent Office;

so deep are my convictions of the positively injurious effects of departmental control, unaccompanied, as it is, by one single compensating advantage to the office, the administration, or the public.

2. *Additional room required.*—I respectfully but earnestly urge an early provision of additional room for the clerical business of the office, as well as for a proper exhibition of the models. The continued occupancy of the largest and best part of the building as a museum, and the delay in finishing the new wing, have resulted in embarrassments that are daily becoming more and more serious. Indeed, if the evil be not soon corrected, it will prove a positive interruption to the business of the office. The few rooms at its command have become so crowded, that the mails have, for the last twelve months, been made up in the open passage, where the correspondence and daily cash remittances are unavoidably exposed.

Such an exhibition of the models as was contemplated and directed by the law of 1836 is not only impossible, but it is scarcely practicable to protect them from serious injury, if, indeed, the more delicate among them can be secured from positive destruction. Their condition is a great injustice to their authors, and to inventors and patentees generally; since the rooms and cases, prepared expressly for them at the expense of the Patent fund, have now been withheld from the office for a period of ten years. As Congress alone has the power, I would respectfully suggest that immediate action be taken to provide room necessary for the classification, arrangement, and proper display of the models.

In relation to the details of the subject, I beg to introduce the following correspondence, elicited by a resolution of the Senate, of January 28, 1851:

PATENT OFFICE, *January* 30, 1851.

SIR: Having been desired by you to express our opinion on the wants of this office, as far as room is concerned, we have the honor to report:

First. That the patented models now in the office are so much crowded that the provision of the law with respect to the exhibition of them cannot be complied with; that the rejected models are in a similar, but worse condition.

Second. That the draughtsman's room, library, and record-room, are at present crowded to an extent which renders it extremely difficult to perform the duties that are required to be done in those departments; at least three times the space is wanted for the library, and double for the draughtsman's room.

Third. It is a matter of almost absolute necessity that the recording clerks should be in the vicinity of the record-room.

Fourth. That the copying-clerk for letters and the clerk who has charge of assignments are at present crowded into apartments of other officers, whose rooms are too full without them.

Fifth. That it has become a matter of necessity for the examiners to have rooms in which they may converse with applicants, without the latter having an opportunity to examine, or even glance at, the models of pending applications.

Sixth. Rooms are required for workshops, caveat models, and pending models.

Seventh. That an ante-room has become indispensably necessary.

Eighth. That it is a matter well understood that the force of this office must be yearly increasing, and that the foregoing considerations are based upon the present force and the expected increase of records, but not upon an increased number of clerks.

We therefore believe that the whole of the basement of the present building and the wing are necessary for a proper distribution of the rejected models and for workshops; that the whole of the upper halls, both of the building and wing, are at present required for patented models, and will probably be filled to overflowing in the course of three years. And we also believe that the whole of the first floor of the present building and the wing will not more than suffice for the wants of the Commissioner, examiners, machinist, draughtsman, and clerks, when it is considered that the library and draughtman's room are daily narrowing in effective space, and that it would be useless to move them into apartments which, in the course of less than three years, would be quite as contracted as those which are now daily hindering the effective action of this office.

If a different arrangement from that herein intimated be adopted, it will merely vary the distribution of offices, models, and records, but will not alter, in the least, the absolute amount of space that is needed.

All of which is respectfully submitted:

CHAS. G. PAGE,
N. P. N. FITZGERALD,
HENRY B. RENWICK,
L. D. GALE,
Principal Examiners.
J. H. LANE,
SAML. COOPER,
T. R. PEALE,
THOS. J. EVERETT,
Assistant Examiners.
R. S. CHILTON, *Librarian.*
A. L. McINTIRE, *Draughtsman.*
SAML. P. BELL, *Machinist.*
S. T. SHUGERT, *Accounting Clerk.*
A. B. LITTLE, *Assignment Clerk.*

Hon. THOS. EWBANK,
Commissioner of Patents.

—

UNITED STATES PATENT OFFICE, *February* 4, 1851.

In reply to your letter of January 31st, I have the honor to state that, with a view of ascertaining the sentiments of the principal officers of this bureau respecting the information called for by the resolution of the Senate of the 28th ultimo, viz: "What additional room, if any, is required for the proper accommodation of the Patent Office," &c., &c., I asked for their opinions, and thought it the safest course to submit them for your consideration in place of my own.

My personal opinion, now required, was, after an examination, expressed in the Report of 1849, page 512. Though the business of the office has increased since the date of that report, I still think that, were the upper floor and its cases restored to the office for the reception of its models, and the space now occupied by the models converted into rooms, there would be sufficient for the immediate wants of the office.

If the museum is to remain where it is, then, certainly, the whole of the upper floor of the new wing will be required for the models now in the office; but that would be an inconvenient arrangement, since by it the models would be far distant from the rooms of the officers requiring them. It would be better to assign the new wing entirely to this office, or remove the museum into it. Under any circumstances the models, if they are to be properly disposed of and arranged for exhibition, as the law requires they should be, must be placed on the upper floor on account of light. When the west wing is completed, it is doubtful if there would be sufficient light to examine the objects in the cases were they to remain on the present or first floor. They are partially obscured now, and would then be much more so.

In conclusion, I have no hesitation in saying that, in view of the rapidly increasing business of the office, the present building will, in my opinion, be found wholly insufficient for the purposes of this bureau in three or four years, if not sooner. The papers accompanying your letter are herewith returned.

I have the honor to be, very respectfully, your obedient servant,

THOS. EWBANK.

Hon. ALEX. H. H. STUART,
Secretary of the Interior.

The number of models at present in the office is nearly 20,000. The yearly accumulation exceeds 2,000; so that in ten years, the number cannot be estimated at less than 50,000, since the annual increase for the last four years has been between two and three hundred.

If the largest and best portion of the original building is still to be occupied with the collection of the Exploring Expedition, and if a moiety only of the new wing be accorded to this office, I submit that the $211,000 withdrawn from the Patent fund, and expended on the wing, be returned; since, after the payment of that sum, the office will have no more room than what is admitted belonged to it before.

Were the Patent fund held sacred for the direct encouragement of science and art, and the interest expended in premiums for inventions and discoveries of national importance, (as suggested in the report of 1849,) it would be a fruitful and enduring source of honor and of benefits to the Union. I believe it of more importance to the country to preserve that fund intact, and to expend the interest as suggested, than to have a stately structure in which to transact the business of the office.

3. *Increase of clerical force.*—With the exception of two, authorized by the act of 1848, there have been no permanent clerks added to this office since its reorganization in 1836; while the duties of those employed have increased more than three fold during that period. They are, consequently, over-tasked, and inadequately paid. I would, therefore, respectfully and most earnestly ask Congress to authorize the employment of *four* additional permanent clerks, at salaries of $1,200, to be assigned to such service as may be deemed necessary by the Commissioner for the despatch of the public business. Some of the duties for which these clerks are designed are now performed by persons employed

under the act of 1837. They are not qualified officers, but necessarily admitted to the secret archives, and other business requiring care and responsibility. These places, it is believed, should be filled by permanent clerks, sworn and qualified as such.

As examples of the necessity of permanent aid and increased compensation to certain branches of business, the duties of some of the officers whose desks are over-tasked are here referred to, by extracts taken from a report made by the Commissioner to the Secretary of the Interior, in September last, in obedience to a resolution of the Senate of the 7th of March, 1851, in relation to the classification of clerks, and "apportioning their salaries according to their services," with slight alterations, in which he recommended—

First. That the salary of the CHIEF CLERK of this bureau be increased to two thousand dollars per annum. This increase would only place the chief clerk of the Patent Office on an equality with those of other bureaus who receive a reasonable compensation, and who are exempt from the necessity of giving bonds, with surety, for faithful performance of duty, required by the chief clerk of this office.

Besides his heavy clerical and administrative duties, the entire business of the office passes through his hands, receiving its appropriate direction to the different branches. The duties thus devolving and accumulating upon him, rendered the services of an assistant necessary. This aid, supplied under the act of 1837, authorizing the employment of temporary clerks, is intended, also, to relieve other desks, and the clerkship should be made permanent.

Second. That the salary of the DRAUGHTSMAN, which is now twelve hundred, be raised to fifteen hundred dollars.

He has charge of the secret archives of the office; the drawings patented and rejected; pending files and evidence in cases of interference; receives applications from the chief clerk, entering them in books kept for that purpose, before they are distributed to the examiners; examines all drawings attached to patents before they go out of the office, and all copies of drawings made for courts or other purposes, besides attending to a large amount of miscellaneous business. It was found impossible, before the increase of the examining corps, for this officer to give his personal attention to these multifarious duties. Accordingly, an assistant was assigned to him under the act of 1837, whom I recommend to be made a permanent clerk.

Third. The MACHINIST. The duty of the machinist is to receive, classify, and arrange the models, to exhibit to inventors such classes as may be in the line of their discoveries; furnish the examiners with such as may be required in their examinations; keep records of those patented, suspended and rejected, and to conduct the correspondence relating to models, generally. The number of these interesting proofs of the inventive genius of the country has doubled within a few years, and now amounts to about 20,000. It has long been impossible for one person to meet the demands of this department. An assistant was necessarily appointed some years ago, and paid out of the contingent fund; and as the duties of the assistant are equally responsible with those of the machinist—he having a knowledge of models of pending applications and others belonging to the secret archives—he ought to be a sworn officer, and his place a permanent clerkship.

Fourth. That the salary of the ACCOUNTING OF DISBURSING CLERK be increased to $1,500 per annum, and he be required to give bonds.

He has charge of the records of the office—the patented and withdrawn files; and is required to give information in relation thereto whenever called upon. He is also the accounting and disbursing clerk, and conducts the correspondence in relation to withdrawals; the discharge of which duties involves a heavy responsibility, and requires a person of not only reputable talents, but also of rigid integrity. Seventy or eighty thousand dollars passes through his hands annually, and yet for a salary of $1,200 he assumes all the responsibility of such a trust.

Fifth. That the salary of the ASSIGNMENT CLERK, who now receives $1,000, be increased to $1,200. When this salary was authorized, the amount was, in a measure, commensurate with the duties performed; but, owing to several changes in the business and *personnel* of the office, many very important matters have been transferred from other desks to his, making it a very responsible and laborious position. He is charged with the preparation of all certificates for copies of records, files, &c., conducts the correspondence respecting copies, transfers of patent rights, and miscellaneous inquiries, and receives and accounts for the fees paid for copies and for recording deeds. In miscellaneous correspondence, which pertains to his desk, questions often arise involving preliminary legal points, requiring a competent knowledge of the patent law, as well as a thorough acquaintance with the practice of the office.

4. *Librarian.*—The library is an indispensable element in transacting the business of the office; and it is essential that it keep pace with the advancement of science and the arts, abroad as well as at home. As its importance and contents daily increase, it is desirable that a salary be attached to the librarianship commensurate with the services required; one sufficient to engage a person whose habits, education, and tastes, fit him for the position. Besides cataloguing, collating, and indexing the books, he might keep a digest of patents as they are issued, and post up materials for and aid the Commissioner in the preparation of the annual report. He should understand the German and French languages. I would recommend that the salary be made permanent, and not less than $1,200.

5. *Patent laws.*—It is believed that a registry law might be beneficially substituted for the law relating to designs. It would be more comprehensive, and better calculated to secure the objects sought, than the law at present in force.

I would recommend that in all cases where a patent is granted, upon proof that the applicant invented it prior to the issue of a patent granted before the application, or prior to a publication of the same invention made before said application, or prior to the use of the same by others before the filing of said application, said patent shall take the date of the earliest patent, the earliest publication, or the earliest use of said invention.

I would also recommend that, for the purpose of diminishing litigation, a system of cumulative damages and cumulative costs be authorized, depending upon the number of times a patent has been affirmed or invalidated before a court of competent jurisdiction. It is believed that such a system will, to a great extent, prevent calling the validity of patents in question for mere purposes of vexation, and will also check

the bringing of suits upon invalid patents for the purpose of procuring unjust tribute through fear of litigation. No plan has occurred to me which I consider so well calculated to check unnecessary and vexatious litigation under patents.

6. *Judge of appeals.*—The infirm health of the venerable chief justice of the District of Columbia, renders it necessary for Congress to make early provision for giving appellate jurisdiction over the decisions of the office.

In submitting the following letter from the chief justice, I feel it my duty again to call the attention of Congress to the total inadequacy of the compensation allowed by the act of 1837 for the services therein prescribed.

My immediate predecessor, in the report of 1847, uses the following language in reference to this officer: "From that time (March 3, 1837) down to the present, many appeals have been taken from the decisions of the Commissioner and decided by the chief justice, who has sustained his decisions by able and elaborate opinions, involving important principles of patent law." These opinions were published by Congress; they constitute the most valuable body of decisions on our present patent laws; are respected as authority in all our courts; and evince the high integrity, profound learning, and great industry of their author.

For these labors his only pecuniary compensation was $100 per annum; whereas single cases have occurred wherein a larger sum would have been inadequate. I respectfully suggest that an additional sum be allowed Judge Cranch out of the patent fund, as an acknowledgment of the important services he has rendered to this office.

Letter of Judge Cranch.

WASHINGTON, D. C., *December* 15, 1851.

DEAR SIR: I am unable, by reason of great age, sickness, and infirmity, to discharge the duties imposed upon me by the patent laws of the United States.

I have, therefore, petitioned Congress to repeal such parts of those laws as require me to hear and determine appeals from the decisions of the Commissioner of Patents.

My memorial is, I believe, referred by the Senate to the Committee on the Judiciary.

I suppose some substitute will be required for the provisions which may be repealed.

With great respect, I am, dear sir, your obedient servant,

W. CRANCH.

Hon. THOMAS EWBANK,
Commissioner of Patents.

7. *Analytical and descriptive Index of Inventions.*—Respecting this great desideratum, I beg to refer to my Report for 1849, page 516; to repeat the recommendations and to urge the appropriation therein named, for the commencement of such a compilation. Its importance, utility and necessity are becoming more and more apparent. No state paper and no mere human volume can ever surpass it in immediate and endur-

ing value. A greater boon to inventors, to science, and to the world at large, could hardly be named. It would be consulted as long as the arts are cherished, and would rather increase than diminish in interest as time rolls on.

If the cost of printing it be deemed an objection, a fair manuscript copy would be of great value to the examiners, and above all price to inventors and others, who should have access to it in person, or through their agents.

8. *Chemical apparatus for the use of the office.*—In the chemical branch of the examining department the furniture of a small laboratory is much needed, to enable the examiner to verify or disprove alleged ingredients and results of applicants for patents for materials, processes and compounds. Section sixth of the act of 1836 provides that every applicant for a chemical patent shall accompany his application "with specimens of ingredients and of the composition of matter, sufficient in quantity *for the purpose of experiment.*" Hitherto no means of testing such specimens have been provided, although obviously within the meaning of the law. The increasing number of applications belonging to this class and their alleged importance render it highly desirable, and indeed indispensable, that the examiner should have at hand the means of arriving at correct and definite decisions. It is therefore proposed to have a room fitted up as a laboratory, and that the Commissioner be authorized to procure the requisite apparatus, at an expense not exceeding $800.

9. *Reports of the office illustrated.*—It is very desirable that these documents should be rendered more practically useful to inventors, and to others interested in the progress of the arts. They are essentially defective in descriptions of devices patented, such descriptions being confined to the claims, the full meaning of which can seldom be understood for want of details and drawings. To publish the specifications in *extenso* would swell the annual exposition into several large volumes; but if simple and neat engraved illustrations were introduced along with the claims, a moderate addition only would be made to the volume now devoted to inventions. Let a small but clear outline engraving be given of each patented invention—that is, of the peculiar portion covered by the claim—and every person consulting the reports would understand the precise nature of the inventions at once, and consequently be prevented from repeating them. As long, therefore, as the specifications and drawings are not published in full, it would be a decided improvement, and in a majority of cases all that is wanted to convey a correct idea of the devices patented, to accompany each "claim" with a neat and lucid wood-cut illustration. Nearly every inventor would be glad to supply one, and few would object to a provision made by law, requiring one, or an electrotype cast of one, to be furnished by each patentee. They might be, and in general ought to be, confined to the features patented, so that seldom more than half a page would be taken up, while in a majority of cases one-third of a page, or even less, would suffice.

The insertion of such illustrations would make the reports much more popular and useful. They would impart greatly increased and more definite information and would save many an inventor an inconvenient outlay of time and money in travelling to Washington to examine the models in the Patent Office. The reports would be more care-

fully preserved, both in public and private libraries, and more frequently consulted by inventors and others.

As regards the style or workmanship in which the office reports are got up, I beg to suggest that a much smaller number than what is usually printed would be preferable, in nearly every point of view, provided they were issued in respectable and enduring volumes. As permanent records, *ten thousand* copies, got up in a style creditable to the office and to the country, would be more valuable and do more service than ten times the number of the usual character. Instead of being rapidly consumed as waste-paper, they would be preserved in both private and public libraries. A complete set is not now to be had; and it is doubtful if a dozen sets are in existence; (there are none in the office of a date prior to 1845) This is believed to be chiefly, if not wholly, due to the inferior quality of the paper and printing—to the unattractive and unsubstantial dress in which they have been sent forth.

If inventions are fraught with consequences of the highest import to the well-being of society and honorable to the people that originate them, descriptions of them are worthy of preservation; and the more so since every new application of science and every addition to art has a lasting value. Tomes of the early printers are extant, and their pages appear fresh as when struck off, promising to outlive most of modern works. Few, if any, of our Patent Office reports will be found on book-shelves four centuries hence—their materials will have perished;* while there is no room to doubt that thousands of volumes printed in the fifteenth century will be consulted in the twenty-fifth. The annual reports of a bureau so intimately allied with mechanical progress as this is, ought, in some degree, to correspond with the present state of the arts connected with book making. Our ministers abroad have often felt ashamed when comparing some of our documents with those of foreign governments. Of the 500 copies of the Report of 1849, Part 1, which the Senate authorized the undersigned to have printed, at a cost not exceeding fifty-five cents each, some were forwarded to American embassies abroad. The secretary of the legation at London, in acknowledging the receipt of a parcel, expressed his gratification at being furnished with a national document which he could exhibit without blushing.

It is the practice in nearly every public library to have its volumes bound in one uniform style; but with bound Patent Office reports this could not be done without cutting away the text, in consequence of the small portion of margin left by official binders; hence unbound are often preferred to bound copies. As the public binding is not calculated to be durable, it would be a decided improvement if the margin left by the binders were required to be not less than five-eighths or three-quarters of an inch in width.

10. *International exchanges.*—It is proper, in this place, to acknowledge the obligations of the office to M. Alexandre Vattemare, the well known founder of the system of international exchanges, for valuable contributions to its library, and for collections of foreign seeds.

The "*Annales des Ponts et Chaussées,*" a journal containing the transactions of the corps of topographical engineers in France, and

* A large edition of an English classic disappeared in thirty years, from the corroding action of chlorine used in bleaching the paper.

"*Annales des Mines*," a journal devoted to mining and metallurgic operations, have been received from him entire; also, the continuation, for several years past, of the "*Brevets d'Invention*," containing descriptions of patents granted in France, together with various works upon agriculture, chemistry, &c., received, through his agency, from individuals and scientific societies in France.

A series of specimens of Algerian soils and products, prepared by order of the Secretary of War of France, together with a collection of the agricultural productions of France, prepared by Mons. A. Vilmorin at the request of the Central Agricultural Society, have been received through Mons. Vattemare; but as it was understood that they were intended for the Department of the Interior, they have been handed over to the Secretary of that department, who has made mention of them in his late report accompanying the message of the President to Congress.

11. *Examiners' reports.*—These have been omitted, partly on account of the pressure of business on the examiners' desks, but principally because complaints have been made of partiality in the selections of inventions noticed. To avoid this, all must be mentioned or none. These reports necessarily made invidious distinctions in regard to the relative importance and merits of devices patented. Such distinctions doubtless exist, but the duty of pointing them out does not attach to this office. They have been a fruitful source of complaint, of charges of partiality, and even of corruption; and although such charges are to be expected under any circumstances, it is inexpedient for the office to travel out of its path to invite them.

II.

FINANCIAL AND STATISTICAL.

The number of applications for patents received during the year ending December 31, 1851, is two thousand two hundred and fifty-eight; the number of caveats filed during the same period is seven hundred and sixty; being an increase of applications over last year of sixty-five, and of caveats one hundred and fifty-eight.

The number of patents issued during the year 1851 is eight hundred and sixty-nine, including twenty five re-issues, three additional improvements, and ninety designs. Three disclaimers were entered during the year.

Within the year 1851, four hundred and thirty-eight patents have expired, a list of which is annexed, marked H. There were fifteen applications made during the year to extend patents, the terms of which were about to expire; which, with five pending applications at the close of last year, made twenty cases to be considered. Of these, nine were granted and eleven rejected. None have been extended by Congress during the year.

The receipts of the office for the year 1851, on account of applications for patents, caveats, additional improvements, re issues, extensions, recording assignments, powers of attorney, &c., and for copies, amount to $95,738 61, as per statement marked A; being an increase over the receipts of last year of $8,811 56.

The expenses of the office for the year 1851 are as follows, viz: For salaries, $33,719 73; contingent expenses, $11,533 81; books for the library, $1,183 32; temporary clerks, $14,391 12; agricultural statistics, $4,937 84; refunding money paid by mistake, $186 77; compensation of librarian, $250; chief justice of the District of Columbia sitting on appeals from Commissioner of Patents, $100; on applications withdrawn, $20,614 31, as per statement marked B; leaving a balance to be carried to the credit of the Patent fund of $8,821 68, as per statement marked C.

On the 1st day of January, 1851, the amount of money in the treasury to the credit of the Patent fund was $15,331 27; to which add the excess of receipts over expenditures for the year, $8,821 68, leaves a balance in the treasury to the credit of the Patent fund, on the 1st day of January, 1852, of $24,152 95, as per statement D.

There were one hundred and sixty nine cases on the examiners' desks on the 1st of January, 1851; the number of applications received during the year, two thousand two hundred and fifty-eight; making the whole number of applications before the office during the year two thousand four hundred and twenty-seven. Of this number, one hundred and fifty-five remained unexamined on the 1st day of January, 1852.

The business of the office for the past year shows the examination of two thousand two hundred and seventy-two applications, resulting in the issue of eight hundred and sixty-nine patents and one thousand four hundred and three rejections and suspensions, as exhibited per statement E.

A statement is also appended, showing the amount of fees received, applications and caveats filed, during each month of the year, marked F.

A.

Statement of receipts for patents, caveats, additional improvements, recording assignments, &c., and for copies.

Amount received for patents, caveats, re-issues, and additional improvements	$89,022 00
Amount received for recording assignments, &c., and for copies	6,716 61
Total	95,738 61

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B.

Statement of expenditures and payments made from the Patent Fund by the Commissioner of Patents, from January 1, 1851, to January 1, 1852, under the acts of Congress making provision for the expenses of the Patent Office, viz:

For salaries		$33,719 73
For contingent expenses		11,533 81
For books for library		1,183 32
For temporary clerks		14,391 12
For refunding money paid by mistake		186 77
For withdrawals		20,614 34
For compensation of librarian		250 00
For compensation of district judge		100 00
For collecting agricultural statistics, viz:		
Salary paid agricultural clerk ($500 due for 1850)	$2,500 00	
Salary paid assistant, Mr. Fogg	222 15	
Amount paid for copying report	501 69	
Amount paid for seeds, stationery, &c	1,714 01	
		4,937 85
		86,916 94

In the above sum of $86,916 94, which shows an increased expenditure for the year 1851 over that of 1850 and former years, is embraced—

The salaries of two principal and two assistant examiners, authorized at the last session of Congress, at the rate of $8,000 per annum for nine months	$6,0 0 00
The excess of expenditure for the agricultural desk over last year	1,078 49

Besides these extraordinary expenditures, the withdrawals of applications have been unusually large, exceeding the amount of those of last year—which was greater than any preceding year—the sum of	$2,601 01
	9,679 50

This sum of $9,679 50 deducted from the whole expenditure, $86,916 93, and the ordinary expenses of the office for the year 1851 is shown to be only $77,237 43—$2,863 52 less as compared with the expenses of last year.

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C.

Statement of receipts and expenditures of the Patent Office for the year 1851.

Amount received from all sources	$95,738 61
Amount of expenditures of all kinds	86,916 93
Amount carried to credit of Patent fund for 1851	8,821 68

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D.

Patent Fund, January 1, 1851.

Amount of fund January 1, 1851	$15,331 27
Amount carried to Patent fund for 1851	8,221 68
Amount remaining in the treasury to the credit of the Patent fund January 1, 1852	24,152 95

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E.

Statement of applications on hand January 1, 1851, and number received during the year and acted upon.

Number of cases on examiners' desks January 1, 1851		169
Number of applications received in 1851		2,258
Number of cases before the office during the year		2,427
Number of patents issued during the year	869	
Number of applications remaining unexamined	155	
Number of rejections and suspensions	1,403	
		2,427

F.

Statement showing amount of fees received and number of applications and caveats filed during each month of the year 1851.

Months.	Cash received.	Certificates receiv'd.	Small fees received.	Total received.	Applications filed.	Caveats filed.
January	$2,860 00	$3,845 00	$477 97	$7,182 97	183	78
February	4,095 00	5,340 00	549 96	9,984 96	211	93
March	3,650 00	5,150 00	982 45	9,782 45	237	72
April	3,195 00	4,021 00	531 92	7,747 92	184	73
May	3,669 00	4,865 00	419 78	8,953 78	218	52
June	3,487 00	5,475 00	635 59	9,579 59	187	50
July	3,319 00	2,725 00	524 44	6,559 44	178	61
August	2,745 00	2,810 00	358 37	5,913 37	141	52
September	4,400 00	3,110 00	669 15	8,179 15	229	55
October	4,225 00	2,955 00	401 30	7,581 30	150	64
November	4,465 00	2,855 00	428 73	7,748 73	171	49
December	2,725 00	3,045 00	737 85	6,507 85	169	61
Total	42,826 00	46,196 00	6,716 61	95,738 61	2,258	760

Table exhibiting the business of the office for the last eleven years, and the necessity of an increase of permanent clerical force.

Years.	Applications filed.	Caveats filed.	Patents issued.	Amount of cash received.	Amount of cash expended.
1841	847	312	495	$40,413 01	$23,065 87
1842	761	291	517	36,505 68	31,241 49
1843	819	315	531	35,315 81	30,776 96
1844	1,045	389	502	42,509 26	36,344 73
1845	1,246	452	502	51,076 14	39,395 65
1846	1,272	448	619	50,264 16	46,158 71
1847	1,531	533	572	63,111 19	41,878 35
1848	1,628	607	660	67,576 69	58,905 84
1849	1,955	595	1,076	80,752 78	77,716 44
1850	2,193	602	995	86,927 05	80,100 95
1851	2,258	760	869	95,738 61	86,916 93

The foregoing statistics exhibit a very large increase of business in this office for the last eleven years; and by reference to the table it will be seen that the increase for 1851 is in full proportion with former years. This accumulation of business has been provided for from time to time by Congress, in authorizing necessary additions to the examining force. This force for the present is deemed sufficient. But there are still departments of the business and labor of the office which have increased in a corresponding ratio with the examinations, and no provision made by Congress to relieve them. Hence the suggestions in relation to an increase of clerical force, in the preceding pages.

Table showing the number of patents, reissues, designs, and additional improvements granted at the Patent Office in Washington during each month of the year 1851.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Total patents	56	38	46	64	57	57	81	60	75	76	72	69	751
Reissues	5	2	6	1	5	1	2	......	......	1	1	1	25
Designs	7	4	10	8	8	12	15	1	11	5	5	4	90
Additional improvements	......	......	......	......	1	......	......	......	1	......	1	......	3
Extensions, 9; disclaimers 3; not included in this table.	......	......	......	......	......	......	......	......	......	......	......	......	......
	68	44	62	73	71	70	98	61	87	82	79	74	869

Table showing the number of patents issued to citizens of different States during the year 1851.

State.	No.	State.	No.	State.	No.	State.	No.
Maine	9	Delaware	3	Arkansas	......	Florida	......
Vermont	12	Maryland	10	Tennessee	4	Texas	2
New Hampshire	17	Virginia	8	Kentucky	8	Iowa	2
Massachusetts	121	North Carolina	2	Ohio	76	Wisconsin	4
Rhode Island	9	South Carolina	4	Michigan	5	District of Columbia	11
Connecticut	53	Georgia	8	Indiana	13	Foreign	18
New York	235	Alabama	2	Illinois	10		
New Jersey	15	Mississippi	1	Missouri	8	Total	869
Pennsylvania	77	Louisiana	4				

Patents, reissues, designs and additional improvements are all included in this table.

IV.

CLASSIFIED LIST OF PATENTS THAT HAVE EXPIRED IN THE YEAR 1851.

CLASS I.—*Agriculture, including instruments and operations.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Corn husking	Jonathan Cutler	Putney, Vt.	July 31
Cultivator for thinning cotton plants	John Weaver	Washington, D. C.	July 5
Cutting cradle for hemp	Wilson L Larimore	Paris, Ky.	April 25
Cutting scythe snath	Dexter Pierce	Montague, Mass.	Mar. 11
Hulling clover seed	William M. Barton	Clark's Cross Roads, Tenn.	Dec. 20
Hulling rice	C. H. Harvey and E. Tracy.	Poughkeepsie, N. Y.	May 30
Lime spreading	Francis H. Smith	Baltimore, Md.	July 5
Lime spreading and sowing	Levi Rice	Chester, Pa.	Aug. 31
Plough	Bancroft Woodcock	Mount Pleasant, Pa.	June 14
Plough	Sam. Hartpence and John D. Bowne.	Kingwood, N. J.	July 5
Plough	John C. Smith	Kingwood, N. J.	July 11
Plough	John B. Norton	Philadelphia, Pa.	July 17
Plough	Isaac Snider	Mount Pleasant, Pa.	July 17
Plough	Stephen McCormick	Auburn, Pa.	Dec. 1
Rake, horse	David Dewey	Poultney, Vt.	Nov. 23
Rake, revolving	Stephen Coats	Shoreham, Vt.	April 17
Smut machine, (antedated August 1, 1837.)	Benjamin M. Smith	Rochester, N. Y.	Sep. 8
Smut machine	Charles D. Childs	Mount Morris, N. Y.	Aug. 15
Smut machine, for garlic	Henry Staub	Shepherdstown, Va.	Nov. 11
Strainers for milk-pails	Isaiah Burmel	Derby, Ct.	Aug. 18
Straw cutting	Henry Silliman	Perry village, N. Y.	Mar. 30
Threshing and hulling clover seed	Jonathan Brooks	Brownsburg, Va.	Dec. 15
Threshing machine	Alexander W. Bowling	Front Royal, Va.	Dec. 26
Threshing and winnowing	Moses Davenport	Phillips, Mass.	Nov. 23
Threshing and winnowing, (antedated June 29.)	J. A. & Hiram A. Pitts.	Winthrop, Maine	Dec. 29
Winnowing, separating, &c , wild peas from grain.	Lester Butler	Coble's hill, N. Y.	June 3
Yoke, horse and oxen	Gideon Hotchkiss	Windsor, N. Y.	Aug. 31

CLASS II.—*Metallurgy and manufacture of metals.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Blow pipe for blast furnaces	John Barker	Baltimore, Md.	Mar. 3
Door plates	William C. Austin	Greensville, Va.	Jan. 31
Door springs	Thomas Thorpe	West Cambridge, Mass.	Dec. 7
Door, springs for shutting	Ithiel S. Richardson	Boston, Mass.	Oct. 20
Fire proof safe	Benjamin Sherwood	New York	May 8
Fire proof safe	Daniel Fitzgerald	Mount Morris, N. Y.	Aug. 15
Furnace blast	John Barker	Baltimore, Md.	April 20
Furnace for shear steel, &c.	Simeon Broadmeadow	New York	April 5
Furnace, smelting ore	George E. Sellers	Philadelphia, Pa.	April 20
Furnace, smelting ore	Simeon Broadmeadow	New York	April 5
Hinges or butts, double-centred joints	Egbert Hedge	Hartford, Conn.	Nov. 23

IV.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Iron, carbonating and smelting	Asa Whitney	Southfield, N. Y.	July 17
Iron ore, smelting	Joseph Lyon	Pottsville, Pa.	July 31
Iron, &c., washing ores	Frederick Fredly	Logan Township, Pa.	April 20
Joints for rules, double-centred	Lemuel Hedge	Hartford, Conn.	April 29
Knobs, door, drawer, commode, &c.	David Holtman	Baltimore, Md.	July 31
Knobs, glass, to metallic sockets, attaching.	Enoch Robinson & G. W. Robinson.	Boston, Mass.	Oct. 20
Latch mortise	Charles S. Gay	Nashua, N. H.	Sep. 28
Latch mortise	David N. Ropes	Portland, Maine	Sep. 28
Lock, door	Turner Whitehouse	Boston, Mass.	Sep. 8
Lock, door	James McClony	New York	June 14
Locks, mail-bag and clasp	Henry C. Jones	Newark, N. J.	Oct. 23
Locks, secret safety	William Hobbs	Springfield, Mass.	Dec. 20
Nails and brad cutting	Joseph Berry & Oliver P. Rand.	Newmarket, N. H.	Mar. 20
Nails, wrought	N. W. Bishop & Simeon Brooks.	Saybrook and Chester, Conn.	Sep. 21
Rivets, making	Levi Severance	Pittsburg, Pa.	July 11
Screws, cutting	Joseph Blackall	Albany, N. Y.	July 29
Screws, cutting, of screw bedsteads.	Palmer Williams	Towanda, Pa.	Feb. 16
Screws, cutting wood	Jacob Sloat & Thomas Springstead.	Ramapo and Poughkeepsie, N. Y.	Mar. 30
Screw, wood, turning heads	Thomas W. Harvey	Poughkeepsie, N. Y.	Mar. 25
Screw, wood	Clement O. Reed	Providence, R. I.	Dec. 15
Shoes, horse	Barzillai Young & Sam Titus.	Brooklyn, Conn.	July 29
Vice, bench. &c.	Linus Dean	Utica, N. Y.	Feb. 16
Window blinds, fastener	Elijah Jaquith	Brattleborough, Vt.	Dec. 26
Window fastening, combined spring.	Philip F. Hazard	Philadelphia, Pa.	July 11
Window sash, spring for upper sash	Henry Hammond	Lewisburg, Pa.	Sep. 8
Wire, cutting and heading	Thomas W. Harvey	Poughkeepsie, N. Y.	Mar. 25

CLASS III.—*Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Flax and hemp-breaking	John Warren	Westbrook, Me.	June 14
Flax and hemp-breaking	Harvey Lull	Ithaca, N. Y.	June 14
Flax and hemp-breaking and cleaning.	David M. Langley and Samuel Davis.	Westbrook, Me.	Sept. 21
Flax and hemp-breaking and dressing.	Chap'n Warner, Abraham F. Mixwell, and Edwin J. Horn.	Belvidere, N. J.	July 31
Flax and hemp-dressing	William and Robert Brittain.	Armwell, N. J.	Oct. 12
Fur-cutting from skins	Samuel Johnson	Walnut Lane, N. C.	Feb. 24
Gin, cotton	Alexander Jones	New Orleans, La.	April 25
Gin, cotton	John Stevens	Poughkeepsie, N. Y.	Nov. 25
Gin, cotton	Lucillius H. Mosely	Poughkeepsie, N. Y.	Nov. 25
Gin, cotton, saw-cylinder for	Jacob Idler	Philadelphia, Pa.	Dec. 1
Hair-seating, weaving	Charles R. Harvey	Poughkeepsie, N. Y.	Nov. 25
Hat bodies	Hugh Moore	New York city	April 20

IV.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Hat bodies	Henry A. Wells, J. James, and R. W. Peck.	Brooklyn, N. Y	April 20
Hat bodies, batting or web for	Phineas Blanchard	New York city	June 14
Hat bodies, batting or web for	Henry A. Wells and Robert W. Peck.	Brooklyn, N. Y	Sept. 22
Hemp-hatcheling	Phineas G. Rice and Gabriel Rice.	Danville, Ky	July 11
Knitting machine	John McMullin and Joseph Hallen, jr.	Sinking Valley and Logan's Valley, Pa	Feb. 11
Loom, (ante dated March 21, 1837).	Christian W. Shauberr.	Subject of the King of Saxony.	May 8
Loom, (ante dated Feb. 10, 1837)	Enoch Burt	Manchester, Conn	Aug. 8
Loom-power, figure	William Compton	Taunton, Mass	Nov. 25
Loom, regulating yarn beam	Welcome A. Potter	Cranston, R. I	Nov. 23
Loom shuttle-tongue	Comfort B. Thorpe	Smithfield, R. I	April 17
Loom temple, self-adjusting	Samuel P. Mason	Newport, R. I	July 22
Loom treadles and harness	B. Harford and W. B. Tilton.	Enfield, N. H	Dec. 29
Napping cloth	Benjamin Swazy	Mt. Vernon, Vt	Aug. 8
Oil-cloth, drying	Daniel Sampson	Winthrop, Me	May 30
Paper sizing	John Ames	Springfield, Mass	Dec. 1
Spinning woollen roving	Edgar M. Titcomb	Andover, Mass	July 29
Thread, preventing from waste, &c.	John Golding	Dedham, Mass	Aug. 15
Thread, waste, reducing to cotton-wool.	Ogden Griswold	Hartford, Conn	July 17
Thread, waste, reducing to cotton-wool.	William Gray	Connecticut	July 29
Wool, cleaning	J. Wolcott and C. W. Brown.	Roxbury, Mass	Oct. 18
Wool, cleaning burr from	Erastus Tracy	Pougkeepsie, N. Y	Dec. 20

CLASS IV.—*Chemical processes, manufactures, and compounds, including medicine, dying, color-making, distilling, soap and candle-making, mortars, cements, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Bitterings from kettles, process of separating.	David Dear	Salina, N. Y	Oct. 18
Candle-moulding	J. Moore and S. P. Bower.	Strasburg, Pa	Mar. 3
Candle-moulding	Joseph H. Tuck	Nantucket, Mass	July 11
Caoutchouc, divesting of its adhesive properties.	Charles Goodyear	New York	June 17
Cement for cisterns	Thomas Coyle	Baltimore, Md	Aug. 16
Cement, hydraulic, from basanite	Ebenezer C. Warner	Albany, N. Y	Oct. 6
Coloring-matter, manufacture of	Henry Stevens	G. Britain, England	Oct. 28
Composition matter for fire-brick, &c.	Christ'phr W. Fenton.	Bennington, Vt	Sept. 22
Composition, protecting metallic sheathing of vessels.	Edward M. Robinson	New Bedford	Aug. 8
Composition, water-proof, for boots,	Patrick G. Nagle	Philadelphia, Pa	Feb. 1

IV.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Gum senegal, substitute for, (antedated May 30, 1837.)	Walter Leveridge	Dorchester, Mass	Aug. 8
India rubber, manufacture of	Stephen C. Smith	New York	Dec. 7
Leaching ashes	Garret Clements	Canandaigua, N. Y	June 10
Lead, carbonate of	Charles Ripley	Saugerties, N. Y	July 11
Lead, white	Peregrine Phillips	Campbell co., Ky	April 17
Matches, locofoco, dipping	John Hatfield	Stillwater, N. Y	June 3
Medicine, worm-destroying	John J. Oellig	Waynesborough, Pa.	Oct. 28
Oleagenous seeds, preparing for pressing.	James Creswell	Pittsburg, Pa	July 31
Paint, composition	William Cox	Dayton, Ohio	Oct. 23
Paint, protection of buildings	Lonis Painboeuf	Washington, D. C	Nov. 11
Paint, white, water-color	Forrest Sheppard	New Haven, Conn	July 17
Pills, tonic and aperient	John J. Oellig	Waynesborough, Pa.	Oct. 28
Plaster, adhesive, spreading	B. Morison	Milton, Pa	Aug. 8
Preserving iron from rust	M. Sorel	Paris, France	Dec. 7
Preserving timber and other vegetable products.	John Knowles & Robt. Gilbert, executors of Robert Bill.	London, Eng., and New York city.	Sept. 21
Preserving timber from worms	August Gotthilff	New York	June 14
Salt water, purifying	Nils Sholtewskü Von Shaultz.	Salina, N. Y	July 29
Soap, making	Daniel E. Stillwell	Utica, N. Y	July 17
Sugar, manufacturing	John Penny	Parish Ascension, La.	Sept. 25

CLASS V.—*Calorific, comprising lamps, fireplaces, stoves, grates, furnaces for heating buildings, cooking apparatus, preparations of fuel, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Air to wood and coal stoves, (antedated March 25, 1837.)	Federick A. Frickhardt.	Easton, Pa	Sept. 25
Cooking apparatus	William W. Parrott	Boston, Mass	Mar. 11
Cooking, fire apparatus for	Daniel Stephens	Kitland, O	Oct. 18
Cooking, generating steam for	John Bovis	Baltimore, Md	Sept. 21
Cooking, steam vessel for	John Morris	Derby, Conn	Oct. 28
Cooking stove	Benjamin H. Wood	Bath, Steuben co., New York.	Jan. 31
Cooking stove	Abraham T. Mixell	Belvidere, N. Y	July 19
Cooking stove	Edwin Reed	West Bridgewater, Massachusetts.	July 29
Cooking stove	John Richardson	Paultney, Vt	July 29
Cooking stove	Samuel Utter	New York city	Aug. 8
Cooking stove	James Wilson	New York city	Aug. 15
Cooking stove	John S. Leavitt	Turner, Me	Aug. 31
Cooking stove	Elijah Skinner	Sandwich, N. H	Oct. 18
Cooking stove	James N. Olney	New York city	Nov. 20
Cooking stove	David Hastings & Soloman Sikes.	Deerfield, Mass	Nov. 23
Cooking stove	Nathaniel Walker	Dighton, Mass	Dec. 1
Cooking stove	Jonathan G. Hathaway.	Painesville, O	Dec. 7
Cooking stove	Jesse Hutchinson, jr.	Lynn, Mass	Dec. 20
Cooking stove	Carrington Wilson, jr.	New York city	Dec. 29
Cooking stove, coal	William Kenney	Louisville, Ky	July 29
Cooking stove, combination	Jordan L. Mott	New York city	Nov. 20
Cooking stove and galley	Benjamin Spratley	Portsmouth, Va	Sept. 25

IV.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Cooking stove and galley	James Barron	Philadelphia, Pa.	Oct. 6
Cooking stove, heat to	Jonathan G. Hathaway.	Painesville, O.	Dec. 7
Cooking stove, heating	William B. Kimball	Peterborough, N. H.	July 19
Cooking stove, heating	Rufus S. Payne	West Springfield, Massachusetts.	July 31
Cooking stove, heating	Philip Wilcox	Springfield, Mass	Sept. 12
Cooking stove, heating buildings	Washington Auld and Jas. Cox.	Philadelphia, Pa.	May 30
Cooking stove and warming rooms.	John Morris	Derby, Conn.	Nov. 4
Fireplace and grate, open	Roger M. Sherman	Fairfield, Conn	June 30
Fuel, burning, &c	Thomas Pearson	Monroe Works, N. York.	July 17
Furnaces, cooking	Horace Gleason	Boston, Mass.	Dec. 15
Furnaces, heatrd air to	John Silsbe	Tyrone, N. Y.	Aug. 8
Grates and fireplace	Ellison Conger	Newark, N. J.	July 22
Grates, &c., register and air-box for.	Allen Pollock	Boston, Mass.	Mar. 3
Grates, revolving and shifting	Enos B. M. Hughes	New Haven, Conn.	July 29
Grates, sliding flute	Daniel Dermand	New York city	Dec. 26
Grates and stoves	Edward H. Dixon	New York city	Aug. 8
Lamps	Samuel Rust	New York city	Apr. 20
Lamps	Samuel Rust	New York city	June 30
Lamps and lamp torches	Jeremiah Martin	Boston, Mass.	June 30
Lamps, patent	Samuel Rust	New York	Sept. 25
Ovens, railway	Sewell Short	Nantucket, Mass.	Sept. 6
Ovens for stoves	David W. Barker	Clyde, N. Y.	July 29
Steaming and mashing apples	John Drum	Greenwood, Pa.	Dec. 1
Stoves	John Collum	Grafton, Mass.	July 31
Stoves, anthracite coal	Aaron O. Price	Newark, N. J.	June 14
Stoves, anthracite coal	Jordan L. Mott	New York city	July 22
Stoves, construction of (antedated March 8, 1837.)	George F. Hopkins	New York city	Sept. 8
Stoves, construction of	Thomas Mills	Havana, New York.	Sept. 25
Stoves, construction of	Henry R. Roath	Norwich, Conn	Nov. 4
Stoves and grates, boilers and ovens.	Caleb Slade	Troy, N. Y.	Nov 11
Stoves, heating apartments	Philip Wilcox	Springfield, Mass.	July 31
Stoves, heating irons for tailors	Bartholomew W. Tabor	Falmouth, Mass.	June 10
Stoves, non-radiating hot-air	Benjamin Blany	Boston, Mass	Sept. 8
Stoves, parlor	Jordan L. Mott	New York city	Dec. 7
Stove-pipes and drums	Merret Bradford	Saugerties, N. Y.	Mar. 25
Stoves, quadrant hinge for	Ebenezer Burrows	Boston, Mass	Aug. 31
Stoves, radiators	Ethan A. Andrews	Boston, Mass	May 30
Stoves, rotary	Rensselaer D. Granger.	Troy, N. Y.	July 17

CLASS VI.—*Steam and gas engines, including boilers and furnaces therefor, and parts thereof.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Boilers, steam	James J. Rush	Philadelphia, Pa	June 3
Boilers, steam	James M. Whittemore	Brighton, Mass	Nov. 23
Explosion of boilers, preventing	Augustus Eitelgeorge	Cincinnati, Ohio	May 22
Heating water for steam engines	Ross Winans	Baltimore, Md	July 29
Locomotive power, engine for removing houses.	Stephen Compton, jr	Almira, N. Y.	July 21
Pistons, metallic, for steam engine pumps.	John Swainson	New York	Mar. 30

IV.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Pistons, packing	John Williamson	New York	Aug. 31
Pump, air, for steam engines	Thos. B. Stillman	....do	May 15
Spark-catcher, &c	William Duff	Baltimore, Md.	Dec. 20
Spark-catcher, centrifugal, &c	James Stimpson	....do	April 17
Steam engine, locomotive	Ross Winans	....do	July 29
Steam engine, locomotive	Ross Winans	....do	July 29
Steam engine, locomotive	Samuel Wright	Philadelphia, Pa.	Dec. 26
Steam engine, locomotive, blowing fire.	Ross Winans	Baltimore, Md	July 29
Steam engine, locomotive, framing.	Ross Winans	....do	July 29
Steam engine, rotary	Roger M. Sherman	Fairfield, Conn	April 25
Steam engine, rotary	D. Gramis & D. E. Brand	Collins, N. Y.	July 29
Steam engine, rotary	Asa Miller	Lockport, N. Y.	Aug. 8
Steam, generating	William Creed	Boston, Mass	Dec. 26
Valve puppet	John Kirkpatrick	Baltimore, Md	Sept. 25
Valve slide	John Kirkpatrick	....do	Sept. 22

CLASS VII.—*Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion; diving dresses, life preservers, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Boats, canal, bays, &c	Abraham Morrison	Johnstown, Pa	May 15
Capstans for ships, &c	Increase Wilson and Francis D. Beckwith.	New London, Conn.	June 15
Constructing ships	Samuel E. Howell	Vincent Town, N. J.	Aug. 31
Grapling irons for raising bodies, &c.	Eben. & Thos. J. Lobdell	Kymton and Boston, Mass.	Aug. 18
Ice-breaker	Barnabas Gillespie	New York	Mar. 8
Mallet, screwing and worming	John B. Petitval	Charleston, S. C.	July 11
Parcelling rope, (antedated March 25, 1837.)	Obed Kempton	New Bedford, Mass.	Sept. 25
Propelling boats, canal, &c	John Finley	Baltimore, Md.	April 17
Propelling boats	J. J. Greenaugh	Boston, Mass.	Aug. 18
Propelling paddles used as ice-breakers.	Washington Van Duzen	Kensington, Pa.	July 29
Propelling paddle-wheels	Jesse Ong	N. Huntington, Pa.	May 22
Propelling paddle-wheels, steam-boats.	Wm. A. Douglas	Albany, N. Y.	July 31
Sounding instrument for ascertaining the depth of water, &c.	John B. Ogden and John Ericson	New Jersey, and subject of the kingdom of Sweden.	July 19
Steering apparatus for ships, &c	Samuel Nicolson	Boston, Mass	Sept. 12
Steering wheel for ships, &c	Andrew Morse	....do	Dec. 1
Vessels used as life preservers	John McIntosh	New York	Nov. 11

IV.—*Classified list of patents, &c.*—Continued.

Class VIII.—*Mathematical, philosophical, and optical instruments, including clocks, chronometers, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Circumferenter	James McCann	New Market, Va	Dec. 20
Electro-magnetism	Thomas Davenport	Brandon, Vt	Feb. 25

Class IX.—*Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Bridges	Francis Good	New London, Pa	Nov. 4
Dock, floating, dry	James Barron	Philadelphia, Pa	July 17
Dock, floating, dry	John Thomas	New York city	Dec. 20
Inclined planes, ascending and descending of cars and canal boats.	Gideon Brown	New York city	Oct. 6
Inclined planes, ascending and descending upon railroads, &c.	Elisha F. Aldrich	New York city	Oct. 12
Railroad	Isaac Cooper	Johnstown, Pa	July 22
Railroad frog	George S. Griggs	Roxbury, Mass	July 31
Railroad, rails for	John Ruggles	Thomastown, Me	May 22
Railroad rails, constructing and fastening.	Peter Henry Dreyer	New York	Oct. 18
Railroad road, stops for	Thomas J. West	White Hall, Va	Mar. 11
Railroad, single	Uri Emmons	Freehold, N. J	Apr. 17
Railroad, turnabout for	Jeremiah Myers	Attleborough, Mass	May 8

Class X.—*Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Axle, and thorough boxes for carriages.	William Slicer	Baltimore, Md	July 5
Axletrees, &c, setting	Timothy Fessenden	Boston, Mass	Sept. 25
Car and circular railroad	James Rowe	Triana, Ala	Oct. 28
Car, railroad, &c., mode of connecting.	Robert Grant	Philadelphia, Pa	July 22
Car, railroad safety	William Kinkead	Elkton, Md	Dec. 29
Car, railroad, supporting the bodies	Richard Imlay	Philadelphia, Pa	Sept. 21
Carriages, construction of	Saml. C Brown and Levi J. Hicks.	Macedon, N. Y	July 17
Link, self-separating, for connecting railroad cars, &c.	Conrad H. Hunt and Wm. Brown.	Fredericksburg, Va	Dec. 26

IV.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Mail carriages, waterproof	Bazil B. Pleasants	Brookville, Md	Dec. 7
Sleds, hold-back for	James Andrews	Camden, Me	Feb. 16
Springs, carriage, railroad cars, &c.	Porter Hill	Veteran, N. Y	Nov. 25
Springs, spiral, to ellipucal or bow for carriages.	William Creasdale	Hartsville, Pa	Feb. 3
Tire bending	Thomas C. Barton	New York city	July 31
Tire, for wheels, drilling	Thomas C. Barton	New York city	July 31
Wheels, driving of locomotive engines, increasing the adhesion.	Andrew M. Eastwick	Philadelphia, Pa	Nov. 20
Wheel hubs	Howard Delano	Skaneateles, N. Y	Oct. 28
Wheel hubs, boring	James Hinds	Troy, N. Y	Nov. 25
Wheel hubs, boring and mortising	James Tompkins	Conesville, N. Y	Oct. 6
Wheel hubs, carriage or wagon	Abraham Randel	Vernon, N. Y	Sept. 8
Wheels of locomotives, ascending inclined planes.	Elisha Town	Montpelier, Vt	July 31

Class XI.—*Hydraulics and pneumatics, including water-wheels, windmills, and other implements operated on by air or water, or employed in raising and delivery of fluids.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Cistern, rain water	George O. Blennis	Salina, N. Y	Aug. 18
Compressed air for drawing liquids.	Jasper Johnson	Genesee, N. Y	May 30
Fluids, measuring	James Bogardus	New York	Oct. 12
Pump, forcing, double	D. L. Farnam	New York	Oct. 23
Pump, preventing water from freezing.	Samuel Adams	Townsend, Mass	Mar. 11
Pump for ships	David Gay	Bath, Me	Sept. 8
Pump, suction and force	Abraham Kassler	Canajoharie, N. Y	Oct. 28
Pump, suction and force	Jonathan Stevens	Newark, N. J	Dec. 20
Pump, valves for	Henry Hickman	Newburg, Pa	July 17
Waterwheel	Nehemiah P. Stanton	Syracuse, N. Y	May 22
Water-wheel	Clayton Parker and R. W. Engle	Wayne township, O.	July 31
Water-wheel, current	Warren P. Wing	Greenwich, Mass	Sept. 22
Water-wheel, horizontal	Chapman Warner	Oxford, N. J	Sept 22
Water-wheel, horizontal	Samuel Curtis	Eagle, N. Y	Dec. 15
Water-wheel, letting on water	Samuel Curtis	Eagle, N. Y	Sept. 28
Water-wheel, reacting	Gideon Hotchkiss	Windsor, N. Y	Jan. 9
Water-wheel, reacting	Nelson Johnson	Erwin Centre, N. Y.	Nov. 23
Water-wheel, spiral bucket	Joseph C. Greene	Fayette, Me	May 30
Water-wheel, tub	David P. Napier	Liberty, Ky	May 22
Wind-wheel	Ebenezer B Sperry	Wenham, Mass	Aug. 31
Wind-wheel	Jacob D. Makely	Cairo, N. Y	Nov. 23

IV.—*Classified list of patents, &c.*—Continued.

CLASS XII.—*Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Balance	B. Morison	Milton, Pa	Feb. 16
Balance, platform	Benjamin Bull	New York city	May 3
Elevating hay	George Wilbur	Macedon, N Y	July 17
Packing flour and pressing	Oliver Jewett	Rochester, N. Y	Mar. 30
Press, cheese	Sullivan White	Bridgewater, Vt	Aug. 31
Press, cotton and hay	Gideon Fitz	Clinton, Miss	June 3
Press, hay	Jacob Grovenor	New York city	Aug. 31
Press, rotary, for woollen goods	Moses Bayley	Salisbury, Mass	July 5
Press, standing	Joel Barns	Philadelphia, Pa	Ap'l 17
Press, tobacco	James H. Washington	Baltimore, Md	Oct. 12
Press, tobacco, cast-iron cases	Granville D. Allen	Richmond, Va	June 30
Press, tobacco, for rolled	James T. Bowman	Pattonsburg, Va	July 5

CLASS XIII.—*Grinding mills and mill-gearing, containing grain mills, mechanical movements, and horse-powers, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Bark-mill	Charles Parker	Meriden, Ct	Nov. 25
Coffee-mill	Hiram Twiss	Meriden, Ct	Nov. 19
Grist-mill	Oliver Wyman	E. Cambridge, Mass.	Dec. 20
Grist-mill	Elijah S. Curtis	Boston, Mass	Nov. 23
Horse-power	Levi Rice	Attleborough, Pa	July 17
Horse-power	Levi Rice and David Congdon.	West Chester, Pa	July 17
Horse-power	Barnabas Langdon	Troy, N. Y	July 19
Horse-power	Henry Smith	Bethel, Ohio	Oct. 6
Horse-power	Benjamin Hinkley	Fayette, Me	Nov. 25
Horse-power, endless chain	Jacob G. Hall	Zanesville, Ohio	Sept. 21
Horse-power, endless chain	Aaron Palmer	Akron, N. Y	Sept. 22
Horse-power, endless chain	Henry G. Hall	Putnam, Ohio	Sept. 28
Horse-power, portable frame-work of.	John A. Nelson & Jas. P. Ross.	Lewisburg, Pa	June 30
Wheel-band, mode of hanging	Isaac Straub	Lewiston, Pa	July 11

CLASS XIV.—*Lumber, including machines and tools for preparing and manufacturing, such as sawing, planing, mortising, shingle and stave, carpenters' and coopers' implements.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Boring and mortising	John H. Power	Norwalk, Ohio	Jan. 31
Clapboards, sawing	Samuel Gross	Milford, N. H	June 3
Clasps in saw-mill gates	Hyz & Nelson Johnson	Erwin, N. Y	May 15
Dye-woods, cutting	Lucilius H. Mosely	Poughkeepsie, N. Y.	June 23
Dye-woods, cutting and reducing	Abner McMillen	Bedford, N. H	Dec. [illegible]

IV.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Lathe, turning mouldings and beads	Eli Coddington	Thompson, N. Y	July 31
Mortising posts and sharpening rails	Wandle Mace	New York	Mar. 11
Mortising timber	Thos. H. Hoskings	Springfield, Ohio	June 30
Pegs, cutting and pointing	Joseph Essex	Killingly, Ct	July 17
Planing machine	Alonzo G. Hull	Brooklyn, N. Y	Sept. 20
Planing boards, &c.	Samuel Whitney	Dunstable, N. H	June 3
Planing, mouldings in wood, &c.	Ambrose Church, jr	Canandaigua, N. Y	July 29
Sawing trees	Samuel H. Hamilton	New York	Dec. 7
Saw mills	John Ambler	Philadelphia, Pa	Dec. 1
Shingles, &c., cutting from steam timber.	Joseph S. Raymond	Lodi, N. Y	Aug. 15
Shingles, dressing and smoothing	George L. Day	Union, N. Y	July 29
Shingles, gauges of machines for sawing.	Elkanah Leonard	Canton, Me	Nov. 4
Shingles, riving, planing, and jointing, antedated June 15, 1837.	Enoch R. Morrison	Pittsburg, Pa	Aug. 8
Shingle sawing	Apollos Wilbur	Burrelville, R. I	Mar. 25
Shingle sawing	Samuel Goss	Milford, N. H	June 3
Shingle sawing	Zebulon Sargent	Contoocookville, N. Hampshire.	Dec. 1
Shingles, shaving	Aaron H. Aiken	Sparta, Pa	Nov. 4
Shingles and staves, &c., cutting	George Pack	Peterborough, N. Y	Nov. 11
Spokeshave	Ira L. Beckwith	Quincy, Mass	April 29
Staves, cutting, for barrels	Thomas Peck	Lenox, N. Y	Nov. 20
Staves, sawing	Harvey Holmes	New Marlborough, Mass.	Dec. 20
Staves, sawing, for barrels	Jesse J. Smith	Brutus, N. Y	Mar. 3
Veneers, cutting	Joseph Skinner	Stockbridge, Mass	Sept. 21
Weather strips to bottom of doors	Isaac D. Brower	New York city	July 29

CLASS XV.—*Stone and clay manufacture, including machines for pottery, glass making, dressing and preparing stone, cements, and other building materials.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Brick machine	Gaylord V. Harper	Franklinville, N. Y	Oct. 23
Brick making and drying	James Hodges	Fairplay, S. C	June 3
Brick mould	Benjamin H. Brown	Alexandria, D. C	Oct. 23
Brick moulding and pressing	Nathaniel Adams	Cornwall, N. Y	Sept. 8
Brick moulding and pressing	Henry Waterman	Bath, Me	Nov. 4
Brick press	Andrew F. Mervine	St. Louis, Mo	Sept. 12
Granite cutting and dressing	Wm. C. Poland and Earle Blossom.	Portland, Me	Nov. 11
Granite cutting and polishing	John D. Buzzel	Cape Elizabeth, Me	May 15
Lime, process of burning	Samuel Garber & Henry Swartzengrouer.	Norristown, Pa	Mar. 25
Stone cutting and dressing	Mighill Nutting	Portland, Me	May 15
Stone, dressing	Nathan Jacobs	Newark, O	Mar. 11
Stone, facing and dressing	David Hull and Jo. Critcherson.	Portland, Me	May 8

IV.—*Classified list of patents, &c.*—Continued.

CLASS XVI.—*Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Boots, crimping leather for	Jesse Van Winkle	Rochester, N. Y.	April 17
Boots, crimping leather for	Moses S. Woodward	Marshallton, Pa.	July 31
Boot trees	David Hastings	Deerfield, Mass.	Dec. 15
Coloring and finishing leather	Harmon Hibbard	Attica, N. Y.	Dec. 15
Cutting leather	Levi N. Leland	Grafton, Mass.	Sept. 28
Harness fastenings	Warner Hayden	New Milford, Pa.	Jan. 21
Harness for horses in shafts	Robert Beale	Washington, D. C.	June 15
Hides, breaking and softening	Eli Kendal	Newton, Mass.	June 10
Hides, scraping	Reuben Shailer	Haddam, Ct.	June 19
Saddles, bow and worm, spring for	Jonathan Keedy	Russelville, Ky	Aug. 18
Saddles for removing the sick	Hezekiah L. Thistle	New Orleans, La.	Jan. 21
Saddles, spring	John G. Manlove	Bainbridge, O.	Mar. 25
Saddles, spring	Henry Sheets	Staunton, Va.	Mar. 30
Saddles, spring	Moses Baldwin	Cincinnati, O.	April 29
Saddles, spring	Harman C. Fisher	Warwick, R. I.	Nov. 25
Saddles, spring	John D. Payne	Warm Springs, Va.	Nov. 25
Saddles, spring seat, riding	Robert Wilson	Milton, Pa.	Mar. 11
Saddle trees	William Kelly	New Columbus, Pa.	May 30
Saddle-bag fastening	Alvin North	North Britain, Conn.	Dec. 29
Shoemakers, clamp for	Richard Emans	Mansfield, N. J.	Oct. 6
Skins, extracting hair from	Edward Flint	New York city	June 30
Skiving, removing wool	Benjamin F. Emery	Bath, Me.	July 30
Trunks, valises, &c	Matthias Steiner	New York city	Dec. 20

CLASS XVII.—*Household furniture, machines, and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Cutting meat	John Morris	Derby, Ct.	Nov. 20
Feathers, dressing and cleaning	Samuel Swett, jr.	Readfield, Me.	July 31
Mopheads	Jacob Howe	Worcester, Mass.	June 15
Refrigerator	J. D. Burns	Baltimore, Md.	Nov. 11
Washing machine	William Hovey	Worcester, Mass.	Feb. 4

IV.—*Classified list of patents, &c.*—Continued.

CLASS XVIII.—*Arts, polite, fine, and ornamental, including music, painting, sculpture, engraving, books, paper, printing, binding, jewelry, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Binder for newspapers	Ezra Ripley	Troy, N. Y.	Dec. 26
Blocks for printing colors on silks	John Crabtree	New York	Dec. 7
Book-binding	William Hancock	Great Britain	Oct. 28
Coloring maps, process, &c	Lucius Stebbins	Hartford, Ct.	July 11
Inking rollers, temperature of, &c	Eliphaz Weston Arnold.	Boston, Mass	Sept. 21
Piano forte, action of	Thomas Loud	Philadelphia, Pa	Dec. 7
Printing both sides of a continuous sheet.	Thomas French	Ithaca, N. Y.	Nov. 20

CLASS XIX.—*Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent
			1837.
Cannon, cast-iron	Cyrus Alger	Boston, Mass.	May 30
Cannon, pointing	John Hobday	Portsmouth, Va.	May 3
Carriage, gun, on ship-board	John Bubier	Marblehead, Mass.	Oct. 20
Fire-arms	Elijah Fisher and D. H. Chamberlain.	Boston, Mass.	April 17
Fire-arms	Henry Harrington	Southbridge, Mass.	July 29
Fire-arms, loading, mode of	Thomas McCarty	Elmira, N. Y.	Mar. 11
Fire-arms, many-chambered	John W. Cochran	New York	April 29
Fire-arms, many-chambered	Daniel Leavitt	Cabotsville, Mass.	April 29
Fire-arms, many-chambered	Curtis Parkhurst	Lawrenceville, Pa.	Sept. 25
Fire-arms, many-chambered, cylinder, (antedated April 28, 1837.)	John W. Cochran	New York	May 8
Fire-arms, many-chambered, cylinder.	Otis W. Whittier	Enfield, N. H.	May 30
Fire-arms and ordnance	Henry C. Fay	Lancaster, Mass.	May 22
Fire-arms, self-loading, and priming	Silas Day	City of New York	Aug. 31
Knives, or dirks, attaching to pistols	Robert W. Andrews	Stafford, Ct.	July 31
Locks for fire-arms	Ethan S. Chapin	Stafford Spring, Ct.	July 17
Locks for fire-arms	Ethan Allen	Grafton, Mass.	Nov. 11
Pistols, knife, or cutlass	George Elgin	New York	July 5
Pistols, sabre	Robert W. Lawton	Newport, R. I.	Nov. 30

IV.—*Classified list of patents, &c.*—Continued.

CLASS XX.—*Surgical and medical instruments, including trusses, dental instruments, bathing apparatus, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Bandages, pads	Robert Thompson	Columbus, Ohio	Jan. 29
Teeth, artificial	Charles M. Graham	Philadelphia, Pa	Mar. 9
Truss for hernia	Elijah Jaquith	Brattleborough, Vt	Mar 11
Truss for hernia	Heber Chase, M. D.	Philadelphia, Pa	June 10
Truss for hernia	Richard Salisbury	Providence, R. I.	Nov. 4
Truss for hernia	Josiah Hungerford	Dover, N. H	Dec. 26

CLASS XXI.—*Wearing apparel, articles for the toilet, &c., including instruments for manufacturing.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Bodkin for inserting corset rings into cloth.	Jonathan S. Turner	Middletown, Ct	April 25
Garments, cutting	Andrew Wiswell	Exeter, N. H	July 11
Garments, draughting coats, geometrical measure for.	William C. Bishop	Ovid, N. Y	April 25
Garments, draughting forepart of coats.	Allen Ward	Moyamensing, Pa	Sept. 28
Garments, pantaloons measurer	Edward Grimston	Danvers, Mass	Sept. 21
Garments, standard measure for coats.	Erastus Barber	Boston, Mass	Dec. 36
Tailoring, system of	Amos Sherman	Newark, N. J	July 17

CLASS XXII.—*Miscellaneous.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
			1837.
Ice, preparing, for shipping	Nathaniel J. Wyeth	Cambridge, Mass	Dec. 1
Splints for friction matches	Stephen Dole	Concord, N. H	May 30
Tobacco spinning	Hiram M. Smith	Richmond, Va	Dec. 20

List of designs that have expired during the years 1849 *and* 1850, *heretofore inadvertently omitted, together with a list of those that expire in* 1851.

Designs.	Patentees.	Residence.	Date of patent.	Expired.
Types, for	George Bruce	New York	Nov. 9, 1842	1849
Bathing tub	Jordan L. Mott	New York	Aug. 17, 1843	1850
Corpse preserver	John Good	Philadelphia, Penn	Aug. 17, 1843	1850
Carpets, painted	James Albro, jr	Elizabethtown, N. J	Oct. 6, 1843	1650
Coffee pots	John R. Remington	Lowndes county, Ala	Oct. 6, 1843	1850
Carpets	John P. Ferguson	Thompsonville, Conn	Oct. 20, 1843	1850
Cloths, floor, printing	James Albro, jr	Elizabethtown, N. J	Dec. 20, 1843	1850
Cloths, floor, printing	James Albro, jr	Elizabethtown, N. J	Dec. 20, 1843	1850
Girandoles, (assigned to H. N. Hooper & Co., Boston, Mass)	Wm. Blake	Boston, Mass	Mar. 17, 1843	1850
Lamps	Wm. W. Bacon	Middletown, Conn	Oct. 18, 1843	1850
Metals, impression on, (assigned to L. C. Ives, Bristol, Conn.)	Waterman L. Ormsby	New York	Feb. 24, 1843	1850
Springs, door	Isaac B. Hartwell	Woodstock, Vt	April 10, 1843	1850
Stove columns, (assigned to Johnson, Geer & Cox)	Ezra Ripley	Troy, N. Y	July 15, 1843	1850
Statues	Alonzo L. Blanchard	Albany, N. Y	Aug. 26, 1843	1850
Stoves, cooking	Alanson Skinner	Brownsville, N. Y	Sept. 14, 1843	1850
Stoves	Jordan L. Mott	New York	Dec. 1, 1843	1850
Bust of Theodore Frelinghuysen, (assigned to J. G. Wellstood)	Salathael Ellis	New York	Aug. 12, 1844	1851
Bust of Robert Burns	John C. King	Boston, Mass	Jan. 31, 1844	1851
Carpets, canvass	Jacob D. Edwards	Elizabethtown, N. J	Mar. 20, 1844	1851
Carpets	Henry G. Thompson	New York	April 4, 1844	1851
Grates	Adam Hampton	New York	May 17, 1844	1851
Pencil cases	George W. Simons	Philadelphia, Penn	Nov. 18, 1844	1851
Stoves	Amaziah Whitney	Albany, N. Y	July 19, 1844	1851
Stove-plate, (assigned to Johnson, Geer & Cox, Troy, New York)	Ezra Ripley	Troy, N. Y	Nov. 26, 1844	1851
Spoons, forks, &c	Michael Gibney	New York	Dec. 4, 1844	1851
Whistle, child's	Henry Dubosq	Philadelphia, Penn	May 6, 1844	1851

Alphabetical list of persons whose patents have expired during the year 1851, with their inventions or discoveries, and class.

Patentees.	Inventions or discoveries.	Class.
Abbott, Andrew	Cooking stove	V.
Adams, Isaac	Hulling coffee berry	I.
Adams, Samuel	Pumps	XI.
Adams, Nathaniel	Brick, moulding and pressing	XV.
Akin, Aaron	Shingle shaving	XIV.
Aldrich, Elisha F.	Inclined planes	IX.
Allen, Granville D.	Tobacco press	XII.
Alger, Cyrus	Cannon, cast	XIX.
Allen, Ethan	Locks for fire-arms	XIX.
Ames, John	Paper sizing	III.
Ambler, John	Saw mill	XIV.
Andrews, Ethan A.	Stove radiators	V.
Andrews, James	Sleds, hold back for	X.
Andrews, Robert W.	Knives or dirks, attaching, to pistols	XIX.
Arnold, Eliphaz W.	Inking rollers, temperature of, &c.	XVIII.
Austin, William E.	Door plates	II.
Auld, Washington, and James Cox	Cooking stove, heating buildings, &c.	V.
Barton, William M.	Hulling clover seed	I.
Barker, John	Blow-pipe for blast furnaces	II.
Barker, John	Blast furnace	II
Barron, James	Cooking stove and galley	V.
Barker, David W.	Ovens for stoves	V.
Barrows, Ebenezer	Stoves, quadrant hinge for	V.
Barron, James	Dock, floating, dry	XIX.
Barton, Thomas C.	Tire bending	X.
Barton, Thomas C.	Tire for wheels, drilling	X.
Bayley, Moses	Press, rotary, for woolen goods	XI.
Barnes, Joel	Press, standing	XII.
Baldwin, Moses	Saddles, spring	XVI.
Barber, Erastus	Garments, standard measure for coats	XXI.
Berry & Rand	Nails and brads, cutting	II.
Beckwith, Ira L.	Spokeshave	XIV.
Bishop & Brooks	Nails, wrought	II.
Beale, Robert	Hames for harness in shaft	XVI.
Bishop, William C.	Garments, draughting coats, &c.	XXI.
Blackall, Joseph	Screws, cutting	II.
Blanchard, Thomas	Hats, bodies, batting, or web for	III.
Blaney, Benjamin	Stoves, non-radiating, &c.	V.
Blenis, George O.	Cistern, rain-water	XI.
Bowling, Alexander W.	Threshing machine	X.
Bogardus, James	Fluids, measuring	XI.
Bowman, James T.	Press, tobacco, for rolled	XII.
Brooks, Jonathan	Threshing and hulling clover seed	I.
Broadmeadow, Simeon	Furnace for shear-steel, &c.	II.
Broadmeadow	Furnace for smelting ore	II.
Brittain, William and Robert	Flax and hemp dressing	III.
Branch, Hardin	Cooking, generating steam for	V.
Bradford, Merrit	Stove pipes and drum	V.
Brown, Gideon	Inclined planes	IX.
Brown & Hicks	Carriages, disengaging horses from	X.
Brower, Isaac D.	Weather strips, &c.	XIV.
Brown, Benjamin H.	Brick mould	XV.
Bunnel, Isaiah	Strainers for milk pails	I.
Butler, Lester	Winnowing, separating, &c.	I.
Burt, Enoch	Loom	III.
Bull, Benjamin	Balance platform	XII.
Buzzell, John D.	Granite cutting and polishing	XV.
Burns, R. D.	Refrigerator	XVII.
Bubier, John	Carriage, gun, on ship-board	XIX.
Childs, Charles D.	Smut machine	I.
Church, Ambrose, jr.	Planing, mouldings on wood	XIV.

Alphabetical list of persons, &c.—Continued.

Patentees.	Inventions or discoveries.	Class.
Chapin, Ethan S.	Locks for fire-arms	XXI
Chase, Heber	Truss for hernia	XX.
Clements, Garret	Leaching ashes	IV.
Coats, Stephen	Rake, revolving	I.
Coyle, Thomas	Cement for cisterns	IV.
Cox, William	Paint, composition	IV.
Conger, Ellison	Grates and fireplace	V.
Collum, John	Stoves	V.
Compton, Stephen, jr.	Locomotive power, &c.	VI.
Cooper, Isaac	Railroad	XIX.
Coddington, Eli	Lathe, turning, mouldings and	XIV.
Cochran, John W.	Fire-arm, many-chambered	XIX.
Cochran, John W.	Fire-arms, many-chambered, &c.	XIX.
Crompton, William	Loom, power, figure	III.
Creswell, James	Oleagenous seed, &c.	IV.
Creed, William	Steam, generating	VI.
Creasdale, William	Spring, spiral, &c.	X.
Crabtree, John	Blocks for printing colors, &c.	XVIII.
Curtis, Samuel	Water-wheel, horizontal	XI.
Curtis, Samuel	Water-wheel, letting on water	XI.
Curtis, Elisha S.	Grist mill	XII.
Davenport, Moses	Threshing and winnowing	I.
Davenport, Thomas	Electro-magnetism	VIII.
Day, Silas	Fire-arms, self-loading, &c.	XIX.
Deats, John	Plough	I.
Dewey, David	Rake, horse	I.
Dean, Linus	Vice, bench and other	II.
Dear, David	Bitterings from kettles, &c.	IV.
Desmond, Daniel	Grates, sliding flute	V.
Delano, Howard	Wheel hubs	X.
Dixon, Edward H.	Grates and stoves	V.
Douglass, William A.	Propelling paddle-wheels, &c.	VII.
Dole, Stephen	Splints for friction matches	XXII.
Dunn, John	Steaming and mashing apples	V.
Duff, William	Spark-catcher, &c.	VI.
Dreyer, Peter Henry	Railroad rails, &c.	IX.
Eastwick, A. M.	Wheels driving locomotive engines, increasing adhesion	X.
Eitelgeorge, Augustus	Explosion of boilers, preventing	VI.
Elgin, George	Pistols, &c.	XIX.
Emmons, Uri	Railroad, single	IX.
Emans, Richard	Shoemakers, clamp for	XVI.
Emery, B. F.	Skiving, removing wool	XVI.
Essex, Joseph	Pegs, cutting and pointing	XIV.
Farnham, D. L.	Pump, forcing, double	XI.
Fay, Henry C.	Fire-arms and ordnance	XIX.
Fessenden, William G.	Bark, extract of	IV.
Fessenden, Timothy	Axletrees, &c., setting	X.
Fitzgerald, Daniel	Fire-proof safe	II.
Frickhardt, F. A.	Air to wood and coal stoves	V.
Finley, John	Propelling boats, screw for	VII.
Fitz, Gideon	Press, cotton	XII
Fisher, H. C.	Saddle, spring	XVI.
Fisher & Chamberlain	Fire-arms	XIX.
Flockton, Webster	Metallic solution for preserving timber	IV.
Flint, Edward	Skins, extracting hair from	XVI
Fredly, Frederick	Iron, &c., washing ores	II.
French, Thomas	Printing both sides of a continuous sheet	XVIII.
Gay, Charles S.	Latch mortice	II
Gay, David	Pumps for ships	XI.
Garber & Swartzengrover	Lime, process of burning	XV.
Gillespie, Barnabas	Ice breaker	VII.

Alphabetical list of persons, &c.—Continued.

Patentees.	Inventions or discoveries.	Class.
Gleason, Horace	Furnaces, cooking	V.
Golding, John	Thread, preventing from waste	III.
Goodyear, Charles	Caoutchouc, divesting of its adhesive properties	IV.
Gotthilf, August	Preserving timber from worms	IV.
Good, Francis	Bridges	IX.
Goss, Samuel	Clapboards, sawing	XIV.
Goss, Samuel	Shingles, sawing	XIV.
Griswold, Ogden	Thread, waste, reducing to cotton wool	III.
Gray, William	Thread, waste, reducing to cotton wool	III.
Grannis & Brand	Steam-engine, rotary	VI.
Greenaugh, J. J	Propelling-paddles, for boats	VII.
Griggs, George S	Railroad frog	IX.
Grant, Robert	Car, railroad, &c., mode of connecting	X.
Greene, Joseph C	Water-wheel, spiral bucket	XI.
Grosvenor, Jacob	Press, hay	XII.
Graham, C. M	Teeth, artificial	XX.
Grimston, Edwin	Garments, pantaloons measurer	XXI.
Harvey & Tracey	Hulling rice	I.
Hartpence & Bawne	Plough	I.
Harvey, Thomas W	Screw, wood, turning heads	II.
Hazard, Phillipe F	Window-fastening, combined spring	II.
Hammond, Henry	Window-sash, spring for upper sash	II.
Harvey, Thomas W	Wire, cutting and heading	II.
Harvey, Charles R	Hair-seating, weaving	III.
Hartford & Tilton	Loom treadles and harness	III.
Hatfield, John	Matches, locofoco, dipping	IV.
Hastings & Sikes	Cooking stove	V.
Hathaway, John G	Cooking stove	V.
Hathaway, John G	Cooking stove, heat to	V.
Hall, Jacob G	Horse-power, endless chain	XIII.
Hall, Henry G	Horse-power, endless chain	XIII.
Hamilton, Samuel H	Sawing trees	XIV.
Harper, Gaylord V	Brick machine	XV.
Hastings, David	Boots, trees	XVI.
Hayden, Warner	Harness and fastenings	XVI.
Hancock, William	Book-binding	XVIII.
Harrington, Henry	Fire-arms	XIX.
Hedge, Egbert	Hinges, or butt, double-centred joints	II.
Hedge, Lemuel	Joints for rules, double-centred	II.
Heckman, Henry	Pumps, valves for	XI.
Hill, Porter	Spring-carriage, railroad car, &c	X.
Hinds, James	Wheel-hubs, boring	X.
Hinkley, Benjamin	Horse-power	XIII.
Hibbard, Harmon	Coloring and finishing leather	XVI.
Hotchkiss, Gideon	Yoke, horse and oxen	I.
Holtman, David	Knobs, door, drawer, commode, &c	II.
Hobbs, William	Locks, secret, safety	II.
Hopkins, George F	Stoves, construction of	V.
Howell, Samuel E	Constructing ships	VII.
Hotchkiss, Gideon	Water-wheel, reacting	XI.
Hoskings, Thomas K	Mortising timber	XIV.
Harvey, Holmes	Stave-sawing	XIV.
Hodges, James	Brick-making and drying	XV.
Howe, Jacob	Mop heads	XVII.
Hovey, William	Washing-machine	XVIII.
Hobday, John	Cannon-pointing	XIX.
Hutchinson, Jesse	Cooking stove	V.
Hughes, Enos B. M	Grates, revolving and shifting	V.
Hunt & Brown	Link, self-separating, for connecting cars, &c.	X.
Hull, Alonzo G	Planing-machine	XIV.
Hungerford, J	Truss for hernia	XX.

Alphabetical list of persons, &c.—Continued.

Patentees.	Inventions or discoveries.	Class.
Hull & Critcherson	Stone-facing and dressing	XV.
Idler, Jacob	Gin, cotton, saw-cylinder	III.
Imlay, Richard	Car, railroad, supporting bodies	X.
Jaquith, Elijah	Window blinds fastener	II.
Jacobs, Nathan	Stone, dressing	XV.
Jaquith, Elijah	Truss for hernia	XX.
Jewett, Oliver	Packing flour and pressing	XII.
Jones, Henry C	Locks, mail-bag, and clasp	II.
Johnson, Samuel	Fur, cutting, from skins	III.
Jones, Alexander	Gin, cotton	III.
Johnson, Jasper	Compressed air for drawing liquids	I.
Johnson, Nelson	Water-wheel, reacting	XI.
Johnson, H. and N	Clasps in saw-mill gates	XIV.
Kassler, Abraham	Pump, suction, and force	XI.
Kempton, Obed	Parcelling rope	VII.
Kendall, Eli	Hides, breaking and softening	XVI.
Keedy, Jonathan	Saddles, bow and worm, spring for	XVI.
Kelly, William	Saddle-trees	XVI.
Kinney, William	Cooking stove, coal	V.
Kimball, William B	Cooking stove, heating	V.
Kirkpatrick, John	Valve, engines	VI.
Kirkpatrick, John	Valve, puppet	VI.
Kinkead, William	Car, railroad	X.
Knowles & Gibbut	Preserving timber, &c	IV.
Larimore, Wilson L	Cutting cradle for grain	I.
Langdon, Barnabas	Horse-power	XIII.
Lawton, Robert W	Pistols, sabre	XIX.
Leveridge, Walter	Gum Senegal, substitute for	IV.
Leavitt, John S	Cooking stove	V.
Leland, Levi N	Cutting leather	XVI.
Leavitt, Daniel	Fire-arms, many-chambered	XIX.
Longley & Davis	Flax and hemp, breaking and cleaning	III.
Lobdell E and T. J	Grappling irons	VII.
Loud, Thomas	Piano forte, action of	XVIII.
Lull, Harvey	Flax and hemp, breaking	III.
Lyon, Joseph	Iron ore, smelting	II.
Mason, Samuel P	Loom, temple, &c	III
Martin, Jeremiah	Lamps, &c	V.
Mackintosh, John	Vessels used as life-preservers	VII.
Mace, Wandle	Mortising posts, &c	XIV.
Manlove, John G	Saddles, spring	XVI.
McCormick, Stephen	Plough	I.
McClery, James	Lock, door	II.
McMullen & Hollen	Knitting machine	III.
McCann	Circumferator	VIII.
McMillen, Abner	Dye-woods, cutting, &c	XIV.
McCarty, Thomas	Fire-arms, loading, &c	XIX.
Mervine, Andrew F	Brick-press	XV.
Minell, Abraham T	Cooking stove	V.
Mills, Thomas	Stoves	V.
Miller, Asa	Steam engine	VI.
Mosely, Lucilius H	Gin, cotton	III.
Moore, Hugh	Hat bodies	III.
Moore & Bower	Candles, moulding	IV.
Morison, B	Plaster, adhesive, spreading	IV.
Morris, John	Cooking, steam vessel for	V.
Mott, Jordan L	Cooking stove	V.
Morris, John	Cooking stove, &c	V.
Mott, Jordan L	Stoves	V.
Mott, Jordan L	Stoves	V.
Morrison, Abraham	Boats, canal, &c	VII.
Morse, Andrew	Steering wheel	VII.

Alphabetical list of persons, &c.—Continued.

Patentees.	Inventions or discoveries.	Class.
Morison, B.	Balance	XII.
Mosely, Lucilius H.	Dye-woods, cutting	XIV.
Morrison, Enoch R.	Shingles, sawing	XIV.
Morris, John	Cutting meat	XVII.
Myers, Jeremiah	Railroad, turnabout for	IX.
Nagle, Patrick G	Composition for boots	IV.
Napier, David P.	Water-wheel tub	XI.
Nelson & Ross	Horse-power	XIII.
Nicolson, Samuel	Steering apparatus	VII.
Norton, Job B.	Plough	I.
North, Alvin	Saddle-bag fastenings	XVI.
Nutting, Mighill	Stone cutting, &c	XV.
Oellig, John J	Medicine, worm destroying	IV.
Oellig, John J	Pills, &c	IV.
Ogden & Ericson	Sounding instrument, &c	VII.
Olney, James N	Cooking stove	V.
Ong, Jesse	Propelling paddle-wheels	VII.
Paimbœuf, Lewis	Paint, protection of buildings	IV.
Parrott, Wm. W	Cooking apparatus	V.
Payne, Rufus S	Cooking stove, heating	V.
Parker & Engle	Water-wheel	XI.
Parker, Charles	Bark mill	XIII.
Palmer, Aaron	Horse-power, endless chain	XIII.
Pack, George	Shingles and staves, &c., cutting	XIV.
Payne, John D.	Saddles, spring	XVI.
Parkhurst, Curtis	Fire-arms, many chambered	XIX.
Penny, John	Sugar manufacturing	IV.
Pearson, Thomas	Fuel, burning, &c	V.
Petival, John B	Mallet, screwing, &c	VII.
Peck, Thomas	Staves, cutting, &c	XIV.
Phillips, Perigrine	Lead, white	IV.
Pierce, Dexter	Cutting, scythe snath	I.
Pitts, J. A. & H. A.	Threshing and winnowing	I.
Pleasants, Bazil B	Mail carriages, &c	X.
Potter, Welcome A	Loom, regulating, &c	III.
Pollock, Allen	Grates, &c., register, &c., for	V.
Power, John H	Boring and mortising	XIV.
Poland & Blossom	Granite cutting, &c	XV.
Price, Aaron O	Stoves, anthracite coal	V.
Randel, Abraham	Wheel hubs, carriage or wagon	X.
Reed, Clement O	Screw, wood	II.
Reed, Edwin	Cooking stove	V.
Rice, Levi	Lime, spreading, &c	I.
Richardson, J. S	Door, springs for shutting	II.
Rice, Phineas G. & Gabriel	Hemp, hatcheling	III.
Ripley, Charles	Lead, carbonate of	IV.
Richardson, James	Cooking stove	V.
Rice, Levi	Horse-power	XIII.
Rice & Cogden	Horse-power	XIII.
Ripley, Ezra	Binder of newspapers	XVIII.
Robinson, E. & G. W	Knobs, glass, metallic, &c	II.
Ropes, David N	Latch, mortise	II.
Robinson, Edward M	Composition, protecting metallic, &c	IV.
Roath, H. R	Stoves, construction of	V.
Rowe, James	Car and circular railroad	X.
Rust, Samuel	Lamps	V.
Rust, Samuel	Lamps	V.
Rust, Samuel	Lamps, patent	V.
Rush, James J	Boilers, steam	VI.
Ruggles, John	Railroad, rails for	IX.
Sampson, Daniel	Oil cloth, drying	III.
Sargent, Zebulon	Shingles, sawing	XIV.
Salisbury, Richard	Truss for hernia	XX.

Alphabetical list of persons, &c.—Continued.

Patentees.	Inventions or discoveries.	Class.
Sellers, Geo. E.	Furnace, smelting ore	II.
Severence, Levi	Rivet making	II.
Sherwood, Benjamin	Fire-proof safe	II.
Shanher, Christian W	Loom	III.
Sheppard, Forrest	Paint, white, water color	IV.
Sherman, R. M	Fire-place and grate, open	V.
Short, Sewall	Ovens, railway	V.
Sherman, Roger M	Steam engine, rotary	VI.
Shailer, Reuben	Hides, scraping	XVI.
Sheets, Henry	Saddle, spring	XVI.
Sherman, Amos	Tailoring, system of	XXI.
Silliman, Henry	Straw, cutting	I.
Silsbee, John	Furnace, heated air to	V.
Skinner, Elijah	Cooking stove	V.
Skinner, Joseph	Veneers, cutting	XIV.
Sloat & Springsteen	Screws, cutting wood	II.
Smith, Francis H	Lime, spreading	I.
Smith, John C	Plough	I.
Smith, Benjamin M	Smut machine	I.
Smith, Stephen C	India rubber, manufacture of	IV.
Smith, Henry	Horse-power	XIII.
Smith, Jesse J	Staves, sawing, for barrels	XIV.
Smith, Hiram M	Tobacco, spinning	XXII.
Snider, Isaac	Plough	I.
Sorel, M	Preserving iron from rust	IV.
Spratley, Benjamin	Cooking stove and galley	V.
Sperry, Ebenezer B	Wind-wheel	XI.
Staub, Henry	Smut machine and garlic	I.
Stephens, John	Gin, cotton	III.
Stephens, Henry	Coloring matter, &c	IV.
Stillwell, Daniel E	Soap, making	IV.
Stillman, Wm. B	Pump, air, for steam engines	VI.
Stimpson, James	Spark-catcher, centrifugal, &c	VI.
Stevens, Jonathan	Pump, suction and force	XI.
Stanton, Nehemiah P	Water wheel	XI.
Staub, Isaac	Wheel-band, mode of hanging	XIII.
Steiner, Matthias	Trunks, valises, &c	XVI.
Stebbins, Lucius	Coloring maps, process, &c	XVIII.
Swazy, Benjamin	Napping cloth	III.
Swainson, Jno	Pistols, metallic, for steam, &c	VI.
Swett, Samuel, jr	Feathers, dressing and cleaning	XVII.
Tabor, Bartholomew W	Stove, heating irons for tailors	V.
Thorp, Thomas	Door springs	II.
Thorpe, Comfort B	Loom shuttle tongue	III.
Thomas, John	Dock, floating, dry	IX.
Thistle, Hezekiah L	Saddles for removing the sick	XVI.
Thompson, Robert	Bandages, pads	XX.
Titcombe, Edgar M	Spinning woollen roving	III.
Tompkins, James	Wheel hubs, boring, &c	X.
Town, Elisha	Wheels of locomotives, &c	X.
Tracy, Erastus	Wool, cleaning burs from	III.
Tuck, Joseph H	Candles, moulding	IV.
Turner, Jonathan S	Bodkin, &c	XXI.
Twiss, Hiram	Coffee mill	XIII.
Ulter, Samuel	Cooking stove	V.
Van Dusen, Washington	Propelling paddles used as ice-breakers	VII.
Van Winkle, Jesse	Boots, crimping leather for	XVI.
Von Shoultz, N. S.	Salt water, purifying	IV.
Warren, John	Flax and hemp breaking	II.
Warner, C. A., T. Mixell, and Edwin J. Horn	Flax and hemp breaking	III.
Warner, Ebenezer C.	Cement, hydraulic, from basanite	IV.

Alphabetical list of persons, &c.—Continued.

Patentees.	Inventions or discoveries.	Class.
Walker, Nathaniel	Cooking stove	V.
Warner, Chapman	Water-wheel, horizontal	XI.
Washington, James H	Press, tobacco	XII.
Watterman & Learned	Brick moulding, &c	XV.
Waterman, Henry	Brick press	XV.
Ward, Allen	Garments, draughting fore part of coats	XXI.
Wells, H. A., J. James, and R. W. Peck	Hat bodies	III.
Wells & Peck	Hat bodies, batting or web for	III.
West, Thomas J	Railroad, road stops for	XIX.
Whitney, Asa	Iron, carbonating and smelting	II.
Whitehouse, Turner	Lock, door	II.
Whittemore, James M	Boilers, steam	VI.
White, Sullivan	Press, cheese	XII.
Whitney, Samuel	Planing boards, &c	XIV.
Whittier, Otis W	Fire-arms, many-chambered, &c	XIX.
Williams, Palmer	Screws of screw bedsteads	II.
Wilson, James	Cooking stove	V.
Wilson, Carrington, jr	Cooking stove	V.
Wilcox, Philip	Cooking stove, heating	V.
Wilcox, Philip	Stoves, heating apartments	V.
Winans, Ross	Heating water for steam engines	VI.
Williamson, John	Pistons, packing	VI.
Winans, Ross	Steam engine, locomotive	VI.
Winans, Ross	Steam engine, locomotive	VI.
Winans, Ross	Steam engine, blowing fire	VI.
Winans, Ross	Steam engine, framing	VI.
Wilson & Beckwith	Capstans for ships, &c	VII.
Wing, Warren P	Water-wheel, current	XI.
Wilbur, Geo	Elevating hay	XII.
Wilbur, Apollos	Shingles, sawing	XIV.
Wilson, Robert	Saddle, spring seat, riding	XVI.
Wiswell, Andrew	Garments, cutting	XXI.
Woodcock, Bancroft	Plough	I
Wolcott & Brown	Wool, cleaning	III.
Wood, Benjamin H	Cooking stove	V.
Woodward, Moses S	Boots, crimping leather for	XVI.
Wright, Samuel	Steam engine, locomotive	VI.
Wyman, Oliver	Grist mill	XIII.
Wyeth, Nathaniel J	Ice, preparing for shipping	XXII.
Young & Titus	Shoes, horse	II.

V.—CLASSIFIED LIST OF PATENTS GRANTED DURING THE YEAR 1851, WITH THE NAMES OF PATENTEES, PLACE OF RESIDENCE, AND DATE OF PATENTS.

Class I.—*Agriculture, including instruments and operations.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Bee hives, construction of	A. J. Surles	Florence, Ga	Mar. 18, 1851.
Bee hives, use of slides in	Nathaniel Potter	Buffalo, N. Y	Mar. 11, 1851.
Broom corn, machines for assorting	Lorenzo D. Grosvener	Shaker Village, Mass	Jan. 1, 1851.
Broom corn, machines for stripping seed from	L. D. Grosvener	South Groton, Mass	Sept. 23, 1851.
Churns	Daniel Fisher	College Corner, Ohio	Jan. 1, 1851.
Churns	Ithiel S. Richardson	Boston, Mass	June 10, 1851.
Churns	Davis Dutcher	Springfield, N. Y	June 10, 1851; antedated 15th Feb., 1851.
Churns	Samuel G. Dugdale	Richmond, Ind	July 15, 1851.
Churns	George B. Clark	Leonardsville, N. Y	Sept. 23, 1851.
Churns	Henry Skinner	Attica, Wyoming co., N. Y	Dec. 16, 1851.
Churn and butter worker	A. Willard	Boston, Mass	Sept. 23. 1851.
Cultivators	Isaac Constant	Buffalo, Hart Grove, Sangamon co., Ill.	Nov. 4, 1851.
Grain seives	Thomas B. Wheeler	Albany, N. Y	Dec. 16, 1851.
Grain separators and fans	Roswell T. Merrill	Bloomfield, Mich	April 8, 1851.
Grain threshing and separating	Cyrus Roberts and John Cox	Belleville, St. Clair co., Ill	Oct. 28, 1851.
Harvesters, mowing machines, and	J. H. Manny	Waddam's Grove, Stephenson co., Ill.	Sept. 23, 1851.
Harvesters, grass	Edward Neely	Savannah, Mo	Jan. 7, 1851.
Harvesters, grain	Sidney S. Hurlbut	Racine, Wis	Feb. 4, 1851.
Harvesters, grain	Nicholas F. Allen	Ludlowville, N. Y	June 10, 1851.
Harvesters, grain	William H. Start	Smyrna, Kent co., Del	June 24, 1851.
Harvesters, grain	A. Palmer and S. G. Williams	Brockport, N. Y	July 1, 1851.
Harvesters, grain and binders	William Watson	Chicago, Ill	May 13, 1851.
Harvesting, machines	William Jones	Bradford, Vt	July 8, 1851.
Harvesting, machines, rakes to	William H. Seymour	Brockport, N. Y	July 8, 1851.
Harvesting, machines, rakes to	Sylvanus Miller	Urbanna, Ohio	July 15, 1851.
Harrows, rotary	Jona. F. Ostrander, assignor to A. B. & C. E. Hutchinson	New York, N. Y	Aug. 26, 1851.
Hullers, rice	Peter McKinlay	Charleston, S. C	April 1, 1851.
Ox yokes	Andrew L. Simpson	Durham, N. H	Jan. 7, 1851.
Planters, seed	James P. Ross	Lewisburg, Penn	Jan. 1, 1851.
Planters, seed	Archibald Wieting	Middletown, Penn	April 1, 1851.
Planters, seed	Jacob Barnhill	Circleville, Ohio	May 27, 1851.

V.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Planters, seed	David Horner	Union, Knox co., Ohio	July 29, 1851.
Planters, seed	Myron Cory	Jerseyville, Jersey co., Ill	Oct. 28, 1851.
Planters, seed	N. Foster, G. Jessup, H. L. Brown, and C. P. Brown	Palmyra, Wayne co., N. Y	Nov. 4, 1851.
Planters, seed	Wm. Redick	Uniontown, Penn	Nov. 18, 1851.
Planter, seed, devices for sewing in a	Wm. P. Clements	Ellersly, Harris co., Ga	Oct. 7, 1851.
Planters, seed, gearing of	Marshal J. Hunt	Rising Sun, Md	June 3, 1851.
Planter, seed, seeding apparatus of a	Samuel and Morton Pennock	Kennet Square, Penn	Feb. 11, 1851.
Planters, seed, seed distributors of	David and Herman Wolf	Lebanon, Pa	June 3, 1851.
Planter, seed, the seeding apparatus of a	Cornelius C. Van Every	Victor, Ontario co., N. Y	Oct. 21, 1851.
Ploughs	John Cooper, admr. of Benj. Yiger	Springfield, Ill	June 24, 1851.
Ploughs	Henry Goldson	Greensboro', Miss	Nov. 18, 1851.
Ploughs	Elijah Goldthait	Fort Wayne, Ind	Nov. 25, 1851.
Ploughs, adjustible land sides of	George Heffley, Samuel Conrad, and James Wigle	Berlin, Penn	Mar. 25, 1851.
Plough-stock, convertible	E. T. Parker	Berkley, Ala	Jan. 21, 1851.
Ploughs, wheeled, cultivating	G. W. C. Gillespie	Burlington, Des Moines, Iowa	Sept. 9, 1851.
Potato diggers	Daniel D. Bell	Wawarsing, Ulster co., N. Y	Dec. 9, 1851.
Scythe fastenings	Ebenezer G. Lamson	Shelburn, Mass	Mar. 18, 1851.
Scythe fastenings	Oliver Clark	Medina, Ohio	Mar. 18, 1851.
Scythe fastenings	Nathaniel Lamson	Shelburn Falls, Mass	Mar. 25, 1851.
Scythe fastenings	Nathaniel Lamson	Shelburn Falls, Mass	Mar. 25, 1851.
Scythe fastenings, construction of	David Anthony	Springport, N. Y	Nov 11, 1851.
Scythes, to the snath, fastenings of	E. S. Clapp	Montague, Mass	Mar. 18, 1851.
Seeding machines	Samuel & M. Pennock	Kennet's Square, Penn	July 8, 1851.
Straw-cutters	T. F. Wingo	McLemorsville, Tenn	April 22, 1851.
Straw-cutters	Jonathan Sulivan	Lexington, N. C	May 13, 1851.
Wheat fans	Jesse White	Barnsville, Ohio	April 1, 1851.
Wheat fans	Jehu Hollingsworth	Zanesville, Ohio	April 1, 1851.
Winnowing machines	Jonathan L. Booth	Cuyahoga Falls, Ohio	April 8, 1851.
Winnowing machines	Oliver Etnier	Shirley, Pa	April 29, 1851.
Winnowing machines, screens of	Jonathan Bean	Montville, Waldo county, Maine	Nov. 11, 1851.
Winnowers and separators, grain	Augustus B. Childs	Rochester, N. Y	Aug. 5, 1851.

Class II.—*Metallurgy and manufacture of metals, and instruments therefor.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Blind and shutter operator	Noah W. Speers	Cincinnati, Ohio	Dec. 16, 1851.
Blind slats, apparatus for operating	Samuel Avery	Phenix, N. Y	April 15, 1851.
Bolt-heading machines	Nathan Starks	Albany, N. Y	Dec. 23, 1851.
Cans or canisters, tops of	Alfred Bliss	Newark, N. J	Oct. 21, 1851.
Casting the backs upon the teeth of curry combs, method of	James M. Gardner	Troy, N. Y	Mar. 18, 1851.
Curry combs, construction of	William Wheeler	Troy, N. Y	Oct. 28, 1851.
Cut nail machine	John P. Sherwood	Fort Edward, Washington co., N. Y	Aug. 26, 1851.
Designs in sheet metal, apparatus for punching	William T. Rudd	Amsterdam, Bottetourt co., Va	July 8, 1851.
Dies, construction of	Hiram W. Hayden	Waterbury, Conn	June 17, 1851.
Door knobs, manufacture of	Orrin Newton	Pittsburg, Pa	Nov. 25, 1851.
Doors or shutters, attachment for opening or closing	William Post	Flushing, N. Y	Feb. 18, 1851.
Drill, hand	William Bushnell	New York, N. Y	Dec. 2, 1851.
Fasteners, blind or shutter	Washburn Race	Seneca Falls, N. Y	Sept 23, 1851.
Files, machinery for cutting	John Crum	Ramapo, Rockland co., N. Y	July 1, 1851.
Foundry apparatus	Chapman Warner	Louisville, Ky	Dec. 2, 1851; Eng. pat. dated Oct. 5, 1849.
Furnaces employed in welding shanks to tools	Jonathan White	Antrim, Hillsborough, N. H	Oct. 14, 1851.
Furnace, revolving reverberatory	Ambrose S. Beadleston	Ausable Forks, Essex co., N. Y	Dec. 9, 1851.
Gold amalgamator	William Ball	Chicopee, Hampden co., Mass	Sept. 9, 1851.
Hammers, trip, method of adjusting the stroke of	Luther Briggs, jr	Braintree, Mass	Mar. 11, 1851.
Hinge, crane, for doors, shutters, etc	Ezra Ripley	Troy, N. Y	May 13, 1851.
Hinge, double-acting spring	Theodore F. Engelbrecht	New York, N. Y	Feb. 25, 1851.
Hinges, spring	Harvey W. Sabin and George Drew	Canandaigua, N. Y	Feb. 25, 1851.
Hooker-up, mechanical	David J. Happersett	Downingtown, Chester co., Pa	July 8, 1851.
Horse shoe machine	Robert G. Babcock	New London, Conn	Apr. 29, 1851; antedated Feb. 24, 1851.
Iron, glazed sheet, process of manufacturing	John and Wm. W. Wood	Conshohocken, Pa	April 15, 1851.
Iron, manufacture of	S. T. Jones	New York, N. Y	Sept. 16, 1851; Eng. pat. dated July 23, 1850.
Iron, measuring and cutting	Levi B. Griffith	Honeybrook, Pa	Nov. 4, 1851.
Iron, wrought, direct from the ore, apparatus for making	James Renton	Newark, N. J	Dec. 23, 1851.

V.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Jackchains, tools for making	William Todd, assignor to Charles Atwood and George Kellogg	Stanford, Conn.; Derby, Conn	April 8, 1851.
Kettles, and articles of like character, from disks of metal, machinery for making	Hiram W. Hayden	Waterbury, New Haven co., Conn	Dec. 16, 1851.
Kettles with spouts, method of moulding	Webster H. Pease	Dayton, Montgomery co., Ohio	Oct. 28, 1851.
Key, swivel-nibbed	James Hanly	New York, N. Y.	Jan. 28, 1851.
Lead machines, sheet, combination of dies for	John Robertson	New York, N. Y.	May 27, 1851.
Lock, bank, powder proof	William Hall	Boston, Mass	July 29, 1851.
Locks, chronometric	William L. Bass	Boston, Mass	Dec. 23, 1851.
Locks, door	Charles H. Beatty	Wheeling, Va.	Oct. 14, 1851.
Lock for safes, &c	F. C. Goffin, assignor to Charles J. Gayler	New York, N. Y.	Dec. 2, 1851.
Locks, key	Jas. R. Bugbee, assignor to Jas. R. Bugbee and Enoch Robinson	Boston, Mass	April 22, 1851.
Locks, key	Linus Yale, jr	Newport, N. Y	May 6, 1851.
Lock, maze	Thomas Nicholson	Falmouth, Stafford co., Va.	Sept. 30, 1851.
Lock on sheet metal, machine for forming	Jabez Walker	East Bloomfield, N. Y.	April 1, 1851.
Locks, permutation safety	Robert Newell	New York, N. Y.	June 10, 1851; in England April 15, 1851.
Locks, rotating tumbler	David H. Richards & Jos. H. Flanders.	Newburyport, Mass	Dec. 16, 1851.
Metal tubes, method of liberating, from forming mandrel	Job Cutler	Birmingham, England	July 29, 1851; English patent Feb 28, 1849.
Milling tool	John Buckingham and Jos. H. Baird, ass'rs to Scovill Manufacturing Co.	Watertown, Conn.; Waterbury, Conn.	April 15, 1851.
Nail machine, horse shoe	Daniel Wilson, jr., assignor to D. Wilson, jr., and H. M. Bird	North Chelmsford, Mass,	Jan. 21, 1851.
Nail machine, horse shoe	Marshall Burnett	Boston, Mass	April 1, 1851.
Nut and washer machine	Henry Carter and James Rees	Pittsburg, Penn,	Aug. 26, 1851.
Nuts, washers, &c., machines for making	Wm. Kenyon, assignor to Joseph P. Haight, A. Hartupee, and J. Morrow	Steubenville, Ohio	Oct. 14, 1851.
Ores, copper, process for smelting	Samuel F. Tracy	New-York, N. Y	Dec. 16, 1851.
Ores, minerals, &c., arrangement of pans for washing	Samuel Porter	Hartford, Conn	Dec. 9, 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Ores, process of reducing by zinc, compounds	E. S. Seymour	Williamsburg, N. Y	Aug. 26, 1851.
Ore washer	Arnold Buffum	Brooklyn, N. Y	Oct. 21, 1851.
Padlock	Geo. McGregor, Robert Lee, and Thos. G. Clinton	Cincinnati, Ohio	Aug. 26, 1851.
Padlock	David Tilton, assignor to Tilton and Smetser	Stoneham, Mass	Aug. 26, 1851.
Padlock	Thomas Slaight	Newark, N. J	Oct. 14, 1851.
Patterns, metal and second for castings	Francis N. Still	New York, N. Y	Jan. 28, 1851.
Pins, machine for sticking on paper	Chauncy O. Crosby	New Haven, Conn	April 1, 1851.
Pins, mode of papering	C. O. Crosby	New Haven, Conn	July 8, 1851.
Pins, mode of papering	C. O. Crosby	New Haven, Conn	Dec. 2, 1861.
Rods, tapered metallic, apparatus for rolling	William Clay	Clifton Lodge, England	April 22, 1851; in England Dec. 16, 1848.
Safes, fire-proof	Louis Lillie, assignor to Jno. W. Bates	Troy, N. Y	July 15, 1851.
Sash lock	Michael Norton	Cambridge, Mass	Mar. 25, 1851.
Sash stopper	Joseph Osbourne	Weymouth, Mass	June 3, 1851.
Sash, upper, arrangement of catches in, operated by moving the lower sash	W. Race	Seneca Falls, N. Y	July 1, 1851.
Sashes, window, method of hanging	Samuel D. Nims	Palmer, Hampden co., Mass	Dec. 23, 1851.
Screw blanks, machine for arranging and feeding	Thomas J. Sloan	New York, N. Y	Feb. 25, 1851.
Screw blanks, &c., machine for assorting	Thomas J. Sloan	New York, N. Y	May 6, 1849.
Screw blanks and articles of a similar character, machine for arranging	Thomas J. Sloan	New York, N. Y	Sept. 30, 1851.
Screws, machinery for shaving, nicking and reshaving wood	Thomas J. Sloan	New York, N. Y	Oct. 21, 1851.
Screws, machinery for threading wood, and feed apparatus therefor	Thomas J. Sloan	New York, N. Y	Sept. 23, 1851.
Screws, method of finishing the heads of	Thomas J. Sloan	New York, N. Y	June 10, 1851.
Screws and pins, machines for counting	Thomas J. Sloan	New York, N. Y	Dec. 23, 1851.
Shutters, apparatus for securing, in any required position	Charles W. Krebs	Baltimore, Md	Mar. 25, 1851.
Shutters, &c., apparatus for moving and securing	N. W. Speers	Cincinnati, Ohio	Mar. 25, 1851.
Spike machines, gauging and heading movement for	Purnel Jefferson	Bridgeton, N. J	May 20, 1851.
Spike machines	Mark M. Ison	Etowa, Cass co., Ga	Aug. 12, 1851.
Spike machinery	James H. Jewett	Concord, N. H	Aug. 26, 1851.
Spike machine, hook heading motion for	Moore Hardaway	Troy, N. Y	Sept. 9, 1851.
Spoons, &c., manufacture of wire, strengthened	Luther Boardman	East Haddam, Conn	May 20, 1851.
Spring bolt	Oliver H. Bush	Fall River, Bristol co., Mass	Aug 5, 1851.
Spring, machinery for forming joints of, eliptical	Wm. T. Richards	New Haven, Conn	Aug. 26, 1851.
Swaging machine, rotary	Perry G. Gardner	New York, N. Y	Dec. 23, 1851.

V.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Tuyers	Joseph Dorwart	Morgantown, Pa	Jan. 14, 1851.
Tyres, by continuous rolling, machinery for making	P. G. Gardner	New York, N. Y	Mar. 11, 1851.
Tuyers, tight joint for	William Graham	Carlisle, Penn	Aug. 5, 1851.
Vaults, safes, &c., compound metallic doors for	Ira L. Cady	New York, N. Y	April 29, 1851.
Vice, bench	N. F. Cone	Kingsville, Ashtabula co., Ohio	Sept. 16, 1851.
Vice, parallel	Samuel R. Simpson	Springfield, Ohio	Jan. 7, 1851.
Wheel tires, machine for making	Maria Vaughn, assignor to James C. Bell and Robert Christie, jr	Greenbush, Rensselaer co., N. Y	Sept. 30, 1851.

Class III.—*Manufacture of fibrous and textile substances, including machine for preparing fibres of wood, cotton, silk, fur, paper, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Bats for felting, making	Leander W. Boynton	South Coventry, Conn	April 29, 1851.
Bats for felt cloth, &c., crossing the fibres in forming	Alonzo C. Arnold	Norwalk, Conn	June 10, 1851.
Card grinders	R. Kitson	Lowell, Mass	Nov. 11, 1851.
Cloth folding machine	D. R. Ambrose and O. S. Reynolds	Portsmouth and Dover N. H	July 22, 1852.
Cloth, machine for folding and measuring	Henry Boot	New Bedford, Mass	April 1, 1851.
Cloth, machine for stretching and drying	Thomas Barrows	Dedham, Norfolk co., Mass	Dec. 2, 1851.
Cords, coupling for	Lawton J. Ware	Warren, R. I	May 20, 1851.
Cotton duck, dressing	Horatio N. Gambrill	Baltimore, Md	Oct. 21, 1851.
Fibre, vegetable, processes for treating	Peter Claussen	Blackfriars, England	June 3, 1851; in England, August 16, 1850.
Flock, machine for grinding	John C. Fonda	Albany, N. Y	July 29, 1851.
Flocks, machine for opening and cleaning	Ephraim C. Brett	Great Barington, Berkshire co., Mass	Oct. 7, 1851.
Flocks to cloth, apparatus for applying	D. and R. Pratt	Elmira, N. Y	Oct. 7, 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Fulling vegetable and other textures, chemical process for	John Mercer	Oakenshaw, Lancaster co., England	Aug. 19, 1851; in England, Oct. 24, 1850.
Hemp brakes	Paris M. Walker	Marshall, Mo	May 27, 1851.
Hemp, &c., machines for dressing Sissal	S. A. Clements	Springfield, Hampden co., Mass	July 15, 1851.
Hemp and flax, machines for breaking and reducing the length of the fibres	Jas. S. Treat and Stephen Randall	Voluntown, Windham co., Conn	Sep. 16, 1851.
Hemp and flax, machine for scutching and hackling	Owen W. Grimes	Paducah, Ky	Sep. 23, 1851.
Hemp, manufacture of, from okra	John Blanc	New Orleans, La	June 24, 1851.
Jacquard machines	John Scott and John Tannahill	Philadelphia, Pa	Mar. 18, 1851.
Knitting machines	John Pepper, assignor to Charles Warren and H. G. Sanford	Portsmouth, N. H., and Boston, Mass	Feb. 25, 1851; antedated Aug. 25, 1850.
Knitting machines	Rufus Ellis, assignor to W. M. Chase	Boston, Mass	July 17, 1851.
Knitting machines	John H. Barsantie	Portsmouth, N. H	June 29, 1851.
Knitting machines	John Pepper, assignor to Hosea Crane, John Pepper and J. G. Crane	Portsmouth, N. H	June 24, 1851.
Looms, cylinders for figuring	Eliakin M. Hastings and John Shepherdson	Jamestown, N. Y	Mar. 18, 1851.
Looms for weaving bags	Cyrus Baldwin, assignor to "Stark Mills"	Manchester, N. H	Dec. 2, 1851; antedated Aug. 30, 1851.
Looms for weaving cut pile fabrics	M. C. Bryant	Lowell, Mass	Aug. 5, 1851.
Looms for weaving piled fabrics	Erastus B. Bigelow	Clinton, Mass	Jan. 14, 1851.
Looms for weaving piled fabrics	John Johnson, assignor to E. Johnson	Troy, N. Y	Aug. 5, 1851.
Looms for weaving seamless bags	Shelden Northrop	New Milford, Conn	Jan. 1, 1851.
Looms for weaving tapestry carpets with particolored warp	Erastus B. Bigelow	Clintonville, Mass	Jan. 7, 1851.
Looms, hand	Isaac H. Garretson	Clay, Iowa	Feb. 16, 1851.
Looms, Jacquard, for weaving cut pile fabrics	Erastus B. Bigelow	Clinton, Mass	Mar. 18, 1851.
Looms, power, fancy check	Enoch Burt	Manchester, Conn	Feb. 4, 1851.
Looms, shuttle, motions of	George W. Perry	Thompson, Windham co., Conn	Nov. 11, 1851.
Looms, shuttle, motions of	George J. Wardwell	Hanover, Oxford co., Maine	Aug. 5, 1851.
Paper moulds	William Brewer and John Smith	Malcome place, Clapham, Eng.; Southville, South Lambeth, England	Mar. 4, 1851; in England, Feb. 12, 1849.
Pulp screws	Geo. West	Tyringham, Mass	Aug. 19, 1851.
Sewing machines	William O. Grover and W. E. Baker	Boston, Mass.; Roxbury, Mass	Feb. 11, 1851.
Sewing machines	W. H. Aikins and J. D. Felthousen	Ithaca, N. Y	Aug. 5, 1851.
Sewing machines	Isaac M. Singer	New York, N. Y	Aug. 12, 1851.

V.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Sewing machines	Allen B. Wilson	Watertown, Litchfield co., Conn	Aug. 12, 1851.
Shawls, &c., machines for twisting fringes of	Jno. Nesmith and Wesley Sawyer	Lowell, Mass	Oct. 14, 1851.
Spinning machines, drawing regulators for	Newell Wyllys	South Glastenbury, Conn	Jan. 28, 1851.
Spinning rope yarns	Richard S. Tucker	Brooklyn, N. Y	Dec. 23, 1851.
Spinning wool, hand machines for	Margaret Hulings	Randolph co., Ind	June 3, 1851.
Waste pickers	Chas. G. Sargent and Rob. Thompson	Lowell, Mass	Sep. 16, 1851.
Weaving, delivering parti-colored warps in	Erastus B. Bigelow	Clinton, Mass	Mar. 18, 1851.
Weavers' headdles	Charles T. Judkins	Lowell, Mass.; patented in England to David Christie.	Feb. 18, 1851; in England, Feb. 10, 1849.
Weavers' temples	A. Jillson	Woonsocket, R. I	Sep. 16, 1851.
Weavers' shuttles	Leroy Litchfield	Southbridge, Worcester co., Mass	Sep. 30, 1851.
Woven fabrics, wires for making pile in	E. B. Bigelow	Clinton, Mass	Nov. 25, 1851.
Weavers' temples	E. and W. W. Dutcher	North Bennington, Vt	Dec. 16, 1851.
Wool, machines for cleansing	Leander W. Boynton	South Coventry, Ct	Aug. 12, 1851.
Yarns, sizing and dyeing apparatus for	Alonzo Bascom	East Jaffrey, Cheshire co., N. H	Nov. 18, 1851.

Class IV.—*Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Acid and naptha from rosin, distilling	L. S. Robins	New York, N. Y	Nov. 4, 1851.
Alloys of iron, zinc and nickel	Otis Boyden	Newark, N. J	May 27, 1851.
Bronze powder, processes of making	L. Branders	New York, N. Y	Sep. 16, 1851.
Calico printing, material for transferring colors in	Charles A. Broquette	France	April 15, 1851; France, April 1, 1849.
Cane juice, machine for expressing	Henry Bessemer	Middlesex co., England	June 3, 1851; in Ireland, Dec. 31, 1850.
Candle making, apparatus for	Willis Humiston	Troy, N. Y	Dec. 23, 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Caviar, manufacture of	Rob. G. Westacott, assignor to Westacott, Lombard & Lombard	Worcester, Mass.; Boston, Mass	Jan. 7, 1851.
Cements, for grinding, cylinders	Jacob Stephan, assignor to P. Augustus Scwaze and Jacob Stephan	Boston, Mass	Oct. 28, 1851.
Compounds, lubricating	Jacob Selgrath	Pottsville, Pa	June 24, 1851.
Drying and oxydizing colored goods	James C. Kempton	Manyunk, Philadelphia co, Pa	Sep. 2, 1851.
Dyeing blue, processes for	Edward Swiney	Andover, Mass	Nov. 4, 1851.
Dyeing door mats	Reuben Shaler	Madison, New Haven, Conn	July 22, 1851.
Gas, illuminating, purifying	Florentine J. de Cavailon	Paris, France	May 6, 1851.
Gutta percha hollow ware	Samuel T. Armstrong	New York, N. Y	June 24, 1851.
Gutta percha, tubing and covering wire, machines for	James Reynolds	New York, N. Y	April 22, 1851.
India rubber, manufacture of	Jonathan T. Trotter	New York, N. Y	Jan. 1, 1851.
India rubber, manufacture of	David McCurdy	Newark, N. J	April 1, 1851.
India rubber, manufacture of	Nelson Goodyear	New York, N. Y	May 6, 1851.
Mashing tubs	Joseph Wright	Waterloo, Seneca co., N. Y	June 24, 1851.
Oil from rosin, lubricating	L. S. Robins	New York, N. Y	Nov. 4, 1851.
Oil from rosin, tanners'	L. S. Robins	New York, N. Y	Nov. 4, 1851.
Paint, manufacture of	G. F. de Douchet	Paris, France	Sep. 9, 1851; English patent dated June 1, 1850; French patent dated Oct. 5, 1850.
Paint, metallic alloy	Chas. Wetterstedt, assignor to Chas. Kenan	Marseilles, France; New York, N. Y	Aug. 5, 1851; Eng. patent dated Nov. 3, 1846.
Paint oil from rosin	L. S. Robins	New York, N. Y	Nov. 4, 1851.
Peppermint droppers	Henry H. Snow	New Haven, Conn	Mar. 4, 1851.
Pigments, manufacture of	H. L. Pattinson	Scott's house, England	Aug. 12, 1851; Eng. patent dated Feb. 14, 1849.
Sugar, apparatus for draining	Smith Gardner	New York, N. Y	Sept. 16, 1851.
Sugar drainers, centrifugal	William Van Anden	Poughkeepsie, N. Y	June 10, 1851.
Sugar drainers, centrifugal	Daniel King	Brooklyn, N. Y	Nov. 25, 1851.
Sugar vacuum pans	James M. Miller	New York, N. Y	Oct. 21, 1851.
Zinc, white, use of steam to make	Henry W. Adams	Boston, Mass	Oct. 28, 1851.

V.—*Classified list of patents, &c.*—Continued.

CLASS V.—*Calorific, comprising lamps, fireplaces, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Bagassee, machines for drying	Samuel H. Gilman	Cincinnati, Ohio	Oct. 28, 1851.
Candlesticks	James Manning	Middletown, Ct	Jan. 1, 1851.
Candlesticks	Francis A. Rockwell	Ridgefield, Fairfield co., Ct	Dec. 16, 1851.
Charcoal, manufacture of	W. P. McConnell	Washington, D. C	Nov. 4, 1851.
Chimney tops	Charles W. Russell	Washington, D. C	Dec. 16, 1851.
Dust, excluding from railroad cars	Ed. Hamilton, assignor to N. Goodyear.	Bridgeport, Ct.; New York, N. Y	May 27, 1851.
Dwellings, apparatus for warming air and water for.	L. C. St. John	Buffalo, N. Y	Oct. 7, 1851.
Fires, compound for extinguishing	Joshua Upham	Salem, Essex county, Mass	Nov. 4, 1851.
Fireplace, reflecting	Robert Jobson	Near Dudley, England	May 20, 1851; in England Dec. 28, 1848.
Fountain and evaporator combined	George H. Thatcher	Albany, N. Y	July 22, 1851.
Furnaces, hot-air	Samuel Pierce	Troy, N. Y	May 20, 1851.
Furnaces, hot-air	Joseph C. Treat	East Hartford, Ct	Aug. 5, 1851.
Furnaces, ventilating	Henry Ruttan	Coburg, Canada West	In Canada Jan. 31, 1851; in America May 20, '51.
Gas-burners, Argand	John G. Webb	Williamsburg, King's county, N. Y	Oct. 14, 1851.
Gas regulators	J. S. Conant	Lowell, Mass	Dec. 9, 1851.
Grate-bars, agitating	A. D. Spoor	Troy, N. Y	April 15, 1851.
Grates, stove	H. J. Ruggles	West Poultney, Vt	Nov. 18, 1851.
Grates, quadrant-hinged	George H. Thatcher	Albany, N. Y	Aug. 5, 1851.
Lamps for burning vapor of benzole, &c	Chapman Warner	Washington, D. C	Oct. 14, 1851.
Lamps, lard	Delamar Kinnear	Circleville, Ohio	Feb. 4, 1851.
Lamps, self-acting blow-pipes	D. W. C. McCloskey	New York, N. Y	Aug. 26, 1851.
Lamps, solar, for burning lard or oils	John G. Webb	Williamsburg, King's county, N. Y	Oct. 14, 1851.
Lamps, street, reflectors for	Hugh and James Sangster	Buffalo, N. Y	Jan. 14, 1851.
Lanterns	Henry and James Sangster	Buffalo, N. Y	June 10, 1851.
Ovens, portable, elevated	P. Killin	Mount Healthy, Ohio	Oct 7, 1851.
Radiating surfaces	J. K. Ingalls	New York, N. Y	Nov. 4, 1851.
Ranges, cooking	Nicholas Mason	Roxbury, Mass	Aug. 19, 1851.
Ranges, cooking	Moses Pond	Boston, Mass	Feb. 25, 1851.
Steam traps	Charles M. Guild and John Brown	New York, N. Y	May 20, 1851.
Stoves	George H. Thatcher	Albany, N. Y	Jan. 21, 1851.
Stoves	Elihu Smith	Albany, N. Y	Jan. 28, 1851.
Stoves	Gardner Chillson	Boston, Mass	Sept. 16, 1851.
Stoves	Elisha Vance	Cincinnati, Ohio	Oct. 14, 1851.
Stoves	Hale R. Rose	Guilford, Vt	Nov. 18, 1851.
Stoves, air-heating	Gordon Williston	Charlestown, Mass	Oct. 14, 1851.
Stoves, air-heating	Charles A. Bogart	West Dresden, Yates county, N. Y	Oct. 21, 1851.
Stoves, airtight, Franklin	Rensselaer D. Granger	Albany, N. Y	Mar. 11, 1851.
Stoves, coal	James Shields and Samuel Pierce	New York, N. Y.; Troy, N. Y	Jan. 7, 1851.
Stoves, cooking	Bachus A. Beardsley	Waterville, N. Y	Feb. 4, 1851.
Stoves, cooking	William Sours	Mount Jackson, Va	Feb. 25, 1851.
Stoves, cooking	James Green and Rufus J. King	Dayton, Ohio	Mar. 11, 1851.
Stoves, cooking	Rufus K. Paine	Cincinnati, Ohio	April 8, 1851.
Stoves, cooking	James J. Marsh	Lewisburg, Pa	April 15, 1851.
Stoves, cooking	Dennis J. Littlefield	Lowell, Mass	April 15, 1851.
Stoves, cooking	Charles W. Grannis	Gowanda, N. Y	April 22, 1851.
Stoves, cooking	Elias Young	Cincinnati, Ohio	June 17, 1851.
Stoves, cooking	Hosea H. Huntly	Cincinnati, Ohio	Aug. 19, 1851.
Stoves, cooking	Hosea H. Huntly	Cincinnati, Ohio	Nov. 25, 1851.
Stoves, cooking	George W. Carleton	Brunswick, Cumberland county, Me	Nov. 25, 1851.
Stoves, dairy	Joel Stevens & H. J. Ruggles	West Poultney, Vt	Oct. 28, 1851.
Stoves, double oven	C. Harris & P. W. Zoiger	Cincinnati, Ohio	Sept. 2, 1851.
Stoves, folding doors of	James Root	Cincinnati, Ohio	Nov. 4, 1851.
Stoves, grate bars	George W. Gardner	Albany, N. Y	Nov. 18, 1851.
Stoves, parlor, cooking	N. A. Boynton	Boston, Mass	July 22, 1851.
Stoves, with portable ovens	George H. Thatcher	Albany, N. Y	July 29, 1851.
Ventilating and excluding dust from railroad cars	Ransom Cook	Saratoga Springs, N. Y	Aug. 19, 1851.
Ventilators	Thatcher C. Hatch	South Braintree, Mass	June 17, 1851.

V.—*Classified list of patents, &c.*—Continued.

CLASS VI.—*Steam and gas engines, including boilers and furnaces therefor, and parts thereof.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Boilers, apparatus for steam	J. & J. J. G. Collins	Kensington, Pa	Nov. 25, 1851.
Boilers, &c., steam apparatus for indicating the height of water in	George Faber	Canton, O	May 13, 1851.
Boilers, method of tracing the water spaces of	Bernard O. Neill	Reading, Pa	March 4, 1851.
Boilers, revolving	Charles Anderson	Warren, Pa	June 17, 1851.
Boilers, revolving	Wiliam Scott	Rising Sun, Ohio co, Indiana	Oct. 7, 1851.
Boiler, steam, annular	Thomas Champion	Philadelphia, Pa	Feb. 18, 1851.
Boilers, steam, arrangement of the flues and water spaces of	William E. Milligan	New York, N. Y	July 15, 1851.
Boilers, steam, insulated fusible plug for	E. H. Ashcroft	Boston, Mass	Feb. 18, 1851.
Boilers, steam, water gauge for	A. S. Lyman	New York, N. Y	Aug. 12, 1851.
Boiler tubes, &c., spring expanding guage for	James McCarty	Reading, Pa	July 29, 1851.
Crank indicator, arrangement of machinery for actuating the	Samuel B. Hutchins	Oswegatchie, N. Y	June 3, 1851.
Cut-off, adjustable	Samuel H. Gilman	Cincinnati, O	Mar. 18, 1851.
Cut-off, gear	George H. Corliss	Providence, R. I	July 29, 1851.
Cut-off, variable, regulated by the governor	Henry Waterman	New York, N. Y	Mar. 4, 1851.
Engine, air	John Ericsson	New York, N. Y	Nov. 4, 1851; in England, December 26th, 1850.
Engines, apparatus for regulating the speed of	H. A. Luttgens	New York, N. Y	Oct. 21, 1851.
Engines, carbonic acid gas	Jno. C. Fr. Salomon	Cincinnati, O	Dec. 9, 1851.
Engines, in which compressed air or other gas, heated and expanded by admixture therewith of a heated fluid, is used as the motive agent	Wm. Mt. Storm	Troy, Rensselaer co., N. Y	Sept. 23, 1851.
Engines, valve for oscillating	William M. Smith	Georgetown, D. C	Nov. 25, 1851.
Equalizers or power regulators	Alfred Gregory	Brooklyn, N. Y	Sept. 9, 1851.
Gauge for indicating pressure of steam, &c	George Faber	Canton, Stark co., Ohio	Sept. 16, 1851.
Indicator, water level, for steam boilers	Albert H. Judd	Marinetown, Ill	Aug. 5, 1851

Kilns, grain	J. S. Stover	Erwenna, Bucks co., Pa	Nov. 11, 1851.
Packing of rotary engines, method of adjusting the	Henry G. Thompson	New York, N Y	Feb. 4, 1851.
Power, motive, method of obtaining	William Mt. Storm	Troy, N. Y	Feb. 4, 1851.
Spark-arresters	James A. Cutting	Philadelphia, Pa	May 6, 1851.
Steam engines	Rich'd. F. Loper & John W. Nystrom.	Philadelphia, Pa	April 15, 1851.
Steam engine, arrangement of the	Frederick P. Dimpfel	New York, N. Y	July 1, 1851.
Valves, balanced	Francis B. Stevens	New York, N. Y	Mar. 25, 1851.
Valve side, method of connecting the, with the rock-shaft	Samuel H. Gilman	Cincinnati, O	Jan. 1, 1851.

CLASS VII.—*Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Boats to facilitate the discharge of cargo, and fittings for	William H. Bryan	Georgetown, D. C	July 29, 1851.
Hand-log	John R. St. John, assignor to James Renwick, Geo. T. Barnard, and E. B. St. John, trustees of the St. John Compass and Log Company	New York, N. Y	May 6, 1851; in Europe Dec. 27, 1850.
Lee-way indicator	A. A. Wilder	Detroit, Michigan	Jan. 21, 1851.
Masts and spars, telescopic connection of	Charles F. Brown	Warren, R. I	June 17, 1851.
Propeller	Ambrose W. Thompson	Philadelphia, Pa	Jan. 21, 1851.
Propeller screw	Gaspard Malo	Dunkirk, France	Nov. 18, 1851.
Propeller, the endless chain	Charles Frederick Fisher	New Orleans, La	Oct. 7, 1851.
Propelling and steering, apparatus for	John C. fr. Salomon	Cincinnati, O	Dec. 2, 1851.
Rudder, apparatus for relieving the helmsman from the shock of	Chandos Hoskins	New Orleans, La	May 13, 1851.
Rudder, balanced	Charles F. Brown	Warren, R. I	June 10, 1851.
Rudders, method of operating	Thos. H. Mortimer & Jas. M. Gardner.	Charleston, S. C	Nov. 25, 1851; French patent dated Jan. 11, 1851.

V.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Sails, method of making	Eli F. Southward	Wellfleet, Mass	Sept. 9, 1851.
Ships, light	Leonard Goodrich	New York, N. Y	Feb. 4, 1851.
Ships, model, measurer	Abijah S. Hosley	New York, N. Y	Aug. 19, 1851.
Ships, ventilating	Amos J. Sexton and Wm. Ennis	Brooklyn, N. Y.; New York, N. Y	Sept. 23, 1851.
Ships' winches	Thomas G. Boone	Brooklyn, N. Y	Oct. 21, 1851.
Snatch-block	Philip Rhoades, jr	Pittsburg, Pa	Feb. 18, 1851.
Steering apparatus	Joseph E. Andrews	Boston, Mass	Jan. 14, 1851.
Velocimeters, aquatic, method of supporting the vanes of.	John R. St. John, assignor to James Renwick, Geo. T. Barnard, E. B. St. John, trustees of the St. John Compass and Log Company.	New York, N. Y	In Europe, Dec. 27, 1850; in U. States, May 13, 1851.
Vessels, flexible hose or float for supporting	Wm. Mt. Storms	Troy, N. Y	April 29, 1851.
Vessels, method of raising sunken	William Irwin	Philadelphia, Pa	Sept. 2, 1851.

Class VIII.—*Mathematical, philosophical, and optical instruments, including clocks, chronometers, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Calculating interest, rules for	Sam. S. Young, ass'r to John R. Stephens	Eaton, Ohio	Sept. 2, 1851.
Calculating machines	John W. Nystrom	Philadelphia, Pa	Mar. 4, 1851.
Electro magnetic engines	Jacob Neff	Philadelphia, Pa	Jan. 7, 1851.
Electro magnetic engines	Thomas C. Avery	New York, N. Y	Feb. 25, 1851.
Electro magnetic telegraphs, circuit changes for	Charles S. Bulkley	Macon, Bibb county, Georgia	Sept. 2, 1851.
Escapements for time pieces	James Fulton	Louisville, Kentucky	Oct. 7, 1851.
Lightning-rods, insulators for	George W. Otis	Lynn, Essex county, Mass	Aug. 26, 1851.
Poles, machines for climbing	Henry D. Chapman	Baltimore, Md	Mar. 11, 1851.
Plotting scales	Lemuel H. Parsons	Lambertville, Hunterdon county, N. J.	Sept. 30, 1851.
Spectacle frames	John P. Paine	Worcester, Mass	July 1, 1851.
Telegraph wires, insulators for	John M. Batchelder	Cambridge, Mass	Oct. 14, 1851.
Telegraph wires, insulators for	Zenas C. Robins	Washington, D. C	Oct. 14, 1851.
Telegraph wires, insulators for	John Yandell	St. Louis, Mo	Oct. 14, 1851.

Telescopes	Alvan Clark	Cambridge, Middlesex, Mass	Nov. 11, 1851.
Telegraphs, means for obviating difficulties arising from defective insulation	Charles S. Bulkley	Macon, Bibb county, Georgia	Aug. 26, 1851.
Watches, winding	Theodore Noel	Memphis, Tenn	Dec. 2, 1851.

Class IX.—*Civil engineering and architecture, comprising works, rail and common roads, bridges, canals, wharfs, docks, rivers, wiers, dams, and other internal improvements, buildings, roofs, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Blasting rocks	Charles Monson	New Haven, Ct	April 1, 1851.
Buildings, iron connexion for the beams and columns of	Joseph Banks	New York, N. Y	Feb. 25, 1851.
Buildings, metallic, construction of	Simon Willard	Cincinnati, Ohio	Mar. 18, 1851.
Bridge, counter-braces, adjusting the effective length of	D. C. McCallam	Owego, N. Y	July 15, 1851.
Bridge trusses, arrangement of arches in	Cunningham M. Pennington	Rome, Ga	Jan. 7, 1851.
Bridges, the construction of	Edwin Stanley	Bennington, Wyoming county, N. Y	Sept. 2, 1851.
Drilling apparatus, steam	Joseph W. Fowle	Boston, Mass	Mar. 11, 1851.
Excavating, machines	Benjamin W. Remy	Brookville, Brookville county, Ia	Oct. 21, 1851.
Fences, flexible	Mathias P. Coons	Lansingburg, Rensselaer county, N. Y.	July 29, 1851.
Fences, hurdle	Cyrus C. Cole	Rushville, Ontario county, N. Y	Dec. 2, 1851.
Fences, iron	J. B. Wickersham	New York, N. Y	July 1, 1851.
Fence, sod, machine for making	H. L. F. Gavett	Jackson, Mich	Sept. 9, 1851.
Frog-guard, self-acting	Chas. A. Postley	Spring Garden, Philadelphia, Pa	June 24, 1851.
Gates, apparatus for opening and closing	Enoch Woolman	Damascoville, Columbiana county, Ohio.	Dec. 2, 1851.
Pavements, method of securing ranges of short plank in	Joseph E. Ware	St. Louis, Missouri	Feb. 11, 1851.
Paving, &c., stone and metal, conglomerate for	Geo. H. Knight	Cincinnati, Ohio	April 1, 1851.
Railings	Sommers Crowell	Reading, Pa	June 10, 1851.
Railings, iron	John Krauser	Reading, Pa	April 15, 1851.
Roofs, construction of	Francis Wilbar	Roxbury, Norfolk county, Mass	Aug. 12, 1851.
Scraper	Charles Schofield and George J. John	Albion, Ill	Feb. 11, 1851.
Shutters for shop fronts	James Root	Cincinnati, Ohio	Aug. 5, 1851.
Vessels, method of raising sunken. (See class IX.)			
Window sashes	Sewall Short	New London, Ct	July 29, 1851.

V.—*Classified list of patents, &c.*—Continued

CLASS X.—*Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Axles, boxes for journals for railroad cars	Oliver N. French, assignor to O. N. French and Eb. Stevens	New London, Ct	July 15, 1851.
Axle boxes, for railroad cars	Robert Levington	Monroe, Mich	Oct. 14, 1851.
Buggy tops	Har. Hibbard, ass'r to Jar. A. Hibbard	Henrietta, N. Y	July 15, 1851.
Car couplings	Silas M. Cockran	Baltimore, Md	Jan. 1, 1851.
Car brakes, railroad	Francis A. Stevens	Burlington, Chittenden co., Vt	Nov. 25, 1851.
Cars, for transportation of coal	Laurence Myers	Philadelphia, Pa	June 24, 1851.
Cars, railroad, coupling	George Winters	Portsmouth, Dauphin county, Pa	Sept. 16, 1851.
Cars, railroad, coupling	Lorenzo D. Livermore	Hartland, Windsor county, Vt	Nov. 11, 1851.
Cars, railroad, excluding dust from. (See class V.)			
Cars, railroad, running-gear of	William Nebinger	Sharpsburg, Washington county, Md	Oct. 21, 1851.
Cars, railroad, running-gear of	Thomas A. Davies	New York, N. Y	Dec. 9, 1851.
Car seats	Rickason Stillwell and E. L. Brundage	New York, N. Y.; Troy, N. Y	April 22, 1851.
Car seats	Ezekiel Booth and Ezra Ripley	Troy, N. Y	Nov. 11, 1851.
Car seats	Ezra Ripley and E. L. Brundage	Troy, N. Y	Dec. 9, 1851.
Carriages	John Jones	Clyde, N. Y	Jan. 14, 1851.
Carriages	James C. Spencer	Phelps, N. Y	May 27, 1851.
Carriages	George B. Durkee	Alden, N. Y	May 27, 1851.
Carriages	Gustavus L. Haussknecht	New Haven, Ct	Dec. 16, 1851.
Carriages	Lewis King	Madison, Madison county, N. Y	Dec. 23, 1851.
Carriage bodies, hanging	John Jones	Clyde, Wayne county, N. Y	July 22, 1851.
Carriage bodies, hanging	John Jones	Clyde, Wayne county, N. Y	July 22, 1851.
Carriage perches	Lewis E. Stillwell	Franklinville, Cattaraugus co., N. Y	Dec. 2, 1851.
Carriages, railroad, running-gear of	Daniel W. Eames	West Turin, Lewis county, N. Y	July 1, 1851.
Carriages, steam, for railways	Jos. H. Moore and Wm. P. Parrott	Boston, Mass	Dec. 2, 1851.
Carriage tops, raising	John L. Allen	New Haven, Ct	Jan. 14, 1851.
Felloes, bending	A. W. Johnston	St. George's, Del	Nov. 11, 1851.
Hubs and axles, connecting and disconnecting	A. M. Billings	Claremont, N. H	Jan. 14, 1851.
Hubs and axles, applying friction rollers to	Jos. B. & S Wilson	Townsend's Inlet, N. J	Feb. 25, 1851.
Hubs, for boxes, machine for preparing	William R. Jones	Granville, Washington county, N. Y	July 22, 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Hubs, for reception of boxes, machine for preparing	Henry Moore	Shepardtown, Pa	July 29, 1851.
Locomotives, moved by the power of animals	Clement Masserano, assignor to Clement Masserano, Josephine Wickliffe, administratrix of R. Wickliffe, jr., deceased, Charles Carenzi, André Cristedoro, Pallegro Rocca, & Louis B. Migone.	Turin, kingdom of Sardinia; and Lexington, Ky.; Genoa, Sardinia	Oct. 7, 1858.
Locomotives, running-gear of	George S. Griggs	Roxbury, Mass	June 17, 1851.
Locomotives, running-gear of	James H. Murrill	Manchester, Va	Oct. 7, 1851.
Locomotives, running-gear of	Ross Winans	Baltimore, Md	Dec. 2, 1851.
Omnibus steps	William H. Hoyt	New York, N. Y	May 27, 1851.
Omnibus drivers, registers for	Ira B. Person and Joel L. Brockett	Baltimore, Md	Aug. 19, 1851.
Springs	James Webster	Leicester, England	Nov. 4, 1851; English patent, Feb. 11, 1851.
Springs, carriage	Levi Bissell	New York, N. Y	May 20, 1851.
Springs, carriage	Chauncy H. Guard	Brownsville, N. Y	June 10, 1851.
Springs, carriage	Gustavus L. Haussknecht	New Haven, Ct	July 15, 1851.
Springs, carriage	M. G. Hubbard	Rochester, N. Y	July 22, 1851.
Springs, carriage	Levi Bissell, assignor to Levi Bissell and Lyman Kinsley	New York, N. Y	Nov. 4, 1851.
Switch, for railroads, self-adjusting and locking	John C. Past	White Haven, Pa	June 3, 1851.
Switch, railroad	David F. Phillips	Republic, Seneca county, Ohio	Nov. 18, 1851.
Switches, railroad	William N. Raines	Thompson, Columbia county, Ga	Dec. 2, 1851.
Tires, for railroad-car wheels	Theodore T. Abbott	Manchester, N. H	Jan. 14, 1851.
Trucks, connecting with car bodies	Thomas P. Howe	Buffalo, N. Y	Mar. 11, 1851.
Trucks, railroad car	Benjamin Hinkley	Troy, N. Y	Dec. 2, 1851.
Wheels and axles, connecting and disconnecting	Simeon Heywood	Claremont, N. H	April 1, 1851.
Wheels, car, machinery for making wrought iron	Maria Vaughn, administratrix of James C. Vaughn, deceased, assignor to James C. Bell and R. Christie, jr	Greenbush, N. Y.; New York, N. Y	June 24, 1851.
Wheels, cast-iron car	George R. McFarlane	Holidaysburg, Pa	Jan. 14, 1851.
Wheels, cast-iron car	P. G. Gardiner	New York, N. Y	Mar. 11, 1851.
Wheels, cast-iron car	Thomas J. Eddy	Waterford, N. Y	July 29, 1851.
Wheels, cast-iron car	Benjamin Severson	Schenectady, N. Y	Oct. 21, 1851.
Wheels, cast-iron car	Isaac Vankuran	Boston, Mass	May 20, 1851.
Wheels, cast-iron car	Albert Hebbard	Worcester, Mass	May 20, 1851.
Wheels, railroad car	Nehemiah Hodge	Adams, Berkshire co., Mass	Nov. 18, 1851.
Wheels, spring carriage	John Lamb and Charles H. Root	McDonough, N. Y	Jan. 1, 1851.
Wheels to axles, method of securing	Junius Foster and David Marsh, assignors to J. Foster	Greene Point, King's co., N. Y	Sept. 2, 1851.

V.—*Classified list of patents, &c.*—Continued.

CLASS XI.—*Hydraulics and pneumatics, including water wheels, wind mills, and other implements operated on by air or water, or employed in raising or delivering fluids.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Coupling, compound for hose or pipe	James W. Osgood	Columbus, Ohio	May 20, 1851.
Faucets	Charles W. Stearn	Springfield, Mass.	July 22, 1851.
Faucets or gates, molasses	Erastus Stebbins	Chicopee, Mass.	July 15, 1851.
Hydraulic ram	William Fields, jr.	Providence, R. I.	Jan. 28, 1851.
Hydraulic rams, operating the waste gates in	John Osborn	Hampden, Conn.	Feb. 11, 1851.
Liquids, apparatus for drawing and measuring	Richard F. Stevens	Syracuse, N. Y.	Mar. 25, 1851.
Pipes, lead, machines, nozzle for	John B. Collian	Reading, Pa.	Jan. 1, 1851.
Propellers of machinery to be used in currents	James Hardie	Victoria, Texas	Nov. 18, 1851.
Pumps	Nelson Newman	Cincinnati, Ohio	May 6, 1851.
Pumps for elevating water mixed with mineral substances	William Ball	Chicopee, Hampden co., Mass.	Dec. 23, 1851.
Pumps for raising water, &c.	J. F. Flanders	Newburyport, Mass.	June 22, 1851.
Pumps, rotary	J. Stuart Gwynne	New York, N. Y.	Jan. 14, 1851.
Pumps, rotary	Phineas Bennett	New York, N. Y.	Jan. 7, 1851.
Valves, shields for	Alexander Jimason	Parkesburg, Chester co., Pa.	Sept. 30, 1851.
Water, apparatus for raising and carrying	James D. Willoughby	Scotland, Pa.	Feb. 18, 1851.
Watering cattle, apparatus for	S. W. Wood	Rochester, N. Y.	Oct. 28, 1851.
Water metres	John Ericsson	New York, N. Y.	Jan. 1, 1851.
Water metres	John Ericsson	New York, N. Y.	Dec. 9, 1851.
Water wheels	James L. Parker	Shirley village, Middlesex co., Mass.	Oct. 14, 1851.
Water wheels, over shot	Edmund Sheetz	Campbellstown, Lebanon co., Pa.	Oct. 14, 1851.

CLASS XII.—*Lever, screw, and mechanical power, as applied to pressing, weighing, raising, and moving weights.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Jacks, lifting	Bolivar Newbury	Catskill, N. Y.	May 27, 1851.
Jacks, lifting	James St. John	New York, N. Y.	July 8, 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Oil presses	David L. Latourette	St. Louis, Mo.	Oct. 28, 1851.
Presses, drop	Milo Peck	New Haven, Conn.	Nov. 25, 1851.
Press, portable hydraulic	Richard Dudgeon	New York, N. Y.	July 8, 1851.
Presses, self-acting	William Moore	Belleville, Richland co., Ohio.	Sept. 30, 1851.
Presses, self-acting, cheese	Bethuel Gillett and Lyman Allis	Windsor, Hartford co., Conn.	Aug. 26, 1851.
Weighing carts	A. B. Livingston	Portland, Fountain co., Ind.	Sept. 30, 1851.
Weighing machine for grain, self	William Biddle	Lafayette, Ind.	May 27, 1851.

CLASS XIII.—*Grinding mills and mill gearing, including grain mills, mechanical movements, and horse-powers.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Bolting flour, apparatus for	Lewis Fagin and Henry C. Hayman	Cincinnati, Ohio	April 8, 1851.
Boxes and axles for saving oil	Benjamin Kraft	Reading, Pa.	July 1, 1851.
Bran dusters	J. M. Carr and James Hughes	Cambridge, Ind.	April 1, 1851.
Bran dusters	Wm. A. McFarland and Thos. C. Carpenter	Wilmington, Del.	May 27, 1851.
Bran dusters	S. W. Kirk	Coatsville, Chester co., Pa.	July 22, 1851.
Corn sheller	Joshua M. C. Armsby	Worcester, Mass.	Jan. 7, 1851.
Flouring apparatus	James M. Clark	Lancaster, Pa.	May 13, 1851.
Flour bolts	Samuel Cook	Adams Basin, N. Y.	June 22, 1851.
Governors	William Gardner	New York, N. Y.	June 10, 1851.
Governors	George H. Corliss	Providence, R. I.	June 10, 1851.
Grinders, method of forming teeth upon cast iron	Ezra Ripley	Troy, N. Y.	Aug. 12, 1851.
Horse-powers	Cyrus Avery	Tunkhannock, Pa.	June 3, 1851.
Horse-powers	Aaron D. Crane	Newark, N. J.	April 8, 1851.
Mills, cider	Nathan Chapin	Syracuse, N. Y.	Sept. 2, 1851.
Mills, cider	David F. Phillips	Republic, Seneca county, Ohio	Nov. 25, 1851.
Mills for grinding corn and cobs	Sidney A. Bantz and Wm. Andrews	Frederick, Md.	July 22, 1851.
Mills for grinding paints and drugs	Gilbert D. Jones	Jersey City, N. J.	April 1, 1851.
Mills for grinding and bolting	Jehu Hollingsworth	Zanesville, Muskingum co., Ohio	Nov. 18, 1851.
Mills, grinding	William Newlove	Utica, N. Y.	Oct. 14, 1851.
Millstones	E. T. Hannon Valcke	Paris, France	April 15, 1851.
Millstones, dressing	Edmund P. Gaines	Milrose, Texas	Mar. 4, 1851.
Millstones, dressing	Moore Holden	Laurenceburg, Indiana	Aug. 5, 1851.
Millstones, finishing and balancing	George Todd	St. Louis, Mo.	Nov. 18, 1851.

V.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Millstones, machines for dressing	E. W. Hazard and Charles H. Jenner	Binghampton, N. Y.; Rochester, N. Y.	Sept. 16, 1851.
Motion, changing a reciprocating into a rotary	Joseph Harris, jr.	Boston, Mass.	Jan. 14, 1851.
Motion, mode of changing reciprocating into rotary	J. V. Strait	Litchfield, Ohio	July 22, 1851.
Oil cups for journal boxes	Aaron Richardson	Bellows Falls, Vt	July 29, 1851.
Power, governors	Junius Judson	New York, N. Y.	Mar. 4, 1851.
Smut machines	Jehu Hollingsworth	Zanesville, Ohio	April 22, 1851.
Smut machines	Nelson Platt	Ottawa, Ill.	May 20, 1851.

CLASS XIV.—*Lumber, including machines and tools, for preparing and manufacturing, such as sawing, planing, mortising, shingle and staves, carpenters' and coopers' implements.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Augurs	Ransom Cook	Saratoga Springs, N. Y.	June 17, 1851.
Augurs, &c., to their handles, means of attaching	Merritt S. Brooks	Chester, Middlesex county, Conn.	Oct. 28, 1851.
Boring holes in posts, machines for	Thos. T. Strode	Coatsville, Chester county, Pa.	Dec. 2, 1851.
Grooving lumber, machines for	B. Holly and Jno. W. Wheeler	Seneca Falls, N. Y.	July 8, 1851.
Guages used in turning	C. R. Hurlbut	Rushford, N. Y.	Sept. 9, 1851.
Irregular forms, machines for turning	Jonathan Russell	Philadelphia, Pa.	Jan. 1, 1851.
Irregular forms, machines for turning	Philo S. Beers	Hampden, Conn	Feb. 18, 1851.
Irregular forms, machinery for turning	Abner Lane	Killingsworth, Conn	Feb. 25, 1851.
Lathes	T. R. Bailey	Lockport, N. Y.	July 1, 1851.
Lathes, chucks for	Thos. J. Eddy, administrator of Jos. Hyde	Troy, Rensselaer county, N. Y.	Dec. 9, 1851.
Lath machines	William Merril	Randolph, Portage county, Ohio	Sept. 23, 1851.
Lath machines	G. W. Tolhurst	Cleveland, Ohio	Dec. 9, 1851.
Lathes, securing pinions, &c., of watches in	J. H. Bottom	New York, N. Y.	July 15, 1851.
Mandrels, expanding	Walter Sherwood	Providence, R. I.	Dec. 2, 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Matches, machinery for making	Ira H. Smith, assignor to Lemuel D. Smith	Wolcott, Conn.; Waterbury, Conn.	April 29, 1851.
Mitre boxes	Mathew Spear	Bowdoinham, Lincoln county, Me.	Sept. 30, 1851.
Planes, hand	Benjamin F. Bee	Harwick, Barnstable county, Mass.	Nov. 11, 1851.
Planing machines	Daniel H. Southworth	New York, N. Y.	Feb. 18, 1851.
Planing machines	John D. Beers and Isaac Winslow	Philadelphia, Pa.	Feb. 25, 1851.
Planing machines	Rufus Bixly, Cyrus Bixly, and John Garst	Dayton, Ohio	May 13, 1851.
Planing machines	Geo. W. Beardslee	Buffalo, N. Y.	May 20, 1851.
Planing machines	Nelson Barlow	St. Louis, Mo.	May 27, 1851.
Planing machines	George W. Beardslee	Albany, N. Y.	Nov. 4, 1851.
Planing machines, cutters for	Jas. M. Patton and Wm. F. Fergus, assignors to John C. Da Costa	Philadelphia, Pa.	Dec. 23, 1851.
Planing machines for dressing the edges of boards	William E. Cornell	Boston, Mass.	Jan. 1, 1851.
Saw-filing machine	Thomas M. Chapman	Old Town, Penobscot county, Me.	Sept. 2, 1851.
Saw-filing machinery, vice-jaw for	George W. Putnam	Morean, N. Y.	May 27, 1851.
Saws for sawing and smoothing boards	George F. Woolston	Orangeburg, dist. of Orangeburg, S. C.	Sept. 30, 1851.
Saw-mills	Isaac Straub	Cincinnati, Ohio	Feb. 18, 1851.
Saw-mills	Lemuel Hedge, assignor to George W. Hedge	Brooklyn, N. Y.	April 22, 1851.
Saw-mills	Martin Rich	Fairfield, Wis.	May 13, 1851.
Saw-mills, feeding logs in	Charles Ketchum	Pen Yan, Yates county, N. Y.	Dec. 9, 1851.
Sawing machines	Pearson Crosby	Fredonia, N. Y.	April 8, 1851.
Saws, &c., machinery for hardening and straightening	Henry Waterman	Williamsburg, N. Y.	May 27, 1851.
Saw-set	Elijah S. Holkins	Painesville, Ohio	April 8, 1851.
Saw-set	Hiram Strait	Covington, Ky.	April 8, 1851.
Saw-set vice	William Hinds	Cooperstown, N. Y.	July 1, 1851.
Saws, teeth of	George F. Woolston	Orangeburg, S. C.	Mar. 11, 1851.
Saw-mills, setting logs in	John W. Robbins	Campden, Ohio	April 14, 1851.
Sawing volutes, machine for	Elijah Whiten	Hingham, Plymouth county, Mass	Sept. 30, 1851.
Shingle machines	Franklin Skinner	Dunkirk, Chatauque county, N. Y.	Nov. 25, 1851.
Shingles, machines for dressing	Seymour Carver	Geneva, Ill.	June 17, 1851.
Splint machines	Henry Mellish	Walpole, N. H.	April 1, 1851.
Splint machines	Lewis L. Gilliland	Dayton, Ohio	April 29, 1851.
Staves dressing machine	William Hawkins	Milwaukie, Wis.	July 22, 1851.
Stave jointing machines	Daniel Drawbough	White Hill P. O., Cumberland co., Pa.	Nov. 11, 1851.
Staves, machines for dressing	Lewis S. Chichester	Williamsburg, Long Island, N. Y.	Nov. 4, 1851.
Staves, machines for jointing	William McGuire	Cincinnati, Ohio	Jan. 7, 1851.
Staves, machines for sawing and dressing	Dennison Woodcock	Independence Centre, N. Y.	July 15, 1851.
Staves, machines for jointing	Lewis S. Chichester	Williamsburg, King's county, N. Y.	Aug. 12, 1851.

V.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Tenoning, boring, &c., machines for	Martin and Thomas R. Way	Paintersville, Ohio	Mar. 11, 1851.
Tonguing, jointing and rebating tool for	John A. Fry	Edinburg, Va	Feb. 18, 1851.
Tool, half adjustable	Peter H. Niles	Boston, Mass	Aug. 26, 1851.

CLASS XV.—*Stone and clay manufactures, including machines for pottery, glass-making, brick-making, dressing and preparing stone, cements, and other building materials.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Brick machines	Mahlon Gregg	Philadelphia, Pa	June 17, 1851.
Brick machines	John J. Riddle	Covington, Ky	July 22, 1851.
Brick machines	James Dane, Darius Healey, and Gary Cumings, assignors to Isaac and Francis Dane	Derby, Vt	Aug. 5, 1851; antedated June 17, 1851.
Brick machines	Luther Brown	Canandaigua, N. Y	Aug. 5, 1851.
Brick machines	Isaac Gregg	Pittsburg, Pa	Aug. 5, 1851.
Brick machines	Richard Long	Columbus, Ohio	Aug. 19, 1851.
Brick, machines for preparing clay for making	Heman Whipple	Port Richmond, N. Y	Mar. 25, 1851.
Brick presses	Jacob Scheitlin	Louisville, Ky	Jan. 21, 1851.
Brick presses	John J. Riddle	Covington, Ky	April 1, 1851.
Brick presses	J. Z. A. Wagner	Philadelphia, Pa	April 8, 1851.
Brick presses	Joseph Grant	Providence, R. I	May 13, 1851.
Clay, machines for working	Daniel and George Duchemin	Cincinnati, Ohio	Dec. 2, 1851.
Clay pipes, manufacture of	Joseph Putnam	Salem, Mass	Sept. 30, 1851.
Earthenware, baked, ornamenting	Ralph B. Beech	Kensington, Ky	June 3, 1851.
Glass, frosting plates of	Isaac Taylor	New York, N. Y	Nov. 11, 1851.
Glass, machinery for cutting	John P. Colne	New York, N. Y	Aug. 26, 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Kilns, lime	Samuel Brown	Berwick, Pa	Aug. 26, 185 .
Kilns, lime	Richard E. Schroeder	Rochester, N. Y	May 6, 1851.
Marble, ornamenting	C. F. Hill and H. Hoffman	New York, N. Y	April 15, 1851.
Pottery and other ware, working clay for	John Akrill	Williamsburg, N. Y	Aug. 5, 1851.
Stone and other substances, machine for facing and polishing	Albert Eames	Springfield, Mass	June 10, 1851.
Stone drilling machine	Henry Goulding	Boston, Mass	Sept. 16, 1851.
Stone, machines for dressing	Joseph V. Tilton	Marcellus, Onondaga county, N. Y	Oct. 21, 1851.
Stone, machines for dressing	Wiliam Wheeler	West Poultney, Vt	Dec. 23, 1851.

CLASS XVI.—*Leather, including tanning and dressing, manufactures of boots, shoes, saddlery, harness, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Boot crimps	Nathan Dawes and Higgins Harrison	Little York, N. J	May 27, 1851; antedated Jan. 31, 1851.
Boot crimps	Hartwell Stanley	Wilmington, Vt	Aug. 19, 1851.
Boot forms, machine for dressing	Joseph Burgess	Leicester, Mass	July 22, 1851.
Boots and shoes, machines for cutting the soles of	Jos. Steger, assignor to Wm. Mitchell	Roxbury, Norfolk co., Mass; Boston, Mass	Nov. 11, 1851.
Boots and shoes, machines for pegging	Alpheus C. Gallahue	Matamoras, Washington co., Ohio	Oct. 28, 1851.
Boot-trees	Davis R. Hendrix	Pottstown, Montgomery co., Penn	Oct. 28, 1851.
Collars, for harness	Joseph W. Briggs	Cleveland, Ohio	June 3, 1851.
Collars, horse	Richard Rickey	Rutland, Ohio	Nov. 11, 1851.
Collars, horse, machines for forming	Isaac Davis	Mechanicsburg, Champaigne co., Ohio	Nov. 4, 1851.
Clogs, or patterns	Charles W. Stearns	Springfield, Mass	April 22, 1851.
Gauges, feather-edging for shoemakers'	J. Jenkins	Andover, Essex co., Mass	July 22, 1851.
Harness-saddles	John McLain	Circleville, Pickaway co., Ohio	Dec. 23, 1851.
Harness, saddle-trees for	Jas. A. Lawrence, assignor to Roberts & Lamsen	New Haven, Conn	July 22, 1851.
Hides, bating and tanning	William B. Milligan	Edinburg, Shenandoah co., Va	Nov. 4, 1851.
Hides, machines for cutting	Jacob C. Flint	Boston, Mass	Nov. 11, 1851.
Hides, machines for preparing	Thomas W. Jones	Philamath, Ga	Feb. 4, 1851.
Lap anvils for shoemakers	Henry Brunk	Albany, N. Y	May 27, 1851.
Lasts, blocks, fastenings for	Levi R. Rockwood, assignor to Joseph L. Woodward	Upton, Worcester co., Mass	Sept. 16, 1851.
Leather, machines for splitting	William Panton	Milton, Mass	July 15, 1851.

V.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Leather, machines for stretching	Wm. Sirevell and Danl. Brown	Albany, N. Y	April 22, 1851.
Leather, machines for stretching	Bradford Rowe	Albany, N. Y	April 22, 1851.
Leather splitting machines	A. Richardson	North Enfield, Grafton co., N. H,	Sept. 16, 1851.
Leather tubes, machines for making	Newell Wylyss, assignor to Chas. Collins and Newell Wylyss	Glastenbury, Hartford co., Conn	Dec. 23, 1851.
Saddles	John C. fr. Salomon	Cincinnati, Ohio	Oct. 21, 1851.
Saddles, spring	Joseph C. Smith	Stoughstown, Penn	April 29, 1851.
Shoes, India rubber	Horace H. Day	Jersey City, N. J	May 20, 1851.
Shoe latches	Isaac Bannister	Newark, N J	Sept. 23, 1851.
Spring saddles	John C. fr. Salomon	Cincinnati, Ohio	Nov. 18, 1851.
Tanning	Nathan C. Towle	Washington, D. C	Oct. 7, 1851.
Trunk handles	Elijah A. Andrews	New Britain, Conn	Mar. 18, 1851.

CLASS XVII.—*Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Bedsteads	Harvey W. Sabin	Canandaigua, Ontario co., N. Y	July 1, 1851.
Bedsteads	Ira Russell	Dedham, Mass	Sept. 16, 1851.
Bedsteads	Levi Newcomb, jr	New Bedford, Mass	Nov. 11, 1851.
Bedsteads, attaching cutters for cutting screws on rails of	Jacob Zimmer	Tiffin, Seneca co., Ohio	Dec. 23, 1851.
Bedstead fastenings	James R. Kai and Spencer Lewis	Tiffin, Ohio	May 6, 1851.
Bedsteads, machine for cutting screws on rails of.	Spencer Lewis	Rochester, N. Y	Oct. 7, 1851.
Bedsteads, machines for cutting screws on posts and rails of	O. Thornly	Lebanon, Ind	Oct. 7, 1851.
Bedstead rails, machines for cutting screws on	H. Gross and Wm. Campbell	Tiffin, Ohio	April 1, 1851.
Bread cutters	A. E. Lazell and D. Lazell	Chicopee Falls, Mass	July 1, 1851.
Brushes and brooms, handles of	L. F. Cavanaugh	Newfield, Tompkins co., N. Y	July 1, 1851.
Brushes, manufacture of	A. R. Davis	East Cambridge, Mass	Aug. 19, 1851.
Cabbage cutters	Hiram Carver	Edinborough, Va	Aug. 26, 1851.
Chair seats	John W. Drummond, assignor to Smith Ely	Skeneateles, Onondaga co., N. Y.; New Brighton, N. Y	Dec. 16, 1851.
Coffee roasters	Edward Whitely	Boston, Mass	April 22, 1851.
Cradles, swinging	Lucius F. Whitaker	Raleigh, Wake co., N. C	Oct. 21, 1851.
Cradles, swinging	S. W. Knowles	Middletown, Conn	Oct. 28, 1851.
Cutters, cheese, butter and bread	Benjamin F. Adams	Bangor, Me	Nov. 11, 1851.
Desks	John T. Hammitt	Philadelphia, Penn	Nov. 4, 1851.
Desks	J. H. Morris and D. Flanders	Parishville, St. Lawrence co., N. Y.	Nov. 18, 1851.
Drying fruits, and other articles, revolving frames for	J. C. Dickey	Washington, D. C	June 3, 1851.
Easy chairs, for invalids, &c	Patrick O'Neil	Brooklyn, N. Y	Sept. 23, 1851.
Fastening pedestals to columns	Wm. and Wm. H. Lewis	New York, N. Y	June 24, 1851.
Gongs	Vine B. Starr	East Hampton, Middlesex co., Conn	Nov. 18, 1851.
Mattresses, spring, for invalids	David Baird	New York, N. Y	Jan. 7, 1851; antedated Oct. 1, 1850.
Mattresses, stuffing, &c, machines for cutting wood into shreds, and crimping them for	Edwin K. Browning	Utica, N. Y	July 15, 1851.
Meat-cutting machines	Thomas Vanderslice	Valley Forge, Penn	May 6, 1851.
Peeling and cutting peaches	Joshua O. Ward	Pleasant Valley, Dutchess co., N. Y	Oct. 21, 1851.
Quilting frames and apparatus	Abraham Kaufman	Orrstown, Penn	Jan. 1, 1851.
Sad-irons	Edward Clapp, assignor to Ed. Clapp & George Alden	Dedham, Mass	Feb. 25, 1851.
Sad-irons, removable handles to	Theodore R. Timby	Meridian, N. Y	Mar. 18, 1851.
Tables, ladies' work	Celia R. P. Foster, late Celia R. P. Wood	Canandaigua, N. Y	April 8, 1851.
Tables, leaves, fastening down of	Lewis J. Mason	Franklinville, N. Y	April 8, 1851.
Tables, extension	Francis Hoguet	Philadelphia, Pa	Feb. 25, 1851.
Tables, extension	Lewis Thorn	Philadelphia, Pa	Mar. 25, 1851.
Wash-boards	William T. Barnes	Buffalo, N. Y	June 17, 1851.
Washing apparatus	James T. King	Baltimore, Md	Oct. 21, 1851.
Washing machines	John O'Neil	Xenia, O	June 10, 1851.
Washing machines	John Boardman	Little Valley, N. Y	June 15, 1851.
Washing machines	David Allen	St. Louis, Mo	Aug. 26, 1851.
Washing machines	Erastus Lawrence	Dublin, Ind	Sept. 9, 1851.
Window-curtain fastening	Hugh Guyer	Albany, N. Y	Mar. 11, 1851.
Window-curtain fixtures	S. S. Putnam	Boston, Mass	April 15, 1851.

V.—*Classified list of patents, &c.*—Continued.

Class XVIII.—*Arts, polite, fine, and ornamental, including music, painting, sculpture, engraving, books, paper, printing, binding, jewelry, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Account-books, machines for numbering the pages of	John McAdams	Boston, Mass.	Aug. 12, 1851.
Æolean attachments	Gustavus W. Ingalls	Concord, N. H.	Dec. 23, 1851.
Books, machine for finishing the backs of	Charles Starr	New York, N. Y.	June 24, 1851.
Carving machines	Lewis S. Chichester	Williamsburg, N. Y.	June 3, 1851.
Copying presses	A. A. Wilder	Detroit, Mich.	Mar. 11, 1851.
Daguerreotype apparatus	William, Wm. H. & H. J. Lewis	New York, N. Y.	Nov. 11, 1851.
Daguerreotype pictures	Charles J. Anthony	Pittsburg, Pa.	Jan. 1, 1851.
Daguerreotype plates, buffing apparatus for	William & Wm. H. Lewis	New York, N. Y.	July 22, 1851.
Daguerreotype, securing in monumental stones	Solon Jenkins, jr.	West Cambridge, Mass.	Mar. 11, 1851.
Embossing backs of books, tool for	Charles Starr	New York, N. Y.	Jan. 21, 1851.
Enameling mouldings, &c., machinery for	Robert Marcher	Cornwall, Orange county, N. Y.	Oct. 21, 1851.
Ink-stands	Henry Whitney, jr.	Cambridge, Mass.	July 1, 1851.
Ink-stands, fountain	Francis Draper	East Cambridge, Mass.	Jan. 7, 1851.
Jasper mineral, composition resembling	John Paige Pepper	New Britain, Hartford county, Conn.	Dec. 16, 1851.
Lenses, adjusting	William & William H. Lewis	New York, N. Y.	Dec. 16, 1851.
Marble, imitating	Hiram Tucker	Cambridge, Mass.	Oct. 14, 1851.
Musical instruments, bellows for	Marvin Smith	New Haven, Conn.	Feb. 25, 1851.
Organs and piano fortes, combining	R. M. Ferris	New York, N. Y.	Dec. 16, 1851.
Pens, fountain	N. A. Prince	New Gloucester, Cumberland co., Me.	Sept. 30, 1851.
Pens for ruling paper	Alfred Hathaway	Boston, Mass.	Jan. 28, 1851.
Photographic purposes, mercury baths for	John Moulson	Philadelphia, Pa.	Sept. 2, 1851.
Piano fortes	Michael Miller	Rochester, Monroe county, N. Y.	July 1, 1851.
Piano fortes	L. H. Browne	Boston, Mass.	Sept. 23, 1851.
Piano fortes	T. Gilbert	Boston, Mass.	Sept. 30, 1851.
Piano fortes	Frederick Mathushek	New York, N. Y.	Oct. 28, 1851.
Piano fortes	John Buck	New York, N. Y.	Mar. 11, 1851.
Piano forte action	Randolph Kretor	New York, N. Y.	Sept. 9, 1851.
Piano forte action	R. M. Kerrison	Philadelphia, Pa.	Sept. 9, 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Piano forte action	James A. Gray	Albany, N. Y.	Sept. 9, 1851.
Piano forte horizontal, square	George Bacon & Richard Raven	New York, N. Y.	Aug. 26, 1851.
Piano forte strings	Henry J. Newton	New York, N. Y.	Oct. 21, 1851.
Piano fortes, upright	Henry Klepfer	Cincinnati, Ohio	Mar. 25, 1851.
Printing house paper, machines for	Milton D. Whipple, assignor to Essex Company	Lowell, Mass.	Sept. 16, 1851.
Printing in colors, machines for	Richard S. Weaver	Maysville, Ky.	Oct. 28, 1851.
Printing names of subscribers on newspapers, &c.	Henry Moeser	Pittsburg, Pa.	June 24, 1851.
Printing presses	Stephen P. Ruggles	Boston, Mass.	Jan. 1, 1851.
Printing presses	George P. Gordon	New York, N. Y.	Aug. 5, 1851.
Printing presses	Jacob Worms, assignor to J. Phalem	Paris, France; New York, N. Y.	Sept. 23, 1851; French patent dated May 19, 1849.
Printing presses	John R. Hathaway & John P. Strippel	Norfolk, Va.	Oct. 21, 1851.
Printing presses	T. H. Dodge	Nashua, Hillsborough county, N. H.	Nov. 18, 1851.
Ruling machines, regulators for the penbeam in	W. O. Hickok	Harrisburg, Pa.	June 17, 1851.
Ruling paper, machines for	G. L. Wright and J. Ames	Springfield, Mass.	Dec. 23, 1851.
Sounding boards, for musical instruments, construction of	C. Bogart	Charlestown, Mass.	Dec. 9, 1851.
Stamps, hand	Stephen P. Ruggles	Boston, Mass.	Sept. 23, 1851.
Stamps, letter	Benjamin Chambers	Washington, D. C.	Sept. 23, 1851.
Stereotype plates, moulding and casting	Charles Hobbs	New York, N. Y.	Sept. 2, 1851.
Type-casting machines	John J. Sturgess, ass'r to H. H. Green	New York, N. Y.	Sept. 9, 1851.
Violins, &c., construction of	William B. Tilton	Carrollton, Ala.	Sept. 2, 1851.
Wind instruments, the mouth-piece for	Charles L. Meech	Preston, New London county, Ct.	Oct. 21, 1851.
Writing, apparatus for giving ease to the arm in	Jos. G. Goshen and Wm. H. Towers	Sherleysburg, Pa., Bucyrus, Ohio	April 29, 1851.

Class XIX.—*Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Cannon, for throwing chain-shot	Adam Lemmer	Newark, N. J.	Nov. 18, 1851.
Fire-arms, breech-loading	Edward Maynard	Washington, D. C.	May 27, 1851.
Fire-arms, breech-loading	Horace Smith, assignor to Courtland Palmer	New York, N. Y.	Aug. 26, 1851.
Fire-arms, revolving breech	P. W. Porter	Memphis, Tenn.	July 8, 1851.

V.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Fire-arms, revolving breech	James Warnen	Springfield, Mass	July 15, 1851.
Lock, fly-tumbler, for fire-arms	Stanhope W. Marston	New York, N. Y	Jan. 7, 1851.
Pistols, revolving breech	Joshua Stevens, assignor to Massachusetts Arms Company	Chicopee, Hampden county, Mass	Oct. 7, 1851.
Repeating fire-arms, means for revolving the breeches of	James Warnen	Springfield, Mass	Jan. 7, 1851.

Class XX.—*Surgical and medical instruments, including trusses, dental instruments, bathing apparatus, &c.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Baths, shower	William H. Brown	Worcester, Worcester county, Mass	Oct. 14, 1851.
Dental hydraulic cups	James Harrison	Jamestown, Chatauque county, N. Y	Aug. 26, 1851.
Forceps, dental	J. C. Burch	Evansville, Ia	Sept. 9, 1851.
Scarificators	Frederick Leypoldt	Philadelphia, Pa	May 20, 1851.
Shoulder-braces, combined with abdominal supporters	John S. Dare	Knightstown, Ia	Aug. 12, 1851.
Sight, means of renovating and correcting	Jonathan Ball	New York, N. Y	April 22, 1851.
Soda powders, &c., machines for crimping package papers for	Carlos A Cook	Lowell, Mass	Dec. 2, 1851.
Stammering, instruments for the cure of	Robert Bates	Philadelphia, Pa	Sept. 30, 1851.
Stethescopes	Nathan B. Marsh	Cincinnati, Ohio	Dec. 16, 1851.
Supporters, abdominal	Moses L. Knapp	Painesville, Ohio	Jan. 28, 1851.
Supporter, abdominal	Allen J. Lonsbury	Somerville, Fayette county, Tenn	Nov. 11, 1851.
Teeth, mineral setting	John Allen	Cincinnati, Ohio	Dec. 23, 1851.
Teeth, porcelain inserting	William Willshire Riley	Columbus, Ohio	Nov. 18, 1851.
Teeth, setting	Adolph F. Ahrens	Philadelphia, Pa	May 13, 1851.
Teeth, setting	Adolph F. Ahrens	Philadelphia, Pa	May 13, 1851.

Class XXI.—*Wearing apparel, articles for the toilet, &c., including instruments for manufacturing.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Buttons, silk, covered	H. Heinemann	New York, N. Y	July 8, 1851.
Combs, cutting machines	Horace S. Cook, assignor to H. S. Cook and S. Colbron	Leominster, Mass	June 3, 1851.
Combs, cutting machines	Thomas W. Hill	Leominster, Mass	June 10, 1851.
Combs, machines for cutting	S. Curtis	Newtown, Fairfield county, Ct	Nov. 18, 1851.
Fastenings, for garments	Elias Howe, jr	Cambridge, Middlesex, Mass	Nov. 25, 1851.
Garments, apparatus for pressing	Joseph W. Thorpe	South Weare, Hillsborough co., N. H	Dec. 16, 1851.
Hat bodies, machines for making	Daniel Barnam	Philadelphia, Pa	July 1, 1851.
Hats, machines for pressing	John Stearns	Templeton, Worcester county, Mass	July 8, 1851.
Hooks and eyes, fastening to paper cards	Chester J. Carrington	Waterbury, Ct	Sept. 9, 1851.
Hooks and eyes, wire	Charles Atwood	Derby, New Haven county, Ct	July 1, 1851.
Suspenders	Julius Hotchkiss, ass'r to the Hotchkiss and Meriman Manufacturing Co.	Waterbury, New Haven county, Ct	Dec. 23, 1851.
Sword canes	S. A. Hudson	Worcester, Mass	Sept. 9, 1851.
Tailors' measures	James McGinnis	Lockport, N. Y	Dec. 2, 1851.
Tailors' measures	Edward Virtue	Philadelphia, Pa	Dec. 16, 1851.

Class XXII.—*Miscellaneous.*

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Ayes and noes, machine for taking	G. William Yerby	Washington, D. C	Aug. 5, 1851.
Boxes, machine for cutting out the corners and scoring the edges of paper for	Andrew Dennison	Brunswick, Me	Dec. 4, 1851, antedated April 15, 1851.
Box opener	Geo. C. Taft	Worcester, Worcester county, Mass	Oct. 21, 1851.
Baby jumper	C. Rice	Elizabethtown, N. J	Oct. 28, 1851.
Burglar alarms	John G. Bolen	New York, N. Y	Oct. 21, 1851.
Cork cutting machine	William King	New York, N. Y	July 8, 1851.

V.—*Classified list of patents, &c.*—Continued.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.
Corks, machines for cutting	George Hammer	Philadelphia, Pa	Oct. 14, 1851.
Fly trap	Harvey Snow and Luther P. Smart	Lowell, Mass	July 29, 1851.
Harpoon, exploding	Charles Burt	Belfast, Me	May 6, 1851.
Horn and shells, machines for splitting	Jabez Robins, assignor to Joel R. Morse	Leominster, Mass	June 24, 1851.
Ice, process for the artificial production of	John Gorrie	New Orleans, La	In England, Aug. 22, 1850; in U. S., May 6, 1851.
Ratans, machinery for cutting, &c.	Sylvanus Sawyer	Templeton, Mass	June 24, 1851.
Swings, portable	Enoch S. Farson	Philadelphia, Pa	May 27, 1851.
Tenpins, apparatus for setting up	Thomas J. Sloan	New York, N. Y	April 8, 1851.
Tenpins, method of setting up	Thomas E. Shull	Lewistown, Mifflin county, Pa	Dec. 23, 1851.
Water closets, portable	George R. Wilmot	Meriden, New Haven county, Conn	Oct. 21, 1851.
Yeas and nays, machines for taking	Thos. B. Stout and Jas. F. Morrell	Keyport, N. J	Oct. 28, 1851.

PATENTS REISSUED DURING THE YEAR 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.	Reiss'd.
				1851.
Augers, method of attaching to their handles	Esther L. Larkin, administratrix of Jno. E. Larkin, deceased.	Milton, N. Y	Nov. 19, 1850	June 17
Bats for felting, &c., machinery for forming	Thos. R. Williams, assig'r to J. B. Hyde	New York, N. Y	Dec. 14, 1840	May 6
Bats in felting, &c., machinery for hardening	Thos. R. Willliams, assig'r to J. B. Hyde	New York, N. Y	Dec. 14, 1840	May 6
Boiler, steam, and furnace thereof	Horace Boardman	Plattsburg, N. Y	Aug. 14, 1849	Feb. 25
Carriages	John Jones	Clyde, N. Y	Jan. 14, 1851	Mar. 4
Composition for covering hams, &c	Horace Billings	Beardstown, Ill	April 9, 1850	Mar. 25
Cut-off and working the valves of steam-engines	George H. Corliss	Providence, R. I	Mar. 10, 1849	May 13
Door locks	John P. Sherwood, assignor to Calvin Adams.	Pittsburg, Pa	Dec. 17, 1842	May 13

Inventions or discoveries.	Patentees.	Residence.	Date of patent.	Reiss'd.
Evaporators and condensors	Edward Lynch	Brooklyn, N. Y	July 18, 1848	Mar. 11
Felloes for the wheels of carriages and wagons, machine for setting or bending.	Edward Reynolds	Haddonfield, N. J	July 17, 1835, extended.	Jan. 1
Fire-arms	William W. Hubbell	Philadelphia, Pa	July 1, 1844	Mar. 11
Guages, steam and vacuum	Paul Stillman	New York, N. Y	May 9, 1848	July 29
Jacquard, machinery for weaving all kinds of figured cloth.	Alexander Calderhead	Philadelphia, Pa	Feb. 3, 1841	May 13
Manifold permutation locks	Robert Newell	New York, N. Y	Sept. 25, 1838	Dec. 2
Mouldings, machinery for making	Alfred T. Serrell	New York, N. Y	May 16, 1848	Jan. 7
Mowing machine	Wm. F. Ketchum	Buffalo, N. Y	July 10, 1847	Oct. 21
Paper-folding machines	Edward N. Smith, assignor through others to American Paper-folding Co.	West Brookfield, Mass. Springfield, Mass	Nov. 27, 1849	Jan. 7
Paper, rag; machines for cleaning	James Phelps	West Sutton, Mass	Nov. 24, 1843	Mar. 25
Sewing machines	Sherburn C. Blodget and John A. Lerow.	Georgetown, Mass., and Boston, Mass.	Oct. 2, 1849	Jan. 4
Sofa bedsteads	Russell Scarritt	St. Louis, Mo	Oct. 8, 1850	Jan. 7
Stone dressing	Charles Wilson	Springfield, Mass	Mar. 13, 1847	Mar. 4
Scythes to the snath, fastenings of	E. S. Clapp	Montague, Franklin co., Mass.	Mar. 18, 1851	July 8
Screw wrench	Solyman Merrick	Springfield, Mass	Original patent, Aug. 17, 1835; reissued May 17, 1842; extended 7 years from August 17, 1849.	Nov. 25
Tanning processes	Harmon Hibbard, assignor to W. W. Reid.	Rochester, N. Y	Oct. 16, 1849	Feb. 11
Thread, machinery for doubling, twisting, and reeling.	Frank Cheney	Manchester, Conn	Oct. 9, 1847	Apr. 29

CLASSIFIED LIST OF PATENTS.—DESIGNS.

Designs.	Patentees.	Residence.	Date of patent.
Bedsteads	P. M. Hutton	Troy, N. Y	May 20, 1851.
Bedsteads, cast iron	Pelatiah M. Hutton	Troy, N. Y	Sep. 2, 1851.
Bust of Jenny Lind	Thomas Ball	Boston, Mass	April 29, 1851.
Clock frame	Nathaniel A. Batchelor	New York, N. Y	May 13, 1851.
Comb for ladies	Aaron Cook	Newtown, Fairfield co., Conn	Aug. 19, 1851.

V.—*Classified list of patents, &c*—Continued.

Designs.	Patentees.	Residence.	Date of patent.
Floor oil-cloth	James Hutchinson, assignor to D. A. E and N. Powers	Troy, N. Y.; Lansingburg, N. Y.	May 13, 1851.
Fences, cast iron	John T. Davy	Troy, N. Y.	Oct. 21, 1851.
Floor oil-cloth	James Hutchinson, assignor to Deborah, Albert E., and N. B. Powers	Troy, N. Y.; Lansingburg, N. Y.	Sep. 2, 1851.
Furnace registers	Gardner Chilson	Boston, Mass	Mar. 4, 1851.
Furnace registers	Gardner Chilson	Boston, Mass	Mar. 4, 1851.
Furnace registers	Gardner Chilson	Boston, Mass	Mar. 4, 1851.
Furnace registers	Gardner Chilson	Boston, Mass	Mar. 4, 1851.
Gates, metallic	Ebenezer Weeman	Charlestown, Mass	Sep. 16, 1851.
Grates, parlor	Joseph Pratt	Boston, Mass	Mar. 25, 1851.
Grates, parlor	Winslow Ames, assignor to Hartshorn and Ames	Nashua, N. H.; Boston, Mass	April 1, 1851.
Hat stand	Charles Muller	Tompkinsville, Richmond co., N. Y.	Nov. 18, 1851.
Iron railing	Frederick Fitzgerald, assignor to Silas C. Herring and John Ryer	New York, N. Y	Nov. 18, 1851.
Pedestals and columns	W. and W. H. Lewis	New York, N. Y	Mar. 25, 1851.
Presses, mantel-pieces, &c., for frames for	Edmund L. Freeman	Bellville, Jefferson co, N. Y.	Dec. 23, 1851.
Shovel, stands for	Charles Zeuner, assignor to M. Greenwood & Co.	Cincinnati, Ohio	Sep. 9, 1851.
Stoves	R. J. Blanchard, assignor to Learned and Thatcher	Albany, N. Y.	July 29, 1851.
Stoves	R. J. Blanchard, assignor to Learned and Thatcher	Albany, N. Y.	July 29, 1851.
toves	R. J. Blanchard, assignor to Learned and Thatcher	Albany, N. Y.	July 29, 1851.
Stoves	Silas Merchant	Cleveland, Ohio	Sep. 2, 1851.
Stoves	Sam. H. Sailor, assignor to North, Harrison, and Chase	Kensington, Philadelphia co., Pa.; Philadelphia, Pa.	Sep. 2, 1851.
Stoves	Anthony W. Jones, assignor to James McGregor, jr.	New York, N. Y.; Troy, N. Y.	Sep. 2, 1851.
Stoves	Lyman Cobb	Akron, Summit co., Ohio	Oct. 14, 1851.
Stoves	Charles J. Woolson	Cleveland, Ohio	Oct. 14, 1851.

Stoves	William Savery	New York, N. Y.	Oct. 21, 1851.
Stoves	Ezra Ripley, assignor to Chollar, Sage, and Dunham	Troy, N. Y.	Oct. 28, 1851.
Stoves	S. W. Gibbs, assignor to North, Harrison, and Chase	Albany, N. Y.; Philadelphia, Pa.	Nov. 11, 1851.
Stoves	W. Ames, assignor to J. Hartshorn and W. Ames	Nashua, Hillsborough co., N. H.	Dec. 9, 1851.
Stoves	Jeremiah D. Green, assignor to Bachus, Bacon & Co.	Troy, N. Y.; Le Roy, N. Y.	Dec. 9, 1851.
Stoves	Samuel W. Gibbs, assignor to Jagger, Tredwell, and Perry	Albany, N. Y.	Mar. 4, 1851.
Stoves	Samuel W. Gibbs, assignor to Jagger, Tredwell, and Perry	Albany, N. Y.	Mar. 4, 1851.
Stoves	Samuel W. Gibbs, assignor to Jagger, Tredwell, and Perry	Albany, N. Y.	Mar. 4, 1851.
Stoves	Samuel W. Gibbs, assignor to Jagger, Tredwell, and Perry	Albany, N. Y.	June 10, 1851.
Stoves	John S. Perry	Albany, N. Y.	Mar. 4, 1851.
Stoves	J. Wager, D. Pratt, and V. Richmond	Troy, N. Y.	May 20, 1851.
Stoves	Ezra Ripley, assignor to D. Stafford & Co.	Troy, N. Y.	May 27, 1851.
Stoves	N. P. Richardson	Portland, Maine	May 27, 1851.
Stoves	William L. Hathaway	Deighton, Mass.	May 27, 1851.
Stoves	W. L. Sanderson, assignor to R. R. Finch	Troy, N. Y.; Peekskill, N. Y.	June 3, 1851.
Stoves	A. Cox, E. Johnson, and D. B. Cox	Troy, N. Y.	June 10, 1851.
Stoves	A. Cox, E. Johnson, and D. B. Cox	Troy, N. Y.	June 10, 1851.
Stoves	W. G. Hallman	Philadelphia, Pa.	June 10, 1851.
Stoves	Jno. F. Rathbone	Albany, N. Y.	June 10, 1851.
Stoves	D. Stuart and J. Beesley, assignors to W. P. Cresson	Philadelphia, Pa.	June 10, 1851.
Stoves	Joseph G. Lamb	Cincinnati, Ohio	June 17, 1851.
Stoves	Joseph G. Lamb	Cincinnati, Ohio	June 17, 1851.
Stoves	Samuel A. House	Mechanicsville, N. Y.	June 24, 1851.
Stoves	W. C. Davis	Cincinnati, Ohio	July 8, 1851.
Stoves	N. S. Vedder, assignor to A. T. Dunham & Co.	Troy, N. Y.	July 29, 1851.
Stoves	Charles Gilbert and Mitchel G. Hallman, assignors to Charles Gilbert	Philadelphia, Pa.	Jan. 1, 1851.
Stoves	Elihu Smith	Albany, N. Y.	Jan. 7, 1851.
Stoves	Joseph G. Lamb	Cincinnati, Ohio	Jan. 21, 1851.

V.—*Classified list of patents, &c.*—Continued.

Designs.	Patentees.	Residence.	Date of patent.
Stoves	Sam. W. Gibbs, assignor to North, Harrison & Co	Albany, N. Y.; Philadelphia, Pa	Jan. 21, 1851; antedated Dec. 31, 1850.
Stoves	Conrad Harris and Paul W. Goiner	Cincinnati, Ohio	Jan. 28, 1851.
Stoves	Seth Williams, assignor to William Bird & Co	Nashua, N. H.; N. Chelmsford, Mass	April 8, 1851.
Stoves	James V. De Witt	Buffalo, N. Y	July 8, 1851.
Stoves	Samuel W. Gibbs, assignor to Jagger, Tredwell, and Perry	Albany, N. Y	April 8, 1851.
Stoves, air tight	N. P. Richardson	Portland, Maine	April 1, 1851.
Stoves, air tight	Frederick Schultz	Philadelphia, Pa	April 1, 1851.
Stoves, cooking	S. W. Gibbs, assignor to North, Harrison, and Chase	Albany, N. Y.; Philadelphia, Pa	July 8, 1851.
Stoves, cooking	John F. Rathbone	Albany, N. Y	July 8, 1851.
Stoves, cooking	William C. Davis	Cincinnati, Ohio	Jan. 1, 1851.
Stoves, cooking	Sam. W. Gibbs, assignor to Jagger, Tredwell, and Perry	Albany, N. Y	Jan. 21, 1851.
Stoves, cooking	Sam. A. House	Mechanicsville, N. Y	Feb. 4, 1851.
Stoves, cooking	S. H. Sailor, assignor to Warwick, Seibrandt & Co	Philadelphia, Pa	Feb. 25, 1851.
Stoves, cooking	Dutee Arnold	Providence, R. I	April 15, 1851.
Stoves, cooking	John Abendroth	Port Chester, N. Y	April 15, 1851.
Stoves, cooking	John F. Rathbone	Albany, N. Y	July 8, 1851.
Stove doors and panels	M. C. Burleigh	Somersworth, N. H	May 13, 1851.
Stove fronts	Ezra Ripley	Troy, N. Y	Sep. 30, 1851.
Stove, parlor	Ezra Ripley and N. S. Vedder, assignors to Lowe and Hicks	Troy, N. Y	Nov. 25, 1851.
Stoves, parlor	Joseph Pratt	Boston, Mass	July 8, 1851.
Stoves, parlor, plates of	Apollos Richmond, assignor to A. C. Barstow & Co	Providence, R. I	July 15, 1851.
Stove or furnace for a ventilating	E. P. Penniman, assignor to H. Ruttan	Rochester, N. Y.; Coburg, Canada	Sep. 16, 1851.
Stove plates	Lyman S. Hapgood	Boston, Mass	June 3, 1851.
Stove plates	Elijah P. Penniman	Rochester, N. Y	July 15, 1851.
Stove plates	Elijah P. Penniman	Rochester, N. Y	July 15, 1851.

Stove, plates of, Franklin	John F. Rathbone	Albany, N. Y	July 8, 1851
Stove registers	David Stuart and Jacob Beesley, assignor to W. P. Cresson	Philadelphia, Pa	Dec. 2, 1851.
Stove plates	Calvin Fulton	Rochester, N. Y	Sep. 2, 1851.
Stove plate, parlor	Apollos Richmond, assignor to A. C. Barstow & Co	Providence, R. I	Nov. 18, 1851.
Stoves, parlor	Samuel A. House	Mechanicsville, N. Y	Feb. 4, 1851.
Table	Nathan Chapin	Syracuse, Onondaga co., N. Y	Sep. 30, 1851.
Tomb, cast iron	H. K. Flinchbaugh	Conestoga, Pa	June 22, 1851.
Umbrella stands	Edward J. Delany, assignor to Hareis and Adamson	Philadelphia, Pa	Feb. 18, 1851.
Water coolers	W. Burnett	Cincinnati, Ohio	July 8, 1851.

PATENTS EXTENDED DURING THE YEAR 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of original patent.	Term of extension.
Brick machines	Nathaniel Adams	Cornwall, Orange co., Ct	Sept. 8, 1837.	7 y'rs from Sept. 8, 1851.
Car, railroad, supporting bodies	Richard Imlay	Philadelphia, Pa	Sept. 21, 1837.	7 ...do... Sept. 21, 1851.
Horse rake	Thos. D. Dewey, adm. of David Dewey	East Poultney, Vt	Nov. 23, 1837.	7 ...do... Nov. 23, 1851.
Looms	Edson Fessenden, conservator of Wm. Crampton	Hartford, Ct	Nov. 25, 1837.	7 ...do... Nov. 25, 1851.
Loom power for weaving coach-lace	Erastus B. Bigelow	Clinton, Mass	Ap'l 20, 1837.	7 ...do... Ap'l 20, 1851.
Plough	Bancroft Woodcock	Late of Mt. Pleasant, Pa., now of Wheeling, Va	June 14, 1837.	7 ...do... June 14, 1851.
Pressing cloth, paper, &c	Moses Bailey	Salisbury, Mass	July 5, 1837.	7 ...do... July 5, 1851.
Spinning woollen roving	C. H. Titcomb, adm'r of E. M. Titcomb, deceased	Late of Andover, Mass	July 29, 1837.	7 ...do... July 29, 1851.
Threshing and cleaning grain, machine for	John A. & Hiram A. Pitts	Springfield, O., and Alton, Ill.	June 29, 1837.	7 ...do... June 29, 1851.

V.—*Classified list of patents, &c.*—Continued.

ADDITIONAL IMPROVEMENTS GRANTED DURING THE YEAR 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.	Improvements added.
Churns	John O'Neil	Xenia, Ohio	July 30, 1850.	May 13, 1851.
Bedsteads	Henry Pace, sen.	Cincinnati, Ohio	Dec. 10, 1846.	Nov. 4, 1851.
Dye-stuff from spent madder, preparation of	Frederick Pianner	Providence, R. I.	Sept. 13, 1845.	Sept. 2, 1851.

DISCLAIMERS ENTERED DURING THE YEAR 1851.

Inventions or discoveries.	Patentees.	Residence.	Date of patent.	Disclaimers entered.
Crackers, cutting	William R. Nevins	New York, N. Y.	Oct. 17, 1835.	June 6, 1851.
Hide-handling cylinders, beaters in	James R. Innis	Easton, Pa.	Mar. 19, 1850.	Jan. 24, 1851.
Heddles wire, machinery for making	Abijah H. Williams	Utica, N. Y.	Sept. 11, 1849.	Mar. 6, 1851.

VI.

Alphabetical list of patentees for the year 1851.

No.	Patentees.	Inventions or discoveries.	Class.
7896	Abbott, Theodore T.	Tires for railroad car wheels	X.
368	Abendroth, John	Stoves, cooking	Design.
8501	Adams, Benjamin F.	Cutters, cheese, butter, and bread	XVII.
	Adams, Calvin. (See John P. Sherwood.)		
8477	Adams, Henry W.	Zinc, white, use of steam to make	IV.
	Adams, Nathaniel	Brick machine	Extension.
8091	Ahrens, Adolph F.	Teeth, setting	XX.
8091	Ahrens, Adolph F.	Teeth, setting	XX.
8282	Akins, William H., and J. D. Felthousen	Sewing machines	III.
8280	Akrill, John	Pottery and other ware, working clay for.	XV.
8309	Allen, David	Washing machines	XVII.
8621	Allen, John	Teeth, mineral, setting	XX.
7897	Allen, John L.	Carriage tops, raising	X.
8157	Allen, Nicholas T.	Harvesters, grain	I.
8240	Ambrose, D. R., and O. L. Reynolds	Cloth-folding machines	III.
	American Paper-folding Co. (See Edward N. Smith.)		
8619	Ames, J., and G. L. Wright	Ruling paper, machines for	XVIII.
362	Ames, Winslow, assignor to Hartshorn & Ames	Grates, parlor	Design.
429	Ames, W., assignor to Hartshorn & Ames	Stoves	Design.
8169	Anderson, Charles	Boilers, revolving	VI.
7981	Andrews, Elijah A.	Trunk handles	XVI.
7905	Andrews, Joseph E.	Steering apparatus	VII.
7865	Anthony, Charles I.	Daguerreotype pictures	XVIII.
8502	Anthony, David, sen	Scythe fastenings, construction of	I.
7881	Armsby, Joshua M. C.	Corn shellers	XIII.
8180	Armstrong, Samuel T.	Gutta-percha hollow ware	IV.
8147	Arnold, Alonzo C.	Bats for felt cloth, &c , crossing the fibres in forming	III.
367	Arnold, Dutee	Stoves, cooking	Design
7934	Ashcroft, E. H	Boilers, steam, insulated fusible plug for.	VI.
8198	Atwood, Charles	Hooks and eyes, wire	XXI.
	Atwood & Kellog. (See Chas. Todd.)		
8136	Avery, Cyrus	Horse power	XIII.
8045	Avery, Samuel	Blind slats, apparatus for operating	II.
7950	Avery, Thos. C.	Electro-magnetic engines	VIII.
8067	Babcock, Robert G.	Horse-shoe machine	II.
8320	Bacon, Geo., and Rd. Raven	Piano fortes, horizontal, square	XVIII.
	Backus, Bacon & Co., assignors. (See Jere. D. Green.)		
8196	Bailey, T. R.	Lathes	XIV.
7882	Baird, David	Mattresses, spring, for invalids	XVII.
	Baker, Wm. E. (See Grover & Baker)		
8553	Baldwin, Cyrus, assignor to Stark Mills	Looms for weaving bags	III.
8049	Ball, Jonathan	Light, means of renovating and correcting	XX.
369	Ball, Thomas	Bust of Jenny Lind	Design.
8344	Ball, William	Gold amalgamator	II.
8602	Ball, William	Pumps for elevating water mixed with mineral substances	XI.
8381	Banister, Isaac	Shoe latchets	XVI.
7951	Banks, Joseph	Buildings, iron, connexion for the beams and columns of	IX.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
8243	Bantz, Sidney A., and Wm. Andrews	Mills for grinding corn and cobbs	XIII.
8125	Barlow, Nelson	Planing machines	XIV.
8161	Barnes, William T	Wash boards	XVII.
8116	Barnhill, Jacob	Planters, seed	I.
8195	Barnum, Daniel	Hat bodies, machines for making	XXI.
8563	Barrows, Thomas	Cloth, machines for stretching and drying	III.
8262	Barsantee, John H	Knitting machines	III.
8520	Bascom, Alonzo	Yarns, sizing and dyeing, apparatus for	III.
8603	Bass, William L	Lock, chronometric	II.
8418	Batchelder, John M	Telegraph wires, insulators for	VIII.
372	Batchelor, Nathaniel A	Clock frames	Design.
	Bates, John W., assignor. (See L. Lillie.)		
8394	Bates, Robert	Stammering, instrument for the cure of.	XX.
	Bayley, Moses	Pressing cloth, paper, &c	Extension.
8573	Beadleston, Ambrose S	Furnace, revolving reverberatory	II.
8504	Bean, Jonathan	Winnowing machines, screens of	I.
7923	Beardsley, Backus A	Stoves, cooking	V.
8098	Beardslee, George W	Planing machines	XIV.
8497	Beardsley, George W	Planing machines	XIV.
8426	Beatty, Charles H	Lock, door	II.
8503	Bee, Benjamin F	Planes, hand	XIV.
8140	Beech, Ralph B	Earthenwares, baked, ornamenting	XV.
7949	Beers, John D., and Isaac Winslow	Planing machines	XIV.
7937	Beers, Philo S	Irregular forms, machines for turning	XIV.
	Bell & Christie. (See Maria Vaughn.)		
	Bell & Christie. (See Maria Vaughn.)		
8574	Bell, Daniel D	Potato diggers	I.
7883	Bennet, Phineas	Pumps, rotary	XI.
8137	Bessemer, Henry	Cane juices, machines for expressing	IV.
8123	Biddle, William	Weighing machines for grain, self	XII.
7898	Bigelow, Erastus B	Looms for weaving piled fabrics	III.
7884	Bigelow, Erastus B	Looms for weaving tapestry carpets with particolored warp	III.
7982	Bigelow, Erastus B	Weaving, delivering particolored warps in	III.
7983	Bigelow, Erastus B	Looms, jacquard, for weaving cut-pile fabrics	III.
	Bigelow, Erastus B	Loom power for weaving coach lace	Extension.
8539	Bigelow, E. B	Woven fabrics, wires for making pile in.	III.
7899	Billings, A. M	Hubs and axles, connecting and disconnecting	X.
195	Billings, Horace	Composition for covering hams, &c	Reissue.
	Bird, Henry M. (See Daniel Wilson, jr.)		
8105	Bissell, Levi	Springs, carriage	X.
8498	Bissel, Levi, assignor to Levi Bissel and Lyman Kinsley	Springs, carriage	X.
8086	Bixby, Rufus, Cyrus Bixby, and John Garst	Planing machines	XIV.
8184	Blanc, John	Hemp, manufacture of, from okra	III.
401	Blanchard, Reuben J., assign'r to Learned & Thatcher	Stoves	Design.
402	Blanchard, Reuben J., assign'r to Learned & Thatcher	Stoves	Design.
403	Blanchard, Reuben J., assign'r to Learned & Thatcher	Stoves	Design.
8440	Bliss, Alfred	Cans or canister, tops of	II.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
188	Blodget, Sherburne C., and John A. Lerow	Sewing machines	Reissue.
190	Boardman, Horace	Boiler, steam, and furnace thereof	Reissue.
8215	Boardman, John	Washing machines	XVII.
8102	Boardman, Luther	Spoon, &c., manufacture of, wire strengthened	II.
8575	Bogart, C	Sounding boards for musical instruments, construction of	XVIII.
8441	Bogert, Charles A	Stoves, air heating	V.
8439	Bolen, John G	Burglar alarms	XXII.
8442	Boone, Thomas G	Ships' winches	VII.
8005	Boot, Henry	Cloth, machines for folding and measuring	III.
8508	Booth, Ezekiel, & Ezra Ripley	Car seats	X.
8033	Booth, Jonathan L	Winnowing machines	I.
8216	Bottum, J. H	Lathes, securing pinions, &c., of watches in	XIV.
8114	Boyden, Otis	Alloys of iron, zinc, and nickel	IV.
8068	Boynton, Leander W	Bats for felting, making	III.
8287	Boynton, L. W	Wool, machines for cleansing	III.
8242	Boynton, N. A	Stoves, parlor cooking	V.
8365	Brandeis, L	Bronze powder, processes of making	IV.
8404	Brett, Ephraim C	Flocks, machines for opening and cleaning	III.
7959	Brewer, William, and John Smith	Paper molds	III.
8133	Briggs, Joseph W	Collars for harness	XVI.
7965	Briggs, Luther, jr	Hammers, trip, method of adjusting the stroke	II.
8142	Brown, Charles F	Rudder, balanced	VII.
8164	Brown, Charles F	Masts and spars, telescopic connexion of.	VII.
	Brown, Daniel. (See Strevell & Brown.)		
	Brown, H. L. & C. P. (See Foster, Jessup, Brown & Brown.)		
	Brown, John. (See Guild & Brown.)		
8269	Brown, Luther	Brick machines	XV.
8383	Browne, L. H	Piano fortes	XVIII.
8319	Brown, Samuel	Kilns, lime	XV.
8421	Brown, Wm. H	Baths, shower	XX.
8217	Browning, Edwin K	Mattress-stuffing, &c., machines for cutting wood into shreds, and crimping them for	XVII.
8464	Brooks, Merrit S.	Augers, &c., to their handles, means for attaching	XIV.
8036	Broquette, Charles A	Calico printing, material for transferring colors in	IV.
	Brundage, Edwin L. (See Stilwell & Brundage.)		
	Brundage, E. L. (See Ripley & Brundage.)		
8111	Brunk, Henry	Lap anvils for shoemakers	XVI.
8266	Bryan, Wm. H.	Boats to facilitate the discharge of cargoes, &c., fittings for	VII.
8283	Bryant, M. C.	Looms for weaving cut-pile fabrics	III.
8036	Buckingham, John, and Joseph H. Baird, assignor to Scovill Manufacturing Co	Milling tool	II.
8443	Buffum, Arnold	Ore washer	II.
8321	Bulkley, Chas. S.	Telegraphs, means for obviating difficulties arising from defective insulation	VIII.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
8340	Bulkley, Chas. S.	Electro-magnetic telegraphs, circuit changes for	VIII.
8351	Burch, J. C	Forceps, dental	XX.
8246	Burgess, Joseph	Boot-forms, machine for dressing	XVI.
370	Burleigh, M. C.	Stove doors and panels	Design.
8006	Burnett, Marshall	Nail machine, horse-shoe	II.
392	Burnet, William	Water coolers	Design.
8073	Burt, Charles	Harpoon, exploding	XXII.
7925	Burt, Enoch	Looms, power, fancy check	III.
8286	Bush, O. H	Spring bolt	II.
8554	Bushnell, William	Drill, hand	II.
8060	Bugbee, James R., assignor to James R. Bugbee and Enoch Robinson	Lock and key	II.
8062	Cady, Ira L	Vaults, safes, &c., compound metallic door for	II.
202	Calderhead, Alexander	Jacquard machinery for weaving all kinds of figured cloth	Reissue.
	Campbell, Wm. (See Gross and Campbell.)		
8542	Carleton, George W	Stoves, cooking	V.
	Carpenter, T. C. (See McFarlan & Carpenter.)		
8014	Carr, J. M., and Jas. Hughes	Bran dusters	XIII.
8354	Carrington, Chester J	Hooks and eyes, fastening to paper cards	XXI.
8322	Carter, Hy., and Jas. Reese	Nut and washer machine	II.
8081	Cavaillon, Florentine J. de	Gas, illuminating, purifying	IV.
8200	Cavanaugh, L. F	Brushes and brooms, handles of	XVII.
8310	Carver, Hiram	Cabbage cutters	XVII.
8165	Carver, Seymour	Shingles, machine for dressing	XIV.
8384	Chambers, Benjamin	Stamps, letter	XVIII.
8339	Chapin, Nathan	Mills, cider	XIII.
415	Chapin, Nathan	Tables	Design.
7935	Champion, Thomas	Boiler, steam, annular	VI.
8330	Chapman, Thomas M	Saw-filing machine	XIV.
7966	Chapman, Henry D	Poles, machine for climbing	VIII.
	Chase, William M. (See Rufus Ellis.)		
197	Cheney, Frank	Thread, machinery for doubling, twisting, and reeling	Reissue.
8288	Chichester, Lewis S	Staves, machines for jointing	XIV.
8141	Chichester, Lewis S	Carving machines	XVIII.
8499	Chichester, Lewis S	Staves, machines for dressing	XIV.
8270	Childs, Augustus B	Winnowers and separaters, grain	I.
352	Chilson, Gardiner	Furnace registers	Design.
353	Chilson, Gardiner	Furnace registers	Design.
354	Chilson, Gardiner	Furnace registers	Design.
355	Chilson, Gardiner	Furnace registers	Design.
8366	Chilson, Gardiner	Stoves	V.
	Chollar, Sage, & Dunham, assignors. (See E. Ripley.)		
7952	Clapp, Edward, assignor to Edward Clapp and George Alden	Sad irons	XVII.
7984	Clapp, E. S.	Scythes to the snath, fastening of	I.
204	Clapp, E. S.	Scythes to the snath, fastening of	Reissue.
8509	Clarke, Alvan	Telescopes	VIII.
8373	Clark, George B	Churns	I.
8089	Clark, James M	Flouring apparatus	XIII.
7985	Clark, Oliver	Scythe fastening	I.
8134	Claussen, Peter	Fibre, vegetable, processes for treating	III.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
8055	Clay, William	Rods, tapered, metallic, apparatus for rolling	II.
8218	Clemens, S. A	Hemp, &c., machines for dressing Sisal.	III.
8408	Clements, William P	Seed-planter, devices for sewing in a	I.
	Clinton, Thos G., and Robert Lee. (See McGregor, Lee, & Clinton.)		
417	Cobb, Lyman	Stoves	Design.
7866	Cochran, Silas M	Car-couplings	X.
8555	Cole, Cyrus C	Fences, hurdle	IX.
7867	Collan, John B	Pipe, lead, machines, nozzles for	XI.
8543	Collins, J. & J. J. G	Boilers, apparatus for steam	VI.
8323	Colné, John P	Glass, machinery for cutting	XV.
8578	Conant, J. S	Gas regulators	V.
8367	Cone, N. F	Vice, bench	II.
	Conrad, Samuel. (See Heffley, Conrad & Wigh.)		
8483	Constant, Isaac	Cultivators	I.
405	Cook, Aaron	Combs for ladies	Design.
8556	Cook, Carlos A	Soda powders, &c, machines for crimping package papers for	XX.
8129	Cook, Horace, assignor to H. S. Cook and S. Colburn	Comb-cutting machines	XXI.
8162	Cook, Ransom	Augers	XIV.
8241	Cook, Samuel	Flour bolts	XIII.
8298	Cook, Ransom	Ventilating and excluding dust from railroad cars	V.
8254	Coons, Mathias P	Fences, flexible	IX.
8170	Cooper, John, administrator of Benjamin Giger	Ploughs	I.
8148	Corliss, George H	Governors	XIII.
8253	Corliss, George H	Cut-off gear	VI.
200	Corliss, George H	Cut-off and working the valves of steam-engines	Reissue.
7868	Cornell, William E	Planing machines for dressing the edges of boards	XIV.
8463	Cory, Myron	Seed-planters	I.
382	Cox, A., E. Johnson, and D. B. Cox	Stoves	Design.
383	Cox, A., E. Johnson, and D. B. Cox	Stoves	Design.
	Cox, John. (See Roberts and Cox.)		
8028	Crane, Aaron D	Horse-powers	XIII.
	Crane, Pepper & Crane. (See John Pepper.)		
8022	Crosby, Pearson	Sawing machines	XIV.
	Cresson, W. P., assignor. (See David Stewart and Jacob Beesley.)		
	Crompton, William—Edson Fessenden, conservator of	Looms	Extension.
8564	Crosby, C. O	Pins, mode of papering	II.
8202	Crosby, C. O	Pins, mode of papering	II.
8007	Crosby, C. O	Pins, machine for sticking on paper	II.
8149	Crowell, Sommers	Railings	IX.
8199	Crum, John	Files, machinery for cutting	II.
	Cummings, Gary. (See Dane, Healy & Cummings.)		
8522	Curtis, S	Combs, machines for cutting	XXI.
8250	Cutler, Job	Metal tubes, method of liberating from forming mandrel	II.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
8077	Cutting, James A	Spark-arresters	VI.
8271	Dane, James, Darius Healy, and Gary Cummings, assignor to Isaac and Francis Dane	Brick machines	XV.
	Da Costa, John C., assignee. (See Patton & Fergus, assignors.)		
8297	Dare, John S	Shoulder-braces, combined with abdominal supporters	XX.
8576	Davies, Thomas A	Cars, railroad, running-gear of	X.
8299	Davis, A. R	Brushes, manufacture of	XVII.
8482	Davis, Isaac	Collars, horse, machines for forming	XVI.
341	Davis, William C	Stove, cook	Design.
390	Davis, William C	Stoves	Design.
419	Davy, John T	Fences, cast-iron	Design.
8127	Dawes, Nathan, and Higgins Harrison	Boot-crimps	XVI.
8100	Day, Horace H	Shoe, india-rubber	XVI
	De Douchet, G. F. (See Douchet, G. F. de.)		
350	Delany, Edward J., assignor to Heine & Adamson	Umbrella stands	Design.
8044	Dennison, Andrew	Boxes, machine for cutting out the corners, and scoring edges of paper for	XX.
	Dewey, Thomas D., adm'r of David Dewey	Horse-rake	Extension.
393	De Witt, James V	Stoves	Design.
8139	Dickey, J. C	Drying fruits and other articles, revolving-frame for	XVII.
8201	Dimpfel, Frederick P	Steam engines, arrangement of	VI.
8521	Dodge, T. H	Printing presses	XVIII.
8356	Douchet, G. F. de	Paint, manufacture of	IV.
7900	Dorwart, Joseph	Tuyers	II.
7885	Draper, Francis	Inkstand fountain	XVIII.
8505	Drawbaugh, Daniel	Stave-jointing machines	XIV.
	Drew, George. (See Sabin & Drew.)		
8585	Drummond, John W., assignor to Smith Ely	Chair-seats	XVII.
8565	Duchemin, Dan'l and George	Clay, machines for working	XV.
8203	Dudgeon, Richard	Press, portable hydraulic	XII.
8219	Dugdale, Samuel G	Churns	I.
	Dunham, A. T. & Co. (See N. S. Vedder.)		
8118	Durkee, George B	Carriages	X.
8586	Dutcher, E. & W. W	Weavers' temples	III.
8143	Dutcher, Davis	Churns	I.
8150	Eames, Albert	Stone and other substances, machines for facing and polishing	XV.
8197	Eames, Daniel W	Carriages, railroad, running-gear of	X.
8255	Eddy, Thomas J	Wheels, cast-iron car	X.
	Eddy, Thomas J., assignee. (See Joseph Hyde.)		
8163	Ellis, Rufus, assignor to William M. Chase	Knitting machines	III.
	Ely, Smith, assignee of John W. Drummond. (See Drummond.)		
7953	Engelbrecht, Theodore F	Hinge, double-acting spring	II.
7869	Ericsson, John	Water-metres	XI.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
8481	Ericsson, John	Engines, air	VI.
8579	Ericsson, John	Water-metres	XI.
	Essex Company, assignee. (See M. L. Whipple.)		
8063	Etnier, Oliver	Winnowing machines	I.
8088	Faber, George	Boilers, &c., steam apparatus for indicating the height of water in	VI.
8361	Faber, George	Gauge for indicating pressure of steam	VI.
8025	Fagin, Lewis, & H. C. Hayman	Bolting flour, apparatus for	XIII.
8117	Farson, Enoch S	Swings, portable	XXII.
	Felthousen, J. D. (See Akins & Felthousen.)		
	Fergus, Wm. F. (See Patton & Fergus, assignors to J. C. Da Costa.)		
8587	Ferris, Richard M	Organs and piano fortes, combining	XVIII.
	Fessenden, Edson. (See W. Crompton.)		
7918	Fields, William, jr	Hydraulic ram	XI.
	Finch, R. R. (See Wm. L. Sanderson.)		
8407	Fisher, Charles Frederick	Propeller, the endless chain	VII.
7870	Fisher, Daniel	Churns	I.
423	Fitzgerald, Frederick, assignor to Silas C. Herring and John Ryer	Iron railing	Design.
8239	Flanders, J. F	Pumps for raising water, &c	XI.
	Flanders, Joseph F. (See Rickards & Flanders.)		
400	Flinchbaugh, H. R	Tomb, cast iron	Design.
8510	Flint, Jacob C	Hides, machines for cutting	XVI.
8261	Fonda, John C	Flock, machine for grinding	III.
8030	Foster, Celia R. P., late Celia R. P. Wood	Tables, ladies' work	XVII.
8331	Foster & Marsh, assignors to J. Foster	Wheels to axles, method of securing	X.
8484	Foster, N., G. Jessup, H. L. Brown, and C. P. Brown	Seed planter	I.
7972	Fowle, Joseph W	Drilling apparatus, steam	IX.
430	Freeman, Edmund L	Presses, mantel-pieces, &c., for frames for	Design.
8220	French, Oliver N., assignor to O. N. French & Eb. Stevens	Axle-boxes, for journals for railroad cars	X.
7938	Frye, John A	Tonguing, jointing, and rebating tools for	XIV.
406	Fulton, Calvin	Stove-plates	Design.
8409	Fulton, James	Escapement for time-pieces	VIII.
7980	Gaines, Edmund P	Mill-stones, dressing	XIII.
8465	Gallahue, Alpheus C	Boots and shoes, machines for pegging	XVI.
8444	Gambrill, Horatio N	Cotton duck, dressing	III.
7967	Gardiner, P. G	Wheels, cast-iron car	X.
7968	Gardiner, P. G	Tyres by continuous rolling, machinery for making	II.
8605	Gardiner, Perry G	Swaging machine, rotary	II.
8523	Gardner, George W	Stove grate-bars	V.
7986	Gardner, James M	Casting the backs upon the teeth of curry-combs, method of	II.
8362	Gardner, Smith	Sugar, apparatus for draining	IV.
8151	Gardner, William	Governors	XIII.
7936	Garretson, Isaac H	Looms, hand	III.
	Garst, John. (See Bixby & Garst.)		
8341	Gavett, H. L. F	Fence, sod, machine for making	IX.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
	Gaylor, Charles J., assignee of F. C. Goffin. (See F. C. Goffin)		
346	Gibbs, Saml. W., assignor to Jagger, Treadwell & Perry	Stoves, cooking	Design.
356	Gibbs, Saml. W., assignor to Jagger, Treadwell & Perry	Stoves	Design.
357	Gibbs, Saml. W., assignor to Jagger, Treadwell & Perry	Stoves	Design.
359	Gibbs, Saml. W., assignor to Jagger, Treadwell & Perry	Stoves	Design.
366	Gibbs, Saml. W., assignor to Jagger, Treadwell & Perry	Stoves	Design.
380	Gibbs, Saml. W., assignor to Jagger, Treadwell & Perry	Stoves	Design.
345	Gibbs, Saml W., assigner to North, Harrison & Co	Stoves	Design.
422	Gibbs, Saml. W., assignor to North, Harrison & Chase	Stoves	Design.
394	Gibbs, Saml. W., assignor to North, Harrison & Chase	Stoves	Design.
	Giger, Benj. (See Jno. Cooper.)		
8398	Gilbert, T	Piano fortes	XVIII.
342	Gilbert, Charles, and Mitchell G. Hallman, assignors to Charles Gilbert	Stoves	Design.
8311	Gillett, Bethuel, and Lyman Allis	Presses, self-acting, cheese	XII.
8069	Gilliland, Lewis L	Splint machines	XIV.
8348	Gillespie, G W. C	Ploughs, wheeled, cultivating	I.
7871	Gilman, Samuel H	Valves, side, method of connecting the, with the rock-shaft	VI.
7987	Gilman, Samuel H	Cut-off, adjustable	VI.
8466	Gilman, Samuel H	Bagasse, machines for drying	V.
8559	Goffin, F. C., ass'r to Charles J. Gaylor	Lock, for safes, &c	II.
8524	Goldson, Henry	Ploughs	I.
8544	Goldthait, Elijah	Plough	I.
7927	Goodrich, Leonard	Ships, light	VII.
8075	Goodyear, Nelson	India rubber, manufacture of	IV.
	Goodyear, Nelson. (See Ed. Hamilton.)		
8285	Gordon, George P	Printing presses	XVIII.
8080	Gorrie, John	Ice, process for artificial production of	XXII.
8065	Goshon, Joseph G., & Wm. H. Towers	Writing, apparatus for giving ease to the arm in	XVIII.
8363	Goulding, Henry	Stone-drilling machine	XV.
8268	Graham, William	Tuyer, tight joint for	II.
7973	Granger, Rensselaer D	Stoves, air-tight Franklin	V.
8050	Grannis, Charles W	Stoves, cooking	V.
8093	Grant, Joseph	Brick presses	XV.
8019	Grass, H., & Wm. Campbell	Bedstead rails, machines for cutting screws on	XVII.
8352	Gray, James A	Piano forte action	XVIII.
8284	Gregg, Isaac	Brick machines	XV.
8158	Gregg, Mahlon	Brick machines	XV.
8345	Gregory, Alfred	Equalizers, or power-regulators	VI.
7975	Greer, Jas., & Rufus J. King	Stoves, cooking	V.
	Green, H. H. (See John J. Sturgis.)		
428	Green, Jeremiah D., assignor to Backus, Bacon, & Co	Stoves	Design.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
	Greenwood, M., & Co., ass'ees. (See Charles Zeuner.)		
8485	Griffith, Levi B	Iron, measuring and cutting	II.
8166	Griggs, George S	Locomotives, running-gear of	X.
8374	Grimes, Owen W	Hemp and flax, machines for scutching and hackling	III.
8375	Grosvenor, L. D	Broom corn, machines for stripping seed from	I.
7872	Grosvenor, Lorenzo D	Broom corn, machines for assorting	I.
7931	Grover, Wm. O., and Wm. E. Baker	Sewing machines	III.
8152	Guard, Chauncey H	Springs, carriage	X.
8103	Guild, Charles M., and John Brown	Steam traps	V.
7971	Guyer, Hugh	Window curtain fastening	XVII.
7901	Gwynne, J. Stuart	Pumps, rotary	XI.
	Haigh, Jos. P., A. Hartupee, and J. Morrow, assignees. (See William Kenyon.)		
8257	Hall, William	Lock, bank, powder-proof	II
	Hallman, Mitchell G. (See Gilbert & Hallman.)		
381	Hallman, W. G	Stoves	Design.
8121	Hamilton, Ed., assignor to N. Goodyear	Dust, excluding from railroad cars	V.
8422	Hammer, George	Corks, machines for cutting	XXII.
8486	Hammitt, John T	Desks	XVII.
7917	Hanley, James	Key, swivel-nibbed	II.
8037	Hanon, Valcke E. T	Mill-stones	XIII.
378	Hapgood, Lyman S	Stove plates	Design.
8204	Happersett, David J	Hooker-up, mechanical	II.
8342	Hardaway, Moore	Spike machines, hook-heading, motion for	II.
8525	Hardie, James	Propellers of machinery, to be used in currents	XI.
8332	Harris, C., and P. W. Zoiner	Stoves, double-oven	V.
347	Harris, Conrad, and Paul W. Zoiner	Stoves	Design.
7902	Harris, Joseph, jr	Motion, changing reciprocating into a rotary	XIII.
	Harrison, H. (See Dawes and Harrison.)		
8312	Harrison, James	Dental hydraulic cups	XX.
7988	Hastings, Eliakim M., and John Shepherdson	Looms, cylinders for figuring	III.
	Hartshorn and Ames. (See Winslow Ames.)		
	Hartshorn, J., and W. Ames, assignees. (See W. Ames.)		
7920	Hathaway, Alfred	Pens for ruling paper	XVIII.
375	Hathaway, William L	Stoves	Design.
8445	Hathaway, John R., and Jno. P. Strippel	Printing presses	XVIII.
8167	Hatch, Thatcher C	Ventilators	V.
8245	Hawkins, Wm	Stave dressing machines	XIV.
8588	Haussknecht, Gustavus L	Carriages	X.
8221	Haussknecht, Gustavus L	Springs, carriage	X.
8159	Hayden, Hiram W	Dies, construction of	II.
8589	Hayden, Hiram W	Kettles and articles of like character from discs of metal, machinery for making	II.
8364	Hazard, E. W., C. H. Jenner	Millstones, machine for dressing	XIII.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
	Healy, Darius. (See Dana, Healy, and Cummings.)		
8106	Hebbard, Albert	Wheels, cast-iron car	X.
8056	Hedge, Samuel, assignor to George W. Hedge	Saw-mills	XIV.
7994	Heffley, George, Samuel Conrad, and James Wigle	Ploughs, adjustable land sides of	I.
8205	Heinemann, H	Buttons, silk covered	XXI.
	Heins & Adamson. (See Ed. J. Delany.)		
8467	Hendrix, Davis R	Boot-trees	XVI.
	Herring, Silas C., and John Ryer, assignees. (See Frederick Fitzgerald.)		
8015	Heywood, Simeon	Wheels and axles, connecting and disconnecting	X.
189	Hibbard, Harmon, assignor to W. W. Reid	Tanning processes	Reissue.
8222	Hibbard, Harmon, assignor to Jared A. Hibbard	Buggy tops	X.
8168	Hickok, W. O	Ruling machines, regulators for the pen beam in	XVIII.
8046	Hill, Charles F., and Henry Hoffman	Marble ornamenting	XV.
8144	Hill, Thomas W	Comb-cutting machine	XXI.
8185	Hinds, William	Saw-set, vice	XIV.
8560	Hinkley, Benjamin	Trucks, railroad car	X.
8333	Hobbs, Charles	Stereotype plates, moulding and casting	XVII.
8526	Hodge, Nehemiah	Wheels, railroad car	X.
	Hoffman, Henry. (See Hill and Hoffman.)		
7954	Hoguet, Francis	Tables, extension	XVII.
8272	Holden, Moore	Millstones, dressing	XIII.
8026	Holkins, Elijah S	Saw-set	XIV.
8008	Hollingsworth, Jehu	Wheat fans	I.
8061	Hollingsworth, Jehu	Smut machines	XIII.
8527	Hollingsworth, Jehu	Mill for grinding and bolting	XIII.
8206	Holly, B., and J. B. Wheeler.	Grooving lumber, machine for	XIV.
8264	Horner, David	Seed planter	I.
8307	Hosley, Abijah S	Ship's model measurer	VII.
8087	Hoskyns, Chandos	Rudder, apparatus for relieving the helmsman from the shock of	VII.
8606	Hotchkiss, Julius, assignor to the Hotchkiss and Merriman Manufacturing Co	Suspenders	XXI.
8348	House, Samuel A	Stoves, cooking	Design.
7349	House, Samuel A	Stoves, parlor.	Design.
8388	House, Samuel A	Stoves	Design.
8540	Howe, Elias, jr	Fastening for garments	XXI.
4969	How, Thomas P	Trucks, connecting them with car bodies.	X.
239	Hoyt, William H	Omnibus steps	X.
834	Hubbard, M. G	Springs, carriage	X.
8193	Hubbell, William W	Fire-arms	Reissue.
146	Hudson, S. A	Sword canes	XXI.
	Hughes, James. (See Carr & Hughes.)		
1830	Hulings, Margaret	Spinning wool, hand machines for	III.
8107	Humiston, Willis	Candle making apparatus	IV.
838	Hunt, Marshall J	Planters, seed, gearing of	I.
8100	Huntley, Hosea H	Stoves, cooking	V.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
8541	Huntley, Hosea H	Stoves, cooking	V.
8355	Hurlbut, C. R	Gauges used in turning	XIV.
7928	Hurlbut, Sidney S.	Harvesters, grain	I.
8131	Hutchins, Samuel B	Crank indicator, arrangement of machinery for actuating the	VI.
371	Hutchinson, James, assignor to D. A. E. and N. Powers.	Floor oil-cloth	Design.
	Hutchinson, A. B. and C. E. (See J. F. Ostrander.)		
411	Hutchinson, James, assignor to Deborah, Albert E., and N. B. Powers.	Floor oil-cloth	Design.
374	Hutton, P. M	Bedsteads	Design.
407	Hutton, Pelatiah M	Bedsteads, cast iron	Design.
	Hyde, J. B. (See Thos. R. Williams.)		
8580	Hyde, Jos., assignor to Thos. J. Eddy	Lathes, chucks for	XIV.
	Imlay, Richard	Car, railroad, supporting, bodies	Extension.
8608	Ingalls, Gustavus W	Æolian attachment	XVIII.
8487	Ingalls, J. K	Radiating surfaces	V.
	Innis, James R	Hide handling cylinders, beaters in	Disclaimer.
8336	Irwin, William	Vessels, method of raising sunken	VII.
8289	Ison, Mark M	Spike machines	II.
	Jagger, Treadwell, & Perry. (See Samuel W. Gibbs.)		
8107	Jefferson, Purnel	Spike machines, gauging and heading movement for	II.
8247	Jenkins, J	Gauges, feather edging, for shoemakers.	XVI.
7974	Jenkins, Solon, jr	Daguerreotypes, securing, in monumental stones	XVII.
	Jessup, G. (See Foster, Jessup, Brown, & Brown.)		
8368	Jillson, A	Weavers' temples	III.
8402	Jimason, Alexander	Valves, shields for	XI.
8101	Jobson, Robert	Fire-places, reflecting	V.
	Johns, George J. (See Schofield & Johns.)		
	Johnson, E. (See Cox, Johnson, & Cox.)		
8281	Johnson, John, assignor to Elias Johnson	Looms for weaving pile fabrics	III.
8511	Johnston, A. W	Felloes, bending	X.
408	Jones, Anthony W., assignor to Jas. McGregor	Stoves	Design.
8009	Jones, Gilbert D	Mills for grinding paints and drugs	XIII.
7906 191	Jones, John	Carriages	X & re-issue.
7924	Jones, Thomas W	Hides, machines for preparing	XVI.
8234	Jones, John	Carriage bodies, hanging	X.
8236	Jones, John	Carriage bodies, hanging	X.
8357	Jones, S. T	Iron, manufacture of	II.
8267	Jones, Wm. R	Hubs for boxes, machine for preparing.	X.
8207	Jones, William	Harvesting machines	I.
8273	Judd, Albert H	Indicator, water-level, for steam boilers.	VI.
7960	Judson, Junius	Power governors	XIII.
7939	Judkins, Chas. T. Patented in England to David Christie	Weavers' treadles	II.
8076	Kain, James R., and Spencer Lewis	Bedstead fastening,	XVII.
7873	Kaufman, Abraham	Quilting frames, and apparatus	XVII.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
	Keenan, Chas. (See C. Wetterstedt.)		
8334	Kempton, Jas. C	Drying and oxidizing colored goods	IV.
8427	Kenyon, William, assignor to Jos. P. Haigh, A. Hartupee, and J. Morrow	Nut-washers, etc., machines for making	II.
8353	Kerrison, R. M	Piano forte action	XVIII.
8581	Ketcham, Charles	Saw-mills, feeding logs in	XIV.
206	Ketchum, Wm. F	Mowing machine	Reissue.
8415	Killin, P	Ovens, portable elevated	V.
8545	King, Daniel	Sugar drainers, centrifugal	IV.
8446	King, James T	Washing apparatus	XVII.
8609	King, Lewis	Carriages	X.
	King, Rufus J. (See Greer & King.)		
8208	King, William	Cork cutting machine	XXII.
7921	Kinnear, Delamar	Lamps, lard	V.
8248	Kirk, S. W	Bran dusters	XIII.
8512	Kitson, Rd	Card grinders	III.
8002	Klepfer, Henry	Piano fortes, upright	XVIII.
7916	Knapp, Moses L	Supporters, abdominal	XX.
8020	Knight, Geo. H	Paving, &c., stone and metal conglomerate for	IX.
8468	Knowles, S. W	Cradles, swinging	XVII.
8187	Kraft, Benjamin	Boxes and axles for saving oil	XIII.
8038	Krauser, John	Railings, iron	IX.
7995	Krebs, Charles W	Shutters, apparatus for securing in any required position	II.
8350	Kreter, Randolph	Piano forte, action	XVIII.
7874	Lamb, John, and C. H Root	Wheels, spring, carriage	X.
344	Lamb, Joseph G	Stoves	Design.
386	Lamb, Joseph G	Stoves	Design.
387	Lamb, Joseph G	Stoves	Design.
7989	Lamson, Ebenezer G	Scythe fastenings	I.
8000	Lamson, Nathaniel	Scythe fastenings	I.
8003	Lamson, Nathaniel	Scythe fastenings	I.
7956	Lane, Abner	Irregular forms, machinery for turning	XIV.
203	Larkin, Esther L., adm'x of John E. Larkin, deceased	Augers, method of attaching to their handles	Reissue.
8469	Latourette, David L	Oil presses	XII.
8347	Laurence, Erastus	Washing machines	XVII.
8238	Lawrence, James A., assignor to Roberts & Lampson	Harness, saddle trees for	XVI.
8193	Lazell, A. E, and D. Lazell	Bread cutters	XVII.
	Learned & Thatcher. (See R. Blanchard.)		
	Learned & Thatcher. (See R. Blanchard.)		
	Learned & Thatcher. (See R. Blanchard.)		
	Lee, Robert, and Thomas G Clinton. (See McGregor, Lee & Clinton.)		
8528	Lemmer, Adam	Cannon for throwing chain shot	XIX.
8428	Levington, Robert	Axle boxes for railroad cars	X.
8416	Lewis, Spencer	Bedsteads, machines for cutting screws on rails of	XVII.
	Lewis, Spencer. (See Kain & Lewis.)		
360	Lewis, Wm. & W. H	Pedestals and columns	Design.
8181	Lewis, Wm. & W. H	Fastening pedestals to columns	XVII.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
8235	Lewis, Wm. & W. H	Daguerreotype plates, apparatus for buffing	XVIII.
8513	Lewis, Wm., Wm. H., & H. J	Daguerreotype apparatus	XVIII.
8590	Lewis, Wm. & Wm. H	Lenses, adjusting	XVIII.
8095	Leypold, Frederick	Scarificators	XX.
8223	Lilley, Louis, assignor to Jno. W. Bates	Safes, fire-proof	II.
8390	Litchfield, Laroy	Weavers' shuttles	III.
8047	Littlefield, Dennis G	Stoves, cooking	V.
8514	Livermore, Lorenzo D	Cars, railroad, coupling	X.
8391	Livingston, N. B	Weighing carts	XII.
	Lombard & Lombard. (See R. G. Westacott.)		
8301	Long, Richard	Brick machines	XV.
8515	Lonsbury, Allen J	Supporter, abdominal	XX.
8039	Loper, Richard F., and John W Nystrom	Steam engines	VI.
	Low & Hicks, assignees. (See Ripley. Ezra, and N. S. Vedder.)		
8447	Luttgens, H. A	Engines, apparatus for regulating the speed of	VI.
8290	Lyman, A. S	Boilers, steam, water-gauge for	VI.
194	Lynch, Edward	Evaporators and condensers	Reissue.
8566	Maginnis, James	Tailors' measures	XXI.
7886	Maguire, William	Staves, machines for jointing	XIV.
8529	Malo, Gaspard	Propeller, screw	VII.
7875	Manning, James	Candlesticks	V.
8385	Manny, J. H	Harvesters, mowing machines and	I.
8448	Marcher, Robert	Enamelling mouldings, &c., machinery for	XVIII.
8040	Marsh, James S	Stoves, cooking	V.
8591	Marsh, Nathan B	Stethoscopes	XX.
7887	Marston, Stanhope W	Lock-fly, tumblers for fire-arms	XIX.
8023	Mason, Lewis J	Table leaves, fastening down of	XIV.
8302	Mason, Nicholas	Ranges, cooking	V.
	Massachusetts Arms Co., assignees. (See Joshua Stevens.)		
8417	Masserano, Clement, assignor to Clement Masserano, Josephine Wickliffe, admx. of R. Wickliffe, jr., deceased, Charles Carenzi, André Crestadora, Pellegro Rocca, and Lewis B. Migone.	Locomotives moved by the power of animals.	X.
8470	Mathushek, Frederick	Piano fortes	XVIII.
8126	Maynard, Edward	Fire-arms, breech loading	XIX.
8291	McAdams, John	Account books, machine for numbering the pages of	XVIII.
8224	McCallum, D. C	Bridge, counter braces adjusting the effective length of	IX.
8256	McCarty, James	Boiler-tubes, &c., spring expanding swage for	VI.
8324	McCloskey, D. W. C	Lamps, self-acting blow-pipe	V.
8492	McConnell, W. P	Charcoal, manufacture of	V.
8016	McCurdy, David	India rubber, manufacture of	IV.
7903	McFarlane George R	Wheels, cast-iron car	X.
8124	McFarlan, William A., and Thomas C. Carpenter	Bran dusters	XIII.
8314	McGregor, Geo, Robert Lee, and Thos. G. Clinton	Padlock	II.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
	McGregor, Jas., jr., assignee. (See Anthony Jones.)		
8010	McKinlay, Peter	Hullers, rice	X.
8610	McLain, John	Harness, saddles	XVI.
8449	Meech, Charles L.	Wind instruments, the mouthpiece for	XVIII.
8017	Mellish, Henry	Splint machines	XIV.
8303	Mercer, John	Fulling vegetable and other textures, chemical processes for	III.
410	Merchant, Silas	Stoves	Design.
207	Merrick, Solyman	Screw wrench	Reissue.
8376	Merrell, William	Lath machines	XIV.
8031	Merrill, Rosewell T.	Grain separators and fans	I.
8450	Miller, James M.	Sugar vacuum pans	IV.
8194	Miller, Michael	Piano fortes	XVIII.
8225	Miller, Sylvanus	Harvesting machines, rake to	I.
8500	Milligan, Wm. B.	Hides, bating and tanning	XVI.
8226	Milligan, William E.	Boilers, steam, arrangement of the flues and water spaces of	VI.
	Mitchell, Wm., assignee of J. Steger. (See Steger, Jos.)		
8175	Moeser, Henry	Printing names of subscribers on newspapers, &c	XVIII.
8011	Monson, Charles	Blasting rocks	IX.
8265	Moore, Henry	Hubs for the reception of boxes, machine for preparing	X.
8561	Moore, Jos. H., and Wm. P. Parrott	Carriages, steam, for railways	X.
8392	Moore, William	Presses, self-acting	XII.
	Morse, Joel R. (See Jabez Robins.)		
8546	Mortimer, Thos. H., and Jas. M. Gardiner	Rudders, method of operating	VII.
8335	Moulson, John	Photographic purposes, mercury bath for	XVIII.
425	Muller, Charles	Hat stand	Design.
8410	Murrill, Jas. H	Locomotives, running gear of	X.
8177	Myers, Laurence	Cars for the transportation of coal, improvements in	X.
8451	Nebinger, William	Cars, railroad, running gear of	X.
7888	Neely, Edward	Harvesters, grass	I.
7989	Neff, Jacob	Electro magnetic engines	VIII.
8424	Nesmith, John, and Wesley Sawyer.	Shawls, &c., machines for twisting fringes of.	III.
	Nevins, William R	Crackers, cutting	Disclaimer.
8110	Newbury, Bolivar	Jacks, lifting	XII.
8516	Newcomb, Levi, jr	Bedsteads	XVII.
208	Newell, Robert	Manifold permutation locks	Reissue.
8145	Newell, Robert	Locks, permutation safety	II.
8425	Newlove, William	Mills, grinding	XIII.
8078	Newman, Nelson	Pumps	XI.
8452	Newton, Henry J	Piano forte strings	XVIII.
8547	Newton, Orin	Door knobs, manufacture of	II.
8396	Nicholson, Thomas	Lock maze	II.
8315	Niles, Peter H	Tool haft, adjustable	XIV.
8611	Nims, Samuel D	Sashes, window, method of hanging	II.
8567	Noel, Theodore	Watches, winding	VIII.
8530	Norris, J. H., & D. Flanders.	Desks	XVII.
	North, Harrison, & Co. (See Samuel W. Gibbs.)		
	North, Harrison, & Chase. (See S. W. Gibbs.)		

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
	North, Harrison, & Chase. (See Samuel H. Sailor.)		
	North, Harrison, & Chase, assignee. (See S. W. Gibbs.)		
7876	Northrop, Sheldon	Looms for weaving seamless bags	III.
7996	Norton, Michael	Sash lock	II.
7961	Nystrom, John W	Calculating machines	VIII.
	Nystrom, John W. (See Loper & Nystrom.)		
7962	O'Neill, Bernard	Boilers, method of bracing the water spaces of	VI.
97	O'Neil, John	Churns	Add'l imp't.
8153	O'Neil, John	Washing machines	XVII.
8377	O'Neil, Patrick	Easy chairs for invalids, etc	XVII.
7932	Osborn, John	Hydraulic rams, operating the waste gate in	XI.
8135	Osborn, Joseph	Sash stopper	II.
8096	Osgood, James W	Coupling, compound for hose or pipe	XI.
8313	Ostrander, Jona. F., assignor to A. B. & C. E. Hutchinson.	Harrows, rotary	I.
8316	Otis, George W	Lightning rods, insulators for	VIII.
99	Pace, Henry Sen'r	Bedsteads	Add'l imp'ts.
8191	Paine, John P	Spectacle frames	VIII.
8034	Paine, Rufus R	Stoves, cooking	V.
8192	Palmer, A., & S. G. Williams.	Harvesters, grain	I.
	Palmer, Courtland. (See H Smith.)		
8227	Panton, William	Leather, machines for splitting	XVI.
7910	Parker, E. T	Plough stock, convertible	I.
8429	Parker, James L	Water-wheels	XI.
8398	Parsons Lemuel H	Plotting scales	VIII.
8128	Past, John C	Switch for railroads, self-adjusting and locking	X.
8292	Pattinson, H. L	Pigments, manufacture of	IV.
8612	Patton, James M., and Wm. F. Fergers, assignors to John C. Da Costa	Planing machine, cutters for	XIV.
8471	Pease, Webster H	Kettles with spouts, method of moulding.	II.
8548	Peck, Milo	Presses, drop	XII.
397	Penniman, Elijah P	Stove plates	Design.
398	Penniman, Elijah P	Stove plates	Design.
414	Penniman, E. P., assignor to H. Ruttan	Stove or furnace, for a ventilating	Design.
7890	Pennington, Cunningham M.	Bridge trusses, arrangement of arches in.	IX.
7930	Pennock, Samuel and Morton	Planter, seed, seeding apparatus of a	I.
8209	Pennock, Samuel and Morton.	Seeding machines	I.
7945	Pepper, John, assignor to Charles Warren and Horatio G. Sanford	Knitting machines	III.
8172	Pepper, John, assignor to Hosea Crane, John Pepper, and J. G. Crane	Knitting machines	III.
8592	Pepper, John Paige	Jasper, mineral composition resembling.	XVIII.
8506	Perry, George W	Looms, shuttle motion of	III.
351	Perry, John S	Stoves	Design.
8304	Person, Ira B., and Joel L. Brocket	Omnibus drivers, registers for	X.
98	Pfanner, Frederick	Dye stuffs from spent madder, preparation of	Add'l imp't.
	Phalen, J., assignee. (See Jacob Worms.)		
1985	Phelps, James	Paper rags, machines for cleaning	Reissue.
163	Phillips, David F	Switch, railroad	X.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
8549	Phillips, David F	Mills, cider	XIII.
	Pierce, Samuel. (See Shields & Pierce.)		
8104	Pierce, Samuel	Furnaces, hot-air	V.
	Pitts, Hiram A., and John A.	Threshing and cleaning grain, machine for	Extension.
8097	Platt, Nelson	Smut machines	XIII.
7946	Pond, Moses	Ranges, cooking	V.
8210	Porter, P. W	Fire-arms, revolving breech	XIX.
8582	Porter, Samuel	Ores, minerals, &c., arrangement of pans for washing	II.
7940	Post, William	Doors or shutters, attachment for opening or closing	II.
8171	Postley, Charles A	Frog-guard, self-acting	IX.
7970	Potter, Nathaniel	Bee-hives, use of slides in	I.
	Powers, D., A. E., and N. (See James Hutchinson.)		
8405	Pratt, D. and R.	Flocks to cloth, apparatus for applying	III.
	Pratt, David (See Wager, Pratt & Richmond.)		
361	Pratt, Joseph	Grates, parlor	Design.
391	Pratt, Joseph	Stoves, parlor	Design.
8399	Prince, N. A	Pens, fountain	XVIII.
8113	Putnam, George W	Saw-filing machinery, vice-jaw for	XIV.
8403	Putnam, Joseph	Clay pipes, manufacture of	XV.
8041	Putnam, S. S	Window curtain fixtures	XVII.
8186	Race, W	Sash, upper, arrangement of catches in the, operated by moving the lower sash	II.
8387	Race, Washburn	Fasteners, blind or shutter	II.
8557	Raines, William N	Switches, railroad	X.
	Randall, S. (See Treat & Randall.)		
384	Rathbone, John F	Stoves	Design.
389	Rathbone, John F	Stoves, cooking	Design.
395	Rathbone, John F	Stoves, cooking	Design.
396	Rathbone, John F	Stoves, plates of Franklin	Design.
8532	Redick, William	Seed planters	I.
	Rees, James. (See Carter & Reese.)		
	Reid, W. W. (See Harmon Hibbard.)		
8453	Remy, Benjamin W	Excavating machines	IX.
8613	Renton, James	Iron, wrought, direct from the ore, apparatus for making	II.
	Renwick, E. S. (See Watson, Renwick & Watson)		
184	Reynolds, Edward	Felloes for the wheels of carriages and wagons, machine for setting or bending	Reissue.
8051	Reynolds, James	Gutta percha tubing and covering wire, machines for	IV.
	Reynolds, O. L., and D. R. Ambrose. (See Ambrose & Reynolds.)		
7941	Rhoades, Philip, jr	Snatch-block	VII.
8478	Rice, E	Baby-jumpers	XXII.
8094	Rich, Martin	Saw-mills	XIV.
8251	Richardson, Aaron	Oil-cups for journal boxes	XIII.
8325	Richards, William T	Springs, machinery for forming joints of eliptical	II.
8369	Richardson, A	Leather and splitting machines	XVI

VI.—*Alphabetical list*—Continued.

No	Patentees.	Inventions or discoveries.	Class.
8146	Richardson, Ithiel S	Churns	I.
376	Richardson, N. P	Stoves	Design.
363	Richardson, N. P	Stoves, air-tight	Design.
399	Richmond, Apollos, assignor to A. C. Barstow & Co	Stoves, parlor, plates of	Design.
424	Richmond, Apollos, assignor to A. C. Barstow & Co	Stove, plates, parlor	Design.
	Richmond, Volney. (See Wager, Pratt & Richmond.)		
8593	Rickards, David H., and Joseph F. Flanders	Locks, rotating tumbler	II.
8517	Rickey, Richard	Collars, horse	XVI.
8231	Riddle, John J	Brick machines	XV.
8021	Riddle, John J	Brick presses	XV.
8533	Riley, Wm. Willshire	Teeth, porcelain, inserting	XX.
8090	Ripley, Ezra	Hinge crane, for doors, shutters, &c	II.
377	Ripley, Ezra, assignor to D. Stafford & Co	Stoves	Design.
8293	Ripley, Ezra	Grinders, method of forming teeth upon cast-iron	XIII.
416	Ripley, Ezra	Stove fronts	Design.
421	Ripley, Ezra, assignor to Chollar, Sage & Dunham	Stove	Design.
426	Ripley, Ezra, and N. S. Vedder, ass'rs. to Low & Hicks.	Stove, parlor	Design.
8583	Ripley, E., & E. L. Brundage.	Car seats	X.
8042	Robbins, John W	Saw-mills, setting logs in	XIV.
8174	Robbins, Jabez, assignor to Joel R. Morse	Horn and shells, machines for splitting.	XXII.
8491	Robbins, L. S	Paint-oil from rosin	IV.
8490	Robbins, L. S	Acid and naptha from rosin, distilling	IV.
8489	Robbins, L. S	Oil from rosin, lubricating	IV.
8488	Robbins, L. S	Oil from rosin, tanners'	IV.
8419	Robbins, Zenas C	Telegraph wires, insulators for	VIII.
8480	Roberts, Cyrus, and Jno. Cox	Grain, threshing and separating	I.
	Roberts & Lampson. (See J. A. Lawrence.)		
8112	Robertson, John	Lead machines, sheet combination of dies for	II.
	Robinson, Enoch. (See Jas. R. Bugbee.)		
8594	Rockwell, Francis A	Candlesticks	V.
8370	Rockwood, Levi R., assignor to Joseph L. Woodward	Last-blocks, fastening for	XVI.
8534	Rose, Hale R	Stoves	V.
7877	Ross, James P	Planters, seed	I.
	Root, Charles H. (See Lamb & Root.)		
8274	Root, James	Shutters for shop fronts	IX.
8493	Root, James	Stoves, folding doors of	V.
8052	Rowe, Bradford	Leather, machines for stretching	XVI.
7976	Ruck, John	Piano forte action	XVIII.
8211	Rudd, Wm. T	Designs in sheet metal, apparatus for punching	II.
8535	Ruggles, H. J	Grates, stove	V.
7878	Ruggles, Stephen P	Printing presses	XVIII.
8388	Ruggles, Stephen P	Stamps, hand	XVIII.
8595	Russell, Charles W	Chimney caps	V.
8358	Russell, Ira	Bedsteads	XVII.
7879	Rossell, Jonathan	Irregular forms, machines for turning	XIV.
8109	Ruttan, Henry	Furnaces, ventilating	V.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
	Ruttan, H. (See E. P. Penniman.)		
7957	Sabin, H. W., & Geo. Drew..	Hinges, spring	II.
8190	Sabin, Harvey W.	Bedsteads	XVII.
351	Sailor, S. H., assignor to Warnick, Leibrandt & Co..	Stoves, cooking	Design.
409	Sailor, Saml. H., assignor to North, Harrison & Chase...	Stoves	Design.
8454	Salomon, John C. Fr.	Saddles	XVI.
8536	Salomon, John C. Fr.	Spring saddles	XVI
8558	Salomon, John C. Fr.	Propelling and steering apparatus for.	VII.
8577	Salomon, John C. Fr.	Engines, carbonic acid gas	VI.
375	Sanderson, Wm. L., assignor to R. R. Finch	Stoves	Design.
7904	Sangster, Hugh & James.	Lamps, street, reflectors for	V.
8154	Sangster, Hugh & James.	Lanterns	V.
8371	Sargent, Chas. G., and Robt. Thompson	Waste-pickers	III.
420	Savery, William	Stoves	Design.
	Sawyer, W. (See Nesmith & Sawyer.)		
8178	Sawyer, Sylvanus	Rattans, machinery for cutting, &c.	XXII.
185	Scarritt, Russell	Sofa bedsteads	Reissue.
7908	Scheitlen, Jacob	Brick-presses	XV.
7929	Schofield, Charles, and Geo. J. Johns	Scraper	IX.
8079	Schroder, Richard E.	Kilns, lime	XV.
364	Schultz, Frederick	Stoves, air-tight	Design.
7990	Scott, John, and John Tannahill	Jacquard machines	III.
8411	Scott, William	Boilers, revolving	VI.
	Scovill Manufacturing Company. (See Buckingham & Baird.)		
	Scwarze, P. Augustus, and Stephan. (See Jacob Stephan.)		
8176	Selgrath, Jacob.	Compounds, lubricating	IV.
187	Serrell, Alfred T.	Mouldings, machinery for making	Reissue.
8455	Severson, Benjamin	Wheels, cast-iron car	X.
8378	Sexton, Amos J., and William Ennis	Ships, ventilating	VII
8308	Seymour, E. L.	Ores, processes of reducing, by zinc compound	II.
8212	Seymour, Wm. H.	Harvesting-machines, rakes to	I.
8249	Shaler, Reuben	Dyeing door-mats	IV.
8430	Sheetz, Edmund	Water-wheels, overshot	XI.
201	Sherwood, John P., assignor to Calvin Adams	Door-locks	Reissue.
	Sheperdson, John. (See Hastings & Sheperdson.)		
8326	Sherwood, John P.	Cut-nail machine	II.
8562	Sherrod, Walter	Mandrels, expanding	XIV.
7891	Shields, James, and Samuel Pierce	Stoves, coal	V.
8259	Short, Sewall	Window-sashes	IX.
8614	Shull, Thomas E.	Ten-pins, method of setting up	XXII.
7893	Simpson, Andrew L.	Ox-yokes	I.
7892	Simpson, Samuel R.	Vice, parallel	II.
8294	Singer, Isaac M.	Sewing machines	III.
8550	Skinner, Franklin	Shingle machines	XIV.
8596	Skinner, Henry	Churns	I.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
8431	Slaight, Thomas	Padlock	II.
7958	Sloan, Thomas J.	Screw-blanks, machine for arranging and feeding	II.
8027	Sloan, Thomas J.	Ten-pins, apparatus for setting up	XXII.
8082	Sloan, Thomas J.	Screw-blanks, &c., machine for assorting	II.
8155	Sloan, Thomas J.	Screws, method of finishing the heads of.	II.
8379	Sloan, Thomas J.	Screws, machinery for threading wood, and feeding apparatus therefor	II.
8397	Sloan, Thomas J.	Screw-blanks and articles of a similar character, machine for arranging	II.
8456	Sloan, Thomas J.	Screws, machinery for shaving, nicking, and reshaving wood	II.
8615	Sloan, Thomas J.	Screws and pins, machines for counting.	II.
	Smart, Luther F. (See Snow & Smart.)		
186	Smith, Edward N., assignor, through others, to American Paper-folding Company.	Paper-folding machines	Reissue.
343	Smith, Elihu	Stoves	Design.
7914	Smith, Elihu.	Stoves	V.
8317	Smith, Horace, assignor to Courtland Palmer	Fire-arms, breech-loading	XIX.
8066	Smith, Ira H., assignor to Lemuel D. Smith	Matches, machinery for making	XIV
	Smith, John (See Brewer & Smith.)		
8064	Smith, Joseph C.	Saddles, spring	XVI.
7947	Smith, Marion	Musical instruments, bellows for	XVIII.
8551	Smith, William M.	Engines, valve for oscillating	VI.
8252	Snow, Harvey, and Luther T. Smart	Fly-traps	XXII.
7963	Snow, Henry H.	Peppermint droppers	IV.
7955	Sours, William	Stoves, cooking	V.
8343	Southwood, Eli F.	Sails, method of making	VII.
7942	Southworth, Daniel H.	Planing machines	XIV.
8401	Spear, Matthew.	Mitre boxes	XIV.
7998	Speers, N. W.	Shutters, &c., apparatus for moving and securing	II.
8597	Speers, Noah W.	Blind and shutter operator	II.
8120	Spencer, James C.	Carriages	X.
8043	Spoor, A. D.	Grate bars, agitating	V.
	Stafford, D., & Co. (See Ezra Ripley.)		
8337	Stanley, Edwin.	Bridges, the construction of	IX.
8305	Stanley, Hartwell	Boot crimps	XVI.
	Stark Mills. (See Cyrus Baldwin.)		
8616	Starks, Nathan	Bolt-heading machines	II.
7911	Starr, Charles	Embossing backs of books, tool for	XVIII.
8179	Starr, Charles	Books, machine for finishing backs of.	XVIII.
8537	Starr, Vine B.	Gongs	XVII.
8182	Start, William H.	Harvesters, grain	I.
8053	Stearns, Charles W.	Clogs, or pattens	XVI.
8237	Stearns, Charles W.	Faucets	XI.
8213	Stearns, John	Hats, machine for pressing	XXI.
8228	Stebbins, Erastus	Faucets, or gates, molasses	XI.
8507	Stever, Joseph, assignor to William Mitchell.	Boots and shoes, machines for cutting soles of	XVI.
8474	Stephan, Jacob, assignor to P. Augustus Scwarze and Jacob Stephans	Cements, for grinding, cylinders	IV.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
	Stephen, John R., ass'ee. (See Sam'l S. Young, assignor.)		
	Steven, Eb. (See O. N. French.)		
8552	Stevens, Francis A	Car-brakes, railroad	X.
8004	Stevens, Francis B	Valves, balanced	VI.
7999	Stevens, Richard F	Liquids, apparatus for drawing and measuring	XI.
8472	Stevens, Joel, & H. J. Ruggles	Stoves, dairy	V.
8412	Stevens, Joshua, assignor to Massachusetts Arms Co	Pistols, revolving breech	XIX.
7915	Still, Francis N	Patterns, mitre, or second, for casting	II.
205	Stillman, Paul	Gauges, steam and vacuum	Reissue.
8059	Stillwell, Rickason, & Edwin L. Brundage	Car seats	X.
8568	Stillwell, Lewis E	Carriage perches	X.
8074	St. John, John R, assignor to James Renwick, George T. Barnard, & E. B. St. John, trustees of St. John's Compass and Log Company.	Hand-logs	VII.
8085	St. John, John R., assignor to James Renwick, George T. Barnard, & E. B. St. John, trustees of the St. John's Compass & Log Company.	Velocimeters, aquatic, method of supporting the vanes of.	VII.
8214	St. John, James	Jacks, lifting	XII.
8413	St. John, L. C	Dwelling, apparatus for warming air and water for	V.
7922	Storms, William Mt	Power, motive, method of obtaining	VI.
8070	Storms, William Mt	Vessels, flexible hose or float for supporting	VII.
8380	Storm, William Mt	Engines, in which compressed air or other gas heated and expanded by admixture therewith of a heated fluid is used as the motive agent	VI.
8473	Stout, Thomas B., and James F. Morell	Yeas and nays, machines for taking	XXII.
8518	Stover, J. S	Kilns, grain	VI.
8032	Strait, Hiram	Saw-set	XIV.
8233	Strait, J. V	Motion, mode of changing reciprocating into rotary	XIII.
7943	Straub, Isaac	Saw-mills	XIV.
8054	Strevell, William, and Daniel Brown	Leather, machines for stretching	XVI.
8569	Strode, Thomas T	Boring holes in posts, machines for	XIV.
385	Stuart, David, and Jacob Beesley, assignors to Wm. P. Cresson	Stoves	Design.
427	Stuart, David, and Jacob Beesley, assignors to Wm. P. Cresson	Stove registers	Design.
8349	Sturgis, John J., assignor to H. H. Green	Type-casting machines	XVIII.
8084	Sullivan, Jonathan	Straw cutters	I.
7991	Surles, A. J	Beehives, construction	I.
	Sweetser, Samuel. (See D. Tilton.)		
8328	Sweet, James H	Spike machinery	II.
8494	Swiney, Edward	Dyeing blue, processes for	IV.
8457	Taft, George C	Box opener	XXII.
	Tannahill, John. (See Scott & Tannahill.)		

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
8519	Taylor, Isaac	Glass, frosting plates of	XV.
7909	Thatcher, George H	Stoves	V.
8232	Thatcher, George H	Fountain and evaporator, combined	V.
8263	Thatcher, G. H	Stoves with portable ovens	V.
8277	Thatcher, G. H	Grates, quadrant-hinged	V.
7907	Thompson, Ambrose W	Propeller	VII.
7926	Thompson, Henry G	Packing of rotary engines, method of adjusting the	VI.
	Thompson, Rob't. (See Sargent & Thompson.)		
7997	Thorn, Lewis	Tables, extension	XVII.
8414	Thornley, O	Bedsteads, machines for cutting screws on posts and rails of	XVII.
8598	Thorp, Joseph W	Garments, apparatus for pressing	XXI.
8318	Tilton, David, assignor to Tilton & Sweetser	Padlock	II.
8458	Tilton, Joseph V	Stone, machines for dressing	XV.
8338	Tilton, Wm. B	Violins, &c., construction of	XVIII.
7992	Timby, Theodore R	Sad-irons, removable handles to	XVII.
	Titcomb, C. H., adm'r of E. M. Titcomb, deceased	Spinning woollen roving	Extension.
8538	Todd, George	Mill-stones, finishing and balancing	XIII.
8029	Todd, Wm., ass'r to Charles Atwood and Geo. Kellogg	Jack-chains, tools for making	II.
8584	Tolhurst, G. W	Lath machines	XIV.
	Towers, William H. (See Goshon & Towers.)		
8406	Towle, Nathaniel C	Tanning	XVI.
8599	Tracey, Samuel F	Ores, copper, processes for smelting	II.
8360	Treat, Jas. S., and Stephen Randall	Hemp and flax, machine for breaking and reducing the length of fibres	III.
8276	Treat, Joseph C	Furnaces, hot-air	V.
7880	Trotter, Jonathan T	India rubber, manufacture of	IV.
8420	Tucker, Hiram	Marble imitating	XVIII.
8617	Tucker, Richard S	Spinning rope yarns	III.
8495	Upham, Joshua	Fires, compounds for extinguishing	V.
8156	Van Anden, William	Sugar-drainers, centrifugal	IV.
8432	Vance, Elisha	Stoves	V.
8459	Van Every, Cornelius C	Seed planter, seeding apparatus of a	I.
8072	Vanderslice, Thomas	Meat-cutting machines	XVII.
8108	Vankuran, Isaac	Wheels, cast-iron car	X.
8173	Vaughn, Maria, administratrix of Jos. C. Vaughn, deceased, ass'r to Jas. C. Bell and R. Christie, jr.	Wheels, machinery for making iron	X.
8395	Vaughn, Maria, ass'r to Jas. C. Bell and Robert Chrystie, jr	Wheel-tires, machines for making	II.
404	Vedder, N. S., assignor to A. T. Dunham & Co	Stoves	Design.
8600	Virtue, Edward	Tailors' measures	XXI.
373	Wager, James, David Pratt, and Volney Richmond	Stoves	Design.
8024	Wagner, J. Z. A	Brick presses	XV.
8012	Walker, Jabez	Lock on sheet metal, machine for forming	II.
8122	Walker, Paris M	Hemp brakes	III.
8460	Ward, Joshua O	Peeling and cutting peaches	XVII.
8278	Wardwell, George J	Looms' shuttles, motions of	III.
7933	Ware, Joseph E	Pavements, method of securing ranges of short plank in	IX.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
8099	Ware, Lawton J	Cords, coupling for	III.
8570	Warner, Chapman	Foundry apparatus	II.
8431	Warner, Chapman	Lamps for burning vapor of benzole, etc.	V.
8229	Warner, James	Fire-arms, revolving breech	XIX.
7894	Warner, James	Repeating fire-arms, means for revolving the breeches of	XIX.
	Warwick, Leibrandt, & Co. (See. S. H. Sailor.)		
	Warren, Chas., & H. G. Sandford. (See John Pepper.)		
7964	Waterman, Henry	Cut off, variable, regulated by the governor	VI.
8115	Waterman, Henry	Saws, &c., machinery for hardening and straightening	XIV.
8083	Watson, William, E. S. Renwick, and P. H. Watson	Harvesters, grain, and binders	I.
797–	Way, Martin and Thomas R.	Tenoning, boring, &c., machines for	XIV.
8475	Weaver, Richard S.	Printing in colors, machines for	XVIII.
8446	Webb, John G.	Lamps, solar, for burning lard or oil	V.
8437	Webb, John G.	Gas-burners, Argand	V.
8496	Webster, James	Springs	X.
413	Weeman, Ebenezer	Dates, metallic	Design.
8306	West, George	Pulp screens	III.
7895	Westacott, Robt. G., assignor to Westacott, Lombard, & Lombard	Caviar, manufacture of	IV.
8275	Wetterstedt, C., assignor to Charles Keenan	Paint, metallic alloy	IV.
8601	Wheeler, Thomas B.	Grain seives	I.
8476	Wheeler, William	Curry-combs, construction of	II.
8618	Wheeler, William	Stone, machines for dressing	XV.
8372	Whipple, Milton D., assignor to Essex Company	Printing house paper, machine for.	XVIII.
8001	Whipple, Heman	Brick, machines for preparing clay for making	XV.
8461	Whittaker, Lucius F.	Cradles, swinging	XVII.
8434	White, Jonathan	Furnaces employed in welding shanks to tools	II.
8013	White, Jesse	Wheat fans	I.
8057	Whiteley, Edward	Coffee roasters	XVII.
8400	Whiten, Elijah	Sawing volutes, machine for	XIV.
8188	Whitney, Henry, jr.	Inkstands	XVIII.
8189	Wickersham, J. B.	Fences, iron	IX.
	Wickliffe, Josephine, administratrix of R. Wickliffe, deceased, and others, ass'nees. (See C. Masserano.)		
8018	Wieting, Archibald	Planters, seed	I.
	Wigle, James. (See Heffly, Conrad, & Wigle.)		
8295	Wilbar, Francis	Roofs, construction of	IX.
7912	Wilder A. A.	Lee-way indicator	VII.
7978	Wilder, A. A.	Copying presses	XVIII.
8382	Willard, A.	Churn and butter-worker	I.
7993	Willard, Simon	Buildings, metallic, construction of	IX.
	William, Abijah J.	Heddles, wire, machinery for making	Disclaimer.
365	Williams, Seth J., assignor to Williams, Bird & Co.	Stoves	Design.
188	Williams, Thos. R., assignor to J. B. Hyde.	Bats for felting, &c., machinery for forming.	Re-issue.
189	Williams, Thos. R., assignor to J. B. Hyde.	Bats in felting, &c., marchinery for hardening.	Re-issue.

VI.—*Alphabetical list*—Continued.

No.	Patentees.	Inventions or discoveries.	Class.
	Williams, S. G. (See Palmer & Williams.)		
8435	Williston, Gordin	Stoves, air-heating	V.
7944	Willoughby, J. D.	Water, apparatus for raising & carrying.	XI.
8462	Wilmot, George R.	Water-closets, portable	XXII.
8296	Wilson, Allen B.	Sewing machines	III.
192	Wilson, Charles	Stone dressing	Reissue.
7948	Wilson, Joseph B., and S. Winslow, Isaac. (See Beers & Winslow.)	Hubs and axles, applying friction rollers to	X.
7913	Wilson, jr., Daniel, assignor to Daniel Wilson, jr., and Henry M. Bird	Nail machine, horse shoe	II.
8058	Wingo, T. F.	Straw-cutters	I.
8571	Winans, Ross	Locomotive, running-gear of	X.
8359	Winters, George	Car, railroad, coupling	X.
8132	Wolf, David & Herman	Planters, seed, seed-distributer of	I.
	Wood, Celia R. P. (See Celia R. P. Foster.)		
8048	Wood, John & William W.	Iron, glazed sheet, process of manufacturing	II.
8479	Wood, S. W.	Watering cattle, apparatus for	XI.
	Woodcock, Bancroft	Plough	Extension.
8230	Woodcock, Dennison	Staves, machines for sawing and dressing.	XIV.
	Woodward, Joseph, assignor of L. R. Rockwood. (See L. R. Rockwood.)		
8572	Woolman, Enoch	Gates, apparatus for opening and closing.	IX.
418	Woolston, Charles J.	Stoves	Design.
7979	Woolston, George F.	Saws, teeth of.	XIV.
8393	Woolston, George F.	Saws for sawing and smoothing boards.	XIV.
8386	Worms, Jacob, assignor to J. Phalen	Printing presses	XVIII.
	Wright, G. L., and Jas. Ames. (See Ames & Wright.)		
8183	Wright, Joseph	Washing tubs	IV.
7919	Wyllys, Newell	Spinning machines, drawing regulators for	III.
8604	Wyllys, Newell, assignor to Charles Collins and Newell Wyllys	Leather tubes, machines for making	XVI.
6071	Yale, Linus, jr.	Lock and key	II.
8438	Yandell, John	Telegraphs, insulators for	VIII.
8279	Yerby, G. William	Ayes and noes, machine for taking	XII.
8160	Young, Elias	Stoves, cooking	V.
8329	Young, Samuel S., assignor for J. R. Stephens	Calculating interest, rule for	VIII.
412	Zeuner, Chas., assignor to M. Greenwood & Co.	Shovels, stand for	Design.
8620	Zimmer, Jacob	Bedsteads, attaching cutters for cutting screws on rails of	XVII.
	Zoiner, Paul W. (See Harris & Zoiner.)		

VII.

INVENTIONS AND CLAIMS

FOR THE YEAR 1851.

No. 7865.—*Improvement in Daguerreotype Pictures.*

What I claim as new, and of my own invention, and desire to secure by letters patent of the United States, is the application of transparent or translucent materials, of varying thicknesses and forms, separately, or in combination with each other, and the application of substances or materials, more or less opaque, either separately or in combination with transparent or translucent materials; both, or either, when such applications and combinations are separately, consecutively, or conjointly employed, for the purpose of manipulating the action of light or chemical substances, substantially in the manner, and with similar effects, to those described and shown.

CHARLES J. ANTHONY.

No. 7866.—*Improvements in Car-couplings.*

Having thus described my invention and improvement, and shown the operation of the same, I wish it to be distinctly understood that I do not claim "*the method of coupling railroad cars, &c.*, by means of *double coupling irons or jaws in combination with a sliding bar*" for disengaging or unlocking said double irons or jaws to relieve the connecting bolt from the draught beam of the leading car, by the deflection of said leading car from the proper line. But what I do claim as my improvement, and desire to secure by letters patent, is in *combination* with the *curved arms* or *ends*, X', X', of the *jaws*, X, X, the *turning slotted* bar, L, attached to the *casing*, T, (fig. 2,) having its ends, L', L', curved in such a manner as to act as levers, and the spring, B, for keeping the slotted bar, L, and jaws, X, in their proper position; the disconnexion of the cars being effected by the contact of the curved arms, or ends, L', of the turning bar, L, with the draught beam, P, when the preceding car runs off the track; when either of the curved arms, X', of the jaws will be relieved from the slot of the turning-bar, L, and permit its curved end, X', to move outward, and open its outer end, and permit the connecting bolt to pass therefrom.

SILAS M. COCHRAN.

No. 7867.—*Improved Nozzle for Lead Pipe Machines.*

What I claim as my invention, and desire to secure by letters patent, is the corrugated nozzle, with its mandrel, through which melted lead is pumped, for the purpose of making pipe, as herein set forth.

JOHN B. COLLAN.

No. 7868.—*Improvement in Planing-Machines for dressing the edges of Boards.*

What I claim, therefore, as my invention, and desire to secure by letters patent, is the method, substantially as described, of communicating motion from the bottom to the top roller by the two pinions combined with the wheel, having the inner and outer rim of cogs, by means of the joint links, substantially as described. and for the purpose specified.

I also claim operating the machinery for carrying the cutter wheel towards or from the line of motion of the plank by the passage of the plank over and in contact with a spur wheel or wheels, substantially as described; whereby the motion of the cutter wheel for edging tapering planks will be made to correspond with the motion of the plank itself, as described.

I also claim interposing between the wheels, or wheels actuated by the plank and the carriage of the cutter wheel, a reversing motion, substantially as described, by means of which the machine can be made to act on the plank from the narrow towards the wide end, or *vice versa*, or, by suspending its operation, edge the plank with parallel sides, as described.

WILLIAM E. CORNELL.

No. 7869.—*Improvement in Water Metres.*

What I claim as my invention, and desire to secure by letters patent, is connecting the two pistons with the two cranks of a crank-shaft, in manner substantially as described; so that at the end of each stroke of either of the pistons it shall remain at rest, while the crank-shaft is being impelled by the other piston; so that the valves shall be shifted, whilst the piston is at rest, for the purpose, substantially as described.

I also claim, in an instrument for the purpose, herein specified, determining the range of motion of the pistons by means of stops connected with the cylinders and the pistons, substantially as described, in combination with the connexion of the pistons with the crank or cranks by means of a joint, having sufficient play to permit the pistons alternately to remain at rest, while the crank-shaft continues to rotate, substantially as described.

I also claim enclosing all the moving parts of an instrument, substantially such as above described in the surrounding casing, through which the water or other fluid passes to be measured, constructed and operating in the manner, and for the purpose, substantially as described.

J. ERICSSON.

No. 7870.—*Improvement in Churns.*

Having thus fully described the construction and operation of my improved double dasher churn, what I claim therein as new, and desire to secure by letters patent, is connecting two vertical chains by a horizontal tube at their bottoms, substantially as described, (said tube being about ten inches long, and about one-fifth of the capacity of one of the vertical cylinders,) in combination with the perforated cutters, E, E, operating in the manner and for the purpose herein fully set forth.

DANIEL FISHER.

No. 7871.—*Method of connecting the Slide Valve with the Rock Shaft.*

Having thus fully described the nature and construction of my improvements in oscillating steam engines, what I claim therein as new, and desire to secure by letters patent, is the tubular nut, (13.) serving the two-fold purpose of a guiding rod and of a clamp for the ball joint at the foot of the valve-pitman.

SAMUEL H. GILMAN.

No. 7872.—*Improvement in Machines for assorting Broom Corn.*

What I claim as my invention is the combination of the endless platform, the roller, G, and the series of pressure rollers, or any mechanical equivalents therefor, as arranged and made to operate together, substantially in the manner and for the purpose as herein before described. And, in combination therewith, I claim the rotary shears and the weighted roller, *m'*, or their mechanical equivalents, the whole being applied and made to operate together, essentially as hereinbefore specified.

LORENZO D. GROSVENOR.

No. 7873.—*Improvement in Quilting Frames and Apparatus.*

What I claim as my invention, and desire to secure by letters patent, is the movable frame, working on the connecting piece O, containing two slides, with wickers, for the purpose of stretching the quilt to any desirable length or breadth, as the case may be, in combination with the slides Nos. 1 and 2, working in sections, C, C, by which the quilt may be enlarged or diminished on the rollers Nos. 1 and 2 as set forth.

ABRAHAM KAUFMAN.

No. 7874.—*Improvement in Spring Carriage Wheels.*

What we claim as our invention, and desire to secure by letters patent, is the construction of the spokes, B, B, B, B, B, B, B, B, of flat steel, split, or divided and curved, as at *a*, *a*, and secured, as at *b*, *b*, Fig. 1, for the purpose and in the manner herein shown.

JOHN LAMB,
CHARLES H. ROOT.

No. 7875.—*Improvement in Candlesticks.*

Having thus described the nature and operation of my invention, what I claim as new, and desire to secure by letters patent, is the combination of the flanch, B, with the circular cap, C, having its orifice, E, eccentric with its periphery, and a guard, G, operating in the manner and for the purpose as above described.

JAMES MANNING.

No. 7876.—*Improvements in Looms for weaving Seamless Bags.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement in one loom of the two series of cams, substantially as described; one series for weaving the cloth double, and the other single, as herein described, in combination with the shifting the treddles from one series of cams to the other, or the equivalent thereof, substantially as herein described.

SHELDEN NORTHROP.

No. 7877.—*Improvement in Seed Planters.*

Having thus fully described my improved seed drill, what I claim as new therein, and desire to secure by letters patent, is—

First. The pinion, K, working between fixed and movable racks, in combination with the elevating yoke (*e*) and the loop (*f*) on its end, for the purpose of raising the teeth from the ground, and simultaneously throwing the feeding apparatus out of gear, substantially as set forth.

Second. I claim the feeding gear, as described, in combination with the lever, (*g*.) and its adjustable fulcrum, permitting the pinions to be reversed, by which double the number of changes can be made as can be done by the same number of pinions on the ordinary arrangement.

J. P. ROSS.

No. 7878.—*Improvement in Printing Presses.*

Having thus described my improvements in printing presses, I shall stake my claim as follows:

What I claim as my invention, and desire to have secured to me by letters patent, is the gauge bar, for cards, hereinabove referred to, in combination with the vibrating platen and stop finger, and crank, which operates the same, in the manner and for the purpose hereinabove described.

I also claim the use of a segment of a cylinder, in combination with the stationary form bed, so that the rotary inking apparatus may move over the form, and then, after taking ink from the fountain, distribute it on said cylinder as hereinabove set forth.

I also claim the movable bearers on the side of the form bed, arranged and operated substantially as herein above described, so as to be moved outwards when the inking rollers are passing over the form, and drawn inwards when the sheet or tympan is moved up to said form.

I also claim regulating the delivery of the ink by combining with the delivering roller a grooved ratchet wheel and weighted pawl band, operating with the lever stud, cam roller, and stop lever, substantially as hereinabove specified.

I also claim supporting the journals of one of the inking rollers on sliding bearers, so that it may be moved up against the delivering roll by means of studs on said bearers and cams, operating the same as hereinabove set forth.

STEPHEN P. RUGGLES.

No. 7879.—*Improvement in Machines for turning Irregular Forms.*

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the horizontal carriages, G, G, working inside of and moving vertically with the carriage, F, and operating as herein described, for the purpose of making the pattern and rough material pass and repass the tracers and cutting tools, or *vice versa*, when the same are used in combination with a pattern and rough block which do not revolve, and are presented to and operated upon by said tracers and cutters as herein described and represented, and for the purposes fully set forth.

JONATHAN RUSSELL.

No. 7880.—*Improvement in manufacture of India Rubber.*

Having described my improved process for curing rubber, I will state what I claim and desire to secure by letters patent. What I claim, therefore, is the use and employment of zinc, substantially as prepared by the process above described, in combination with India rubber, for the purpose of curing or vulcanizing it, in form and manner as herein set forth, without the use of free sulphur in any way in combination with the rubber.

JONA. T. TROTTER.

No. 7881.—*Improvement in Corn Shellers.*

Having thus described my improvements, I shall state my claims as follows:

What I claim as my invention, and desire to have secured to me by letters patent, is casting the fly wheel of the corn sheller solid with the feeding wheel, so as to bring it between the two bearings of said wheel, as hereinbefore set forth.

JOSHUA M. C. ARMSBY.

No. 7882.—*Improvement in Spring Mattresses for Invalids.*

Having thus fully described my improvements, what I claim, and desire to secure by letters patent, is—

Firstly. The employment of the end stays, (*b*,) having rule joints allowing a limited range of motion, and standing in a bracing position, substantially in the manner and for the purposes set forth.

Secondly. I claim the centre supports for rendering that part of the mattress permanent when desired.

DAVID BAIRD.

No. 7883.—*Improvements [illegible] otary Pumps.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the curved water ways in the annular space above the fan or paddle, when substantially as described, in combination with the rotating fan or paddle wheel, substantially as described, and for the purpose specified.

And I also claim the self-adapting valves substantially as described, and governing the apertures leading to the annular space above, in combination with the rotating fan or paddle wheels, and the curved water ways, substantially in the manner and for the purpose specified.

PHINEAS BENNET.

No. 7884.—*Improvement in Looms for weaving Tapestry Carpets with parti-colored warp.*

What I claim as my invention, and desire to secure by letters patent, is regulating the delivery of giving out of one or more warps or chains by the separate tension of each, substantially as specified, in combination with a ground or controlling warp, which determines the length of cloth made at each beat of the lathe, by having the delivery of the said ground or controlling warp regulated by its tension, and controlled by a break, or the equivalent thereof, when the lathe beats up, substantially as specified.

I also claim the employment of an index wheel, or measuring apparatus, or the equivalent thereof, to indicate the length of figuring warps given out or taken up in the process of weaving, substantially as and for the purpose specified, when this is combined with an index or measuring apparatus, to indicate the amount of cloth woven, substantially as and for the purpose specified.

And, lastly, I claim the employment of fingers moving or vibrating independently of the lathe, substantially as and for the purpose specified.

E. B. BIGELOW.

No. 7885.—*Improvement in Fountain Inkstands.*

What I claim as my invention, and desire to have secured to me by letters patent, is the arrangement for cutting off the communication between the cup and the main fountain of ink, by means of a layer of cork or other similar substance in the bottom of said fountain, and a cork or other similar stopper fitted on the bottom of the cup tube, or the lower end of said extended cup tube, pressing against said layer, as set forth, in combination with above specified arrangement; the inner cylinder in which said stopper moves as a piston, by which the air is more effectually excluded from the main fountain of ink.

FRANCIS DRAPER.

No. 7886.—*Improvement in Machines for jointing Staves.*

Having thus fully described the nature, construction, and operation of my invention, what I claim therein as new and original, and desire to secure by letters patent, is the arrangement, substantially as herein described, of a circular rest, having a sliding motion to and fro in the plane of its axis, and having around its perimeter catches, for the retention of the stave during the process of jointing, and rotating the distance from stave to stave at every forward stroke, and held fast for the action of the rotating jointers upon the stave at every return stroke; the jointers and circular rest being so arranged as to impart at the same time to the stave edges any given bevel and taper, according to the size and bilge of the cask.

WILLIAM MAGUIRE.

And I also claim the self-adapting valves substantially as described, and governing the apertures leading to the annular space above, in combination with the rotating fan or paddle wheels, and the curved water ways, substantially in the manner and for the purpose specified.

PHINEAS BENNET.

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What I claim as my invention, and desire to secure by letters patent, is regulating the delivery of giving out of one or more warps or chains by the separate tension of each, substantially as specified, in combination with a ground or controlling warp, which determines the length of cloth made at each beat of the lathe, by having the delivery of the said ground or controlling warp regulated by its tension, and controlled by a break, or the equivalent thereof, when the lathe beats up, substantially as specified.

I also claim the employment of an index wheel, or measuring apparatus, or the equivalent thereof, to indicate the length of figuring warps given out or taken up in the process of weaving, substantially as and for the purpose specified, when this is combined with an index or measuring apparatus, to indicate the amount of cloth woven, substantially as and for the purpose specified.

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WILLIAM MAGUIRE.

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Firstly. The employment of the end stays, (*b*,) having rule joints allowing a limited range of motion, and standing in a bracing position, substantially in the manner and for the purposes set forth.

Secondly. I claim the centre supports for rendering that part of the mattress permanent when desired.

DAVID BAIRD.

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And I also claim the self-adapting valves substantially as described, and governing the apertures leading to the annular space above, in combination with the rotating fan or paddle wheels, and the curved water ways, substantially in the manner and for the purpose specified.

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I also claim the employment of an index wheel, or measuring apparatus, or the equivalent thereof, to indicate the length of figuring warps given out or taken up in the process of weaving, substantially as and for the purpose specified, when this is combined with an index or measuring apparatus, to indicate the amount of cloth woven, substantially as and for the purpose specified.

And, lastly, I claim the employment of fingers moving or vibrating independently of the lathe, substantially as and for the purpose specified.

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FRANCIS DRAPER.

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Having thus fully described the nature, construction, and operation of my invention, what I claim therein as new and original, and desire to secure by letters patent, is the arrangement, substantially as herein described, of a circular rest, having a sliding motion to and fro in the plane of its axis, and having around its perimeter catches, for the retention of the stave during the process of jointing, and rotating the distance from stave to stave at every forward stroke, and held fast for the action of the rotating jointers upon the stave at every return stroke; the jointers and circular rest being so arranged as to impart at the same time to the stave edges any given bevel and taper, according to the size and bilge of the cask.

WILLIAM MAGUIRE.

No. 7887.—*Improved Fly Tumbler Lock for Fire Arms.*

What I claim as my invention is the fly tumbler, arranged and combined with respect to the sear and the cock, in the manner and for the purposes set forth in my specification.

STANHOPE W. MARSTON.

No. 7888.—*Improvement in Grass Harvesters.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the manner herein described of suspending the cutter ring, *h*, from the wheel, *f*, by means of straps, or other yielding material, for the purpose herein described.

I also claim the combination of the cutters, *i*, *i*, *i*, &c., bevelled cutter ring, *h*, and straps, *g*, *g*, &c., for the purpose of raising the cutter ring over any obstruction coming against the edge of the knife, as herein described.

I also claim the manner of arranging the guide-board, *m*, standard, *n*, arm, *o*, and strap, *r*, secured as described, for the purpose of guiding the machine, and allowing the parts to yield to a sudden stopping of the machine, or to irregularities in the ground, for the purpose and in the manner herein described.

EDWARD NEELY.

No. 7889.—*Improvement in Electro-Magnetic Engines.*

I do not confine myself to the use of any particular battery. What I claim as my improvement, and wish to secure by letters patent, is the insulated disks, in combination with the platina points, to act in concert with the magnetic wheels, in manner and form and for purposes herein described.

JACOB NEFF.

No. 7890.—*Improved arrangement of Arches in Bridge Trusses.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the method herein described of combining and arranging the several arches of a bridge, so as to make each arch, alternately, the upright and inverted arch, as it passes from one span of the bridge to another, and *vice versa*, when one set of said arches have their remotest distance from each other, and their greatest sustaining point directly over and under the points where the other set of arches are changing from upright to inverted arches, or *vice versa*.

C. M. PENNINGTON.

No. 7891.—*Improvement in Coal Stoves.*

We have described such arrangements of flues, &c., as we have essayed with success in the application of the principle of our invention; but we do not wish to limit ourselves to these. as they may be variously modified. But what we claim as our invention, and desire to secure by letters patent, is the method, substantially as herein described, of supplying currents of atmospheric air to the products of the combustion at or near the throat leading from the fire chamber to the flues, in combination with what is known as Nott's fire chamber, having the draught-throat leading therefrom between the top and the grate, that the upper part of the fire-pot may constitute a feeder or chamber of preparation, substantially in the manner and for the purposes specified.

JAMES SHIELDS,
SAMUEL PIERCE.

No. 7892.—*Improved Parallel Vice.*

What I claim as my invention, and desire to secure by letters patent, is the attaching the lower end of the moving jaw of the vice to a block that is attached to, and moves with, the end of the screw, in the manner and for the purposes herein described.

SAMUEL R. SIMPSON.

No. 7893.—*Improvement in Ox Yokes.*

What I claim as my invention, and desire to have secured to me by letters patent, is arranging in the beam of the yoke two draught staples, some six inches apart, in lieu of one at the centre; and the combination, or use therewith, of a branch chain of proper length, connected to the main draught chain at a proper distance from the beam, and the adjustable hook for modifying the length of the branch chain, as hereinabove specified, and for the purpose set forth.

ANDREW L. SIMPSON.

No. 7894.—*Improved means for revolving the Breeches of Repeating Fire-Arms.*

What I claim as of my own invention, and desire to secure by letters patent of the United States, is the cranked shaft (*e*, *c*, *b*) operated by the tumbler having its axis of vibration in the line, or nearly so, with the axis of rotation of the cylinder, substantially in the manner herein set forth.

JAMES WARNER.

No. 7895.—*Improvement in the manufacture of Caviar.*

What I claim, therefore, as my invention, is the improvement in the process of salting the roe or ova, whereby extraneous matters are separated; the same consisting in suffering it to stand in pickle, or a strong saline solution, until it undergoes a process or change by which the ova, and such extraneous matters, separate from one another—the former rising to the surface of the pickle, while the latter falls to the bottom of it.

And I also claim the combination of the male sturgeon oil, as above mentioned, with the salted ova, for the purpose of improving the manufacture thereof as specified

R. G. WESTACOTT.

No. 7896.—*Improvement in Tires for Railroad Car Wheels.*

What I claim, therefore, as my invention, and for which I wish to obtain letters patent, is making the tire of car wheels, by the combination of several distinct pieces, so arranged and disposed as mutually to support and confine each other, substantially in the manner above described.

T. T. ABBOT.

No. 7897.—*Improvement in raising Carriage Tops.*

What I claim as my invention, and wish to secure by letters patent, is the application of a spiral spring to operate upon the braces of a carriage top, so as to assist in supporting and elevating the top, substantially as described and shown.

JOHN L. ALLEN.

No. 7898.—*Improvement in Looms for weaving Piled Fabrics.*

I do not wish to limit myself to the particular mode of connecting the series of bars or plates to admit of the required vibration, as other modes of connecting them may be employed; as, for instance, instead of hanging them back of the lathe by pendulous jointed links, the rods by which they are connected may be adapted to work in slides; but I have described and represented the mode which I have essayed with success and deem the best.

What I claim as my invention, and desire to secure by letters patent, is connecting the intersecting bars or plates with the loom, substantially as described, so that they shall be free to vibrate and yield to the beat of the lathe and shedding of the warps, as described.

And I also claim, combining with the said vibrating bars or plates, a stop or stops, to arrest them at the required point, substantially as described, that the continued beat of the lathe may cause the fabric to move forward over them, as described.

E. B. BIGELOW.

No. 7899.—*Improvement in connecting and disconnecting Hubs and Axles.*

What I claim as my invention, and desire to secure by letters patent, is my device for detaching a wheel from its axle-tree by means of the plate, C, C, acting as a wrench for unscrewing the nut, B, which holds the wheel to the axle; said plate being advanced and withdrawn by the screw, D, substantially in the manner herein described.

A. M. BILLINGS.

No. 7900.—*Improvements in Tuyers.*

What I claim in the foregoing as my invention, and desire to secure by letters patent, is the curved partition in the air chamber, placed opposite the orifice of the windpipe, with its lower edge extending beneath this orifice; the arrangement and construction of the partition being such that it serves the double purpose of directing the blast upwards and facilitating the descent of the cinders, as herein set forth.

JOSEPH DORWART.

No. 7901.—*Improvement in Rotary Pumps.*

I do not claim to be the inventor of the centrifugal pump.

I do not claim simply using collars extending from the openings in the outer case to the openings in the piston case, to prevent the water or air from passing between said cases; nor extending the inlet or suction-pipe inwards in such a manner as to supply the place of one of said collars—this having already been done; but I only claim thus extending said pipe when the collar on the opposite side is made adjustable, and the parts so arranged that the joints of the piston-case with said pipe and collar may be tightened, as they wear by tightening the adjustable collar only, as described; the piston and case, and the suction-pipe being constructed substantially as herein described.

J. STUART GWYNNE.

No. 7902.—*Improvement in changing a reciprocating into a rotary motion.*

What I claim as my invention, and desire to secure by letters patent, is the application to steam or other engines, or machines of a mechanical arrangement, whereby the effect of the applied power is rendered equal, (or nearly so,) both on the outward and return strokes of any reciprocating or vibrating movement, using for that purpose the aforesaid combination of the cranks, connecting rods, and oscillating lever, or their equivalents, as described in the above specification, and shown in the accompanying drawings.

JOSEPH HARRIS, Jr.

No. 7903.—*Improvement in Cast Iron Car Wheels.*

What I claim as my invention, and desire to secure by letters patent, is the mode of constructing a cast iron car wheel, by the use of spokes or arms, composed in part of portions of a hollow cone, connected by brackets, and in part by straight spokes or arms, forming a continuation of plates and spokes, possessing the advantages and obviating the objection of both.

GEO. R. McFARLAN.

No. 7904.—*Improvement in Reflectors for Street Lamps.*

What we claim as our invention, and desire to secure by letters patent, is making the faces of the reflector in concave rings, substantially in the manner and for the purposes herein set forth.

HUGH SANGSTER,
JAMES SANGSTER.

No. 7905.—*Improved Steering Apparatus.*

What I claim as new in my invention, and desire to secure by letters patent, is the combination of the cranks, H, H, and the connecting rods, K, K′, which are attached by universal joints to the projections or arms, X, X, on the rudder post, the cranks having a worm-wheel, G, on their shaft or axis, which gears with and is actuated by an endless screw, F, on the axle or shaft of the steering-wheel, the whole of the parts being arranged in the manner substantially as described.

JAS. E. ANDREWS.

No. 7906.—*Improvement in Carriages.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of two bars or reaches, placed in connexion with the straight reach, as above described, and combination with the spring-rod and cross-bar, substantially in the manner described.

JOHN JONES.

No. 7907.—*Improved Propeller.*

What I claim as my invention, and desire to secure by letters patent, is a propeller, constructed as herein described, in such manner that any one of its blades in any line drawn either parallel or perpendicular to its entering edge shall have the curvature of a parabola produced, as herein set forth.

A. W. THOMPSON.

No. 7908.—*Improvement in Brick Presses.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is—

First. I claim, in combination with the clay ducts and alternating carriage of moulds, the rods, *g'*, with their knives, H', (for the purpose of cutting off and forcing into the moulds the regular quantity of clay,) and sliding plate or gate, Z, for the purpose of opening and closing the communication between the clay ducts and moulds, as herein described and represented.

Second. I claim the arrangement of the pins, *n*, *n*, connecting rods, *o*, *o*, and standard, N, with its arm, Q, for the purpose of removing the brick after it is raised from the moulds, when the same are operated by means of the cranks, as herein described and shown.

J. SCHEITLIN.

No. 7909.—*Improvement in Stoves.*

Having thus described my improvements in the combined open and air-tight stoves, and shown the advantages of the same, I wish it to be understood that I do not claim the device of sliding doors between parallel jambs or plates for the purpose of concealing the same.

But what I do claim as new, and desire to secure by letters patent, is the providing of the sliding doors, A, with flanges, H, H, on their vertical edges, the real flanges serving the purpose of hinges—in opening and closing the same, and also serving to form air-tight joints when the doors are closed; and the front flanges serving, in connexion with the projecting ends, E, E, of side plates, B, B, to relieve the appearance of a joint when the doors are opened, as before described.

I also claim the providing of the side plates, B, B, with projecting front plates, F, F, for the purpose of forming fronts to the spaces into which the doors are slid when open, to conceal the same; and in connexion with the rear flanges, H, H, to form the hinges of the doors when closing the same; and also to conceal a portion of the front flanges when the doors are opened and slid back, as described.

GEORGE H. THATCHER.

No. 7910.—*Improvement in Convertible Plough Stock.*

What I claim as my invention, and desire to secure by letters patent, is so constructing a subsoil plough, with removable mould board and cutter, in combination with the tri-pronged cultivating teeth, that the same stock may be used either for a subsoil plough or common ploughing and cultivating the land, as herein set forth.

EDWARD T. PARKER.

No. 7911.—*Improvement in Tools for embossing Backs of Books.*

I do not claim forming various devices by gluing or securing loose or detached tools to a surface, as that is common.

But what I do claim as my invention, and desire to secure by letters patent, is forming circular embossing, gilding, or lettering tools of any required pattern for embossing, gilding, and lettering book-covers, by having a case or hollow metal cylinder, B, fitting on a roller, A, and having an opening, *b*, *b*, or openings, in it of any required form for a panel or other border, the part of the periphery of the roller, A, within the opening or openings in the case, having any required number of small tools, *c*, *c*, *c*, of any suitable form or pattern secured to it; the surfaces of the said tools standing even with the outer face of the case or cylinder, B, or by the employment of any number of tools consisting of parts of a hollow cylinder secured to a solid cylinder, substantially in the manner herein described.

CHARLES STARR.

No. 7912.—*Improved Lee-way Indicator.*

What I claim as my invention, and desire to secure by letters patent, is hanging the vane, E, loose at the bottom of the rod, C, which carries or communicates with the pointer, and holding it either in position for operation or secure within the vessel, above the bottom of the keel, by means of a spring, *d*, or its equivalent, operating substantially as herein shown, and for the purposes set forth.

A. A. WILDER.

No. 7913.—*Horse Shoe Nail Machine.*

What, therefore, I claim is the simple combination of the punch, the slotted bed-die, the heading die, the header slide, discharging orifice, and header as arranged, constructed, and made to operate together, substantially as specified; or, in other words, their arrangement and construction essentially as explained, whereby they are made to separate the nail blank from the rolled plate; to move it downwards upon the header slide; to cause the header slide to advance in the mean time; to hold the nail blank by means of the punch and header slide; to cause the header slide to slide underneath the nail while it is so held; to carry the header against the nail, and head it; to cause the header slide to retrack or move backwards far enough to carry or move the discharging orifice directly under the nail, so that the nail may be forced down into or through such orifice by the further depression of the punch, which next takes place; and, finally, to elevate the said punch to its first or highest position.

DANIEL WILSON, Jr.

No. 7914.—*Improvement in Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the combination of a transparent water vessel, with mica-covered or other transparent openings, in the top of a stove plate, and a mirror placed upon a stove top, as herein represented and described.

ELIHU SMITH.

No. 7915.—*Improvements in Metal, or Second Patterns for Castings.*

What I claim as my invention, and desire to secure by letters patent, is preparing second patterns, by moulding metal patterns in two-part moulds. and then separating the two parts of the mould, the pattern being left in the sand, to cast a plate fitted to the metal pattern, so moulded as specified; so that the pattern can be attached to the plate, and the two be used in moulding to produce castings, substantially as described.

FRANCIS N. STILL.

No. 7916.—*Improvement in Abdominal Supporters.*

Having described the construction, and also the operation, of my improvement, what I claim as my invention, and desire to secure by letters patent, is the construction of hip springs, with split or divided ends, forming elongations of the same strip of steel, the front prongs having slots and pivot holes, and the back prongs having two or more graduating pivot holes, to be used in combination with the adjusting screw and pivot screws, as herein substantially set forth.

MOSES L. KNAPP.

No. 7917.—*Swivel-nibbed Key.*

I therefore claim as my invention, and desire to secure by letters patent, the making the exposed ends of keys in such a manner that they may revolve freely upon the other parts of the key substantially in the manner and for the purposes described.

JAMES HANLEY.

No. 7918.—*Improvement in the Hydraulic Rams.*

I claim as my invention and improvement the hinge valve, C, opening upwardly and inwardly, at or near the upper end of the inclined plane or drive pipe, C, D, of the hydraulic ram; said valve being placed in a box made of brass, or any other suitable materials; which valve, by closing on the reaction of the water in the drive-pipe, prevents the said reaction from distributing the water in the spring or reservoir. The box of said valve is bolted to the drive-pipe, as represented in the annexed drawing; and said valve may be a hinge-valve, or any other suitable valve.

WILLIAM FIELDS, Jr.

No. 7919.—*Improvement in drawing Regulators for Spinning Machines.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the trumpet, as herein described, in connexion with the system of weighted levers, escapements, and reversed cone-pulleys, whereby the force required to move the trumpet is made to vary, under different circumstances, to a sufficient extent to prevent over-sensitiveness in the mechanism, which changes the relative speed of the drawing-rolls to inequalities in the slivers; while at the same time but little force is required to effect such changes, thus proportioning the draw more nearly than heretofore to the quantity of fibre in the slivers, and thereby rendering the latter of more uniform diameter and density.

NEWELL WYLLYS.

No. 7920.—*Improvement in Pens for Ruling Paper.*

Whatever may be the number of thicknesses of metal of which the back bar and pens are composed, my improvement, and what I claim, consists in not only making the upper one longer than the others, but in making it the marking part, and soldering the next one below it to it, as specified. Such improved mode of making the pen or pens, I claim as my invention, whether the plates of metal placed upon another be of different metals, or of different thicknesses of metal, as described. And I also claim the improvement on the construction of the back bar; the same consisting in making it with a slit, or opening, *u*, between any two pens, and extending nearly or quite up to the vertex of the angle or bend of the bar, as specified; the same producing the advantage above mentioned.

And when the pen is composed of more than two thicknesses of metal, I claim the improvement by which one single soldering of the upper and lower parts together, suffices to bind or keep all the parts together, or in place; the said improvement consisting in making the lowest thickness of metal longer than any of the others, except the first or upper, and marking one, as described.

And I also claim the method of making the pens and back bar, as shown in figures 5 and 6, when the same are composed of two *different* thicknesses of metal, or of two plates of different metals; the said improvement consisting in making the lower plate to enclose or lap over the one or other above it, as seen at *g*, in figure 6, and thus make the back bar of one more thickness of metal than the pens are composed of.

And I also claim to make the different thicknesses of the pen of different metals, as specified.

ALFRED HATHAWAY.

No. 7921.—*Improvement in Lard Lamps.*

Having thus described my invention and improvement in lamps, I disclaim the invention of every part of the lamp except the angular chambers, *i*, or grooves, above the reservoir, *a*, on either side of the wick tubes, *b c*, for preventing the spilling or waste of the oil when the stem of the lamp is held in a horizontal or inclined position; and also the dove-tailed slide, *d*, and the aforesaid angular channels or grooves. *i*—I claim as my invention, in combination with a lamp of the peculiar form and construction represented in the annexed drawings, or other form, substantially the same; said channels or grooves serving also to receive and hold the sliding cover, *d*, used for closing the supply opening, instead of the ordinary screw-cap, and in combination with the aforesaid angular channels.

I also claim the said sliding cover, *d*, when made with correspondingly shaped sides to fit and move in said channels, all as herein described and represented.

DELAMAR KINNEAR.

No. 7922.—*Improved method of obtaining Motive Power.*

Having thus fully described the nature of my invention, and pointed out its distinctions from all others, what I claim, and desire to secure by letters patent of the United States, is actuating an engine, such as are now usually driven by steam, or of any convenient form, by means of the combustion allied to an explosion of a measured or detailed quantity of a charcoal (or other solid, carbonaceous fuel, similar in nature, and of like effect) in a measured quantity of highly compressed air, (or oxygen;) said combustion being effected in a vessel which, at that time, is not in connexion, either with the reservoir or main source of compressed air, or with that of the charcoal; and the gases resulting from each separate and distinct explosion being allowed to act on the pistons, or their equivalents, before the other charges are introduced into the exploding or combustion vessel; the whole operation being effected through the agency of apparatus in nature substantially such as are herein specified, or apparatus that shall effect the whole operation in the manner claimed.

I also claim in actuating an engine, as just claimed, using the combustible in a granulated or pulverized form, for the purposes and various reasons made known.

WM. MT. STORM.

No. 7923.—*Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the construction of the adjustable and sliding partitions, (G and G, fig. 3,) by which the draught of the stove and the distribution of the heated air under the bottom of the lower oven is varied and controlled at pleasure, adjusting the same to the particular place and circumstances of each stove; the whole being arranged and constructed substantially as set forth and described.

BACHUS A. BEARDSLEY.

No. 7924.—*Improvement in Machines for Preparing Hides.*

I do not, therefore, wish to limit myself to the precise arrangement and construction herein set forth; but what I claim as my invention, and desire to secure by letters patent, is the method of consolidating and smoothing leather by drawing it with a continuous motion beneath a series of stampers, which alternately rise, fall, and rest upon its surface, a portion of the stampers being at all times in contact with the leather, so that the smoothing of its surface is constantly going on simultaneously with the consolidation by the blows of the falling stampers.

THOMAS W. JONES.

No. 7925.—*Improvement in Fancy Check Power Looms.*

I have thus fully described my improvement in fancy check power looms, and have adverted to many things in this description which I do not mean to claim as new. Some of them are of my own invention, and heretofore used by me—such as the revolving box, shuttle boxes on each end of the lay, to weave thread about the pin wheel, or chain bands of pins by themselves, having long since used them all myself; and, in a word, I disclaim, together with the forenamed, considered singly, everything pertaining to the common power-loom.

But I do claim as my invention the connecting a series of shuttle-boxes by joints at their lower corners, or attaching them to a flat-jointed chain, and connecting their extremities so as to form an endless chain of boxes, and bringing them into a parallelogramic figure by means of two square heads of a size to fit the space between the joints of the boxes, or the chain, and hung on journals, one on the end of the race-beam, and the other on the sword of the lay, substantially as heretofore described.

Second. I claim the combination of the irregular worm, the two sets of double rectangular levers, the connecting bars, and the vertical-notched levers on which the bars operate, the pin band and knees, and the wires connecting the knees and vertical-notched levers, through which the notched levers are moved forward and backward, to embrace the bars, giving them, with the heddles, an upward and downward movement, in any irregular manner desired, substantially as described in the specifications, constituting a new and advantageous *modus operandi* of forming a variegated shed.

ENOCH BURT.

No. 7926.—*Improved method of adjusting the packing of Rotary Engines.*

What I claim as my invention, and desire to secure byetters patent, is the method, substantially as above described, of regulating the packing-ring interposed between the steam-wheel and head of the cylinder, or outer casing of rotary steam-engines, by combining with the said packing-ring a series of segment wedges, operated simultaneously, in manner substantially as described.

HENRY G. THOMPSON.

No. 7927.—*Improved Ship's Light.*

Having thus fully described my invention, I will now proceed to state what I claim as new, and desire to secure by letters patent.

I claim hanging the screwed socket, or frame, C, containing the glass, so as to turn freely within a frame, H, which swings on a hinge, K, K, I, provided with a slot, K, or its equivalent, whereby the socket, C, can be screwed into, or unscrewed from, the fixed socket, B, and, when unscrewed, be swung back, substantially as herein described.

LEONARD GOODRICH.

No. 7928.—*Improvement in Grain Harvesters.*

Having thus described my improved reaping machine, I first claim combining with a reaping machine a self-acting weighing apparatus, for weighing the grain into any required quantity, to form sheafs or bundles of a uniform weight, as described, and depositing the same upon the ground in readiness to be tied, whilst the reaping machine is drawn forward and cuts the grain—the said weighing apparatus being made adjustive so to increase or diminish the size of the bundles at pleasure: and this I claim, whether the weighing apparatus be made and arranged as described, or in any other way which is substantially the same, or whether combined with the aforesaid reaping machine, or any other of a similar character.

Second. I likewise claim the combination of the beat-holders, W, W, with the inclined endless conveyor for holding the grain thereupon, whilst conveying it to the weighing and depositing apparatus, as aforesaid.

SIDNEY S. HURLBUT.

No. 7929.—*Improved Scraper.*

Having thus fully described our invention, what we claim as new, and desire to secure by letters patent, is the combination and arrangement of the scoop, A, standard, B, beam, G, arm, E, and handles, H, in such manner that when the scoop is tripped it will revolve sufficiently far to allow the earth to slide off, and then remain in such position that the operator, by a slight movement of the handles, can level down the earth with the scoop, and without the aid of another hand, or another scraper, as herein described and represented.

CHARLES SCHOFIELD,
GEORGE J. JOHNS.

No. 7930.—*Improvement in Seeding Apparatus of a Seed Planter.*

Having thus fully described the manner of constructing and operating our revolving multiplied distributor, and several of the modified forms of the same for distributing seed, and grain, and manures, and other substances, for various purposes, what we claim as our invention, and desire to secure by letters patent, is the employment of the ring, or cylinder, A, having projections on its periphery in combination with the notched and toothed cylindrical gauge caps, C, D, constructed, arranged, and operated substantially in the manner herein set forth, for increasing and diminishing the size and number of the distributing receptacles as represented in figures 1, 2, 3, 4, 5, and 6.

We likewise claim the combination of the helical spring, I, screw-shaft, E, flanged nut, N, and clamp nut, H, with the notched and toothed cylindrical gauge caps, to which the ends of the springs are attached for turning the gauge cap, in order to change the relationship of the teeth or projections of one of the caps with the teeth or projections on the adjacent cap, for enlarging the distributing receptacles, as described in the foregoing specifications, and represented at fig. 5 in the annexed drawings.

We also claim the combination of the screw-shaft, E, clutch-nut, G, clutch washer, F, and clamp-nut, H, with the toothed cylinder cups, C, D, for enlarging or diminishing the distributing receptacles, as described and represented in fig. 6.

We likewise claim the modifications of the distributing apparatus, in their simplified forms, as represented in figures 14 and 15, the several parts being operated in the manner herein set forth.

SAMUEL PENNOCK,
MORTON PENNOCK.

No. 7931.—*Improvement in Sewing Machines.*

What we claim as our invention, and desire to have secured to us by letters patent, is the use of two needles operating alternately—one working vertically, and the other horizontally, substantially as hereinabove described, and uniting two pieces of cloth, or forming the seam, by means of the double loop stitch, as hereinabove set forth.

WILLIAM O. GROVER,
WILLIAM E. BAKER.

No. 7932.—*Improvements in operating the Waste Gate in Hydraulic Rams.*

What I claim as my invention, and desire to secure by letters patent, is, the use of the regulating slide, M, and nut, or other similar arrangement, in combination with the levers, wires, springs, rods, weights, or other devices, substantially similar to those described for adjusting the "waste" valve, and operated on, and in connexion with a float, F, at the spring, or source, which float rises and falls with the water.

I also claim the use of the hammer, R, resting or falling on a springing piece, S, for opening the "waste" valve, D, or starting the hydraulic ram, and worked as described, or in any other similar manner.

JOHN OSBORN.

No. 7933.—*Method of securing Ranges of Short Plank in pavements.*

What I claim as my invention, and desire to secure by letters patent, is the method, above described, of securing ranges of short pieces of the planking of a street or road, in longitudinal lines, over water or gas pipes, by means of screws, or keys, with staples, aided by the double bevel of the short planks, and the ends of the permanent, interval planks securely holding and permitting the easy removal of such short piece.

JOSEPH E. WARE

No. 7934.—*Insulated Fusible Plug for Steam Boilers.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement, herein described, for surrounding a fusible plug and its case by a stratum of air, in such manner that the plug shall promptly melt and give warning, after the water gets low in the boiler, but before the boiler plate, to which the apparatus is applied, is left bare of water, substantially as herein set forth.

I also claim the arrangement of the stopper and plug case, substantially as herein described, for stopping the escape of steam, to admit of the replacement of the fusible plug, without blowing off the steam or water from the boiler after the plug has melted, substantially as herein set forth.

I likewise claim the method of preventing the waste of the metal of the plug, after it has melted, by supporting it in a closed socket, the lower unoccupied part of which is of sufficient capacity to receive and retain the metal when melted, and to allow the steam to pass over it to escape.

E. H. ASHCROFT.

No. 7935.—*Improved Annular Steam Boiler.*

Having thus described the nature of my invention and improvement in the construction of steam boilers, what I claim as new, and of my invention, and desire to secure by letters patent, is—

First. The employment of the tapered rings, B, for closing the ends of any of the water spaces of the concentric boilers, in the manner set forth.

Second. I also claim connecting the lower parts of the annular water spaces, each to each, from the upper and inner to the lower and outer one, substantially as described, by metallic rings or collars, thus giving free ebullition, assisting evaporation, and allowing the dirt to settle down into the blow-pipe, from whence it may be blown out; the aforesaid rings or collars bracing the boiler, as well as forming the connexion between the cylinders.

THOMAS CHAMPIN.

No. 7936.—*Improvements in Hand Looms.*

What I claim as my invention, and desire to secure by letters patent, is the device, consisting, substantially, of the tappet shaft, with its ring block and ratchet, together with the connecting cord-weight and marches, whereby the heddles are raised and depressed in the proper order to form the shed by the movement of the lay, substantially as herein set forth.

I likewise claim the device, consisting, substantially, of the levers, with the breast-beam cords and picker-stick cords, whereby the picker-sticks are moved to drive the shuttle by the movement of the lay.

ISAAC H. GARRETSON.

No. 7937.—*Improvement in Machines for turning Irregular Forms.*

What I claim as my invention, and desire to secure by letters patent, are—

First. The three cutter cylinders, A, B, C, with cutters arranged as within described, in combination with the sliding frame, compound

cams, and cam-rails, constructed and arranged substantially in the manner and for the purpose herein described.

Second. I claim the combination of the compound cams and cam-rails with the sliding frame and devices, within described, for holding and revolving the timber material, whereby such vertical motion is produced in the latter, while being subjected to the action of revolving or vibrating cutters, as to reduce the timber to the required form.

PHILO S. BEERS.

No. 7938.—*Improvement in Tools for tonguing, jointing, and rebating*

What I claim as my invention, and desire to secure by letters paten is so making a jointing, tonguing, and rebating plane, that the jointing and tonguing of a board, while resting on its edge, and also the jointing and rebating of it, while it lies on its flat side, may all be performed with one planing tool, in the manner substantially as herein described, and for the purposes herein set forth.

I also claim making the tonguing hand plane in such a manner as to enable the workman to make, therewith, tongues of various thicknesses, substantially in the manner herein set forth, whereby I prevent the necessity of providing different tools to tongue planks of different thicknesses.

I also claim, in combination with a divided body, or plane-stock, the two cutters, having each a cross-cutting and a side-cutting edge, and the means, substantially as herein described, for adjusting the distance apart of the two cutters and bodies, whereby the plane is made capable of dressing the sides of a tongue to any desired thickness, and, at the same time, to cut the shoulders as herein specified.

I also claim, in combination with the gauge, G, the use of the body, B′, and the cross edge of the cutter, P′, to constitute a jointer to straighten the edge of a board, preparatory to tonguing it, and while resting on its edge in a situation to receive the tonguing.

I also claim the gauge, G, in combination with the notch, *p*, and the side edge of the cutter, P, acting as herein described, as a jointing plane to straighten the edge of a board or plank, resting on its flat side, in a position to have a rebate cut in the manner substantially as herein set forth.

JOHN A. FRY.

No. 7939.—*Improvement in Weavers' Heddles.*

Having now described the nature of my invention, and in what manner the same is carried into effect, I declare that I do not claim metal in combination with harness or heddles, when used in the solid state, and fixed to the harness or heddle yarn at each end, such heddle yarn not being continuous, as in my invention.

But what I do claim as my invention, is covering, coating, or lining the loop eyes in heddles or harness with metal by the process I have shown, or by any equivalent process.

CHARLES TIOT JUDKINS.

No. 7940.—*Improved attachment for opening and closing Doors or Shutters.*

What I claim as my invention, and desire to secure by letters patent, is the use of swinging attachments, or jibs, F, G, for moving sliding-doors or shutters, constructed and operating substantially in the manner herein shown and described.

WM. POST.

No. 7941.—*Improved Snatch Block.*

What I claim as my invention, and desire to secure by letters patent, is the closing up of the opening in the side of a ship's snatch-block, by means of a gate, (E,) arranged and operating substantially as herein set forth, by which I am enabled to make the block shorter and more compact than it has heretofore been made.

I also claim the securing the pulley axle, *f*, in its place, without the aid of screw and nut, or rivet heads, and in such a manner that it can be readily removed by means of the combination of the said pulley-axle with the enclosing strap, C, and the gate strap, D, substantially in the manner herein set forth.

PHILIP RHODES, Jr.

No. 7942.—*Improvement in Planing Machines.*

I claim—First. The use of circularly grooved rollers in front of the cutter to divide and cut the unplaned surface of the board into narrow longitudinal strips, whereby the outer shavings are taken off in narrow strings or threads, in the manner and for the purposes herein set forth.

Second. I do not claim simply the arrangement of the plane stocks, with their cutters, upon the travelling frame in such order that one gang or set of cutters will plane one plank by their movement in one direction, and another gang of cutters plane another plank by their movement in the opposite direction, and remove the first plank planed from the bed; but this I claim only when these are used in connexion with the circular groove scoring roller, as within described.

D. H. SOUTHWORTH.

No. 7943.—*Improvement in Saw-Mills.*

What I claim as my invention, and desire to secure by letters patent, is the method of imparting a rocking or curved motion to the saw, and of straining the same by mechanical devices, substantially such as herein described.

ISAAC STRAUB.

No. 7944.—*Improvement in Apparatus for raising and carrying Water.*

What I claim as my invention, and desire to secure by letters patent, is the double draught cord so arranged and connected with the car windlass, that it effects the two-fold purpose, of propelling the carriage to and fro, and of turning the car-windlass to unwind and wind up the bucket cord, thus insuring the descent of the bucket into the well.

J. D. WILLOUGHBY.

No. 7945.—*Improvements in Knitting Machines.*

Having thus described the construction and operation of my improved machine, I claim as my invention the following new improvements:

My first improvement consists in the manner of producing the upward and downward motion, as above described, of the lead sinkers and the jack sinkers, so far as they move simultaneously; and

I claim the half-jack, U, vibrating on the comb-bar, P, and connected with the sinker-frame and with the movable cross bar, 28, and springs, 29, for the purpose of depressing the tail-ends of the jacks, and thereby raising their forward ends with the jacks' sinkers, as aforesaid.

I also claim the movable cross-bar, 28, containing the springs, 29, connected as aforesaid, and for the purposes aforesaid.

My second improvement consists in the manner of producing the backward and forward motion of the jack and lead sinkers, as above described; and

I claim the cams, 7, in combination with the cross-bar, 60, with the projections thereon; the hanging bars, S, vibrating on pivots; the comb-bar, P, and the half jacks, U, connected with the sinker-frame, as aforesaid, and for the purposes aforesaid.

My third improvement consists in the manner of moving the carrier-needle and slur-knob, as aforesaid; and

I claim the combination of the cam, V, and the shoe and shoe-plate, for the purposes aforesaid.

I also claim the combination of the cam, V, with the shoe, 5; the movable shoe plate, *f*; the chains, *h* and *l*; the semi-circles and hubs, or wheel and hub; the bar, W, connected with the slur-carriage and the slur-knob, Q, and the horizontal bar, X; the carriage, *q*, connected with the carrier-needle, q^2, for the purposes aforesaid.

My fourth improvement consists in the manner of moving the ribbed work attachment, and producing the ribbed stitch, simultaneously with the plain stitch, without the machine slide, and with one presser, as above described; and

I claim the combination of the cams, 9, with the levers, 18, connected with the frame, 17, and with the ribbed needle bar, 16, for the purposes aforesaid; also, the same in combination with the presser, *r*, connected, moved, and operating as aforesaid, and for the purposes aforesaid.

JOHN PEPPER.

No. 7946.—*Improvement in Cooking Ranges.*

What I claim as my invention, is the improvements by which the hot-water back is connected with the plate, G, and by means of which said hot-water back may be either readily removed at any time, or applied in such manner that the directions of its water pipes may be disposed so as to accommodate the bath boiler, into which they are usually led, on whatever side of the range the said bath-boiler may be placed; the said improvements consisting, *first*, in the connecting piece, H, and the attachment of it and the hot water back, the whole being made to operate together, substantially in the manner as above set forth; *second*, in a second set of attachments (fixed in the opposite face of the water back) in combination with the first set thereof, as described.

I also claim the peculiar arrangement of flues, which lead the smoke and volatile products of combustion directly around the oven; the said arrangement of flues causing the heat to course against one half of the bottom of the oven; next into another flue, which takes it *backwards* and against the other half of the bottom of the oven; thence up a flue against the back of the oven, through a flue extending over and against half of the top of the oven; thence into and through another flue, which carries it backwards and over and against the top of the oven and conveys it to the chimney or discharge flue—not meaning to include in such arrangement the radiating chamber or space, Y, Z, hereinbefore mentioned.

And I also claim the two recesses, *l*, *m*, and two flue-plates, *p*, *q*, applied to the plate, K, in combination with the two valve openings, X, A′, their damper and cam-plate, as applied to the top plate of the oven-frame and used under an arrangement of oven flues, substantially as described; the same allowing of the adaptation of the oven to either side of the fire-place, or the use of two such ovens and their frames, in connexion with the fire-place, all essentially as hereinbefore stated.

I also claim the improvement by which the oven can be raised and readily removed, and by which the smoke is prevented from passing underneath the partition which separates the flues on top of the oven, the same consisting in the sliding or gravitating plate, G′, affixed to the partition, and made to operate substantially in the manner as specified.

MOSES POND.

No. 7947.—*Improvement in the Bellows for Musical Instruments.*

What I claim as my invention, and desire to secure by letters patent, is the method, herein described, of making or constructing the *wind chest* commonly used in seraphim melodeons, and all similar musical instruments, with one or more sides, made of *gum elastic*, or other elastic material, and in such way and manner as to be capable of expanding and contracting, or of being increased or diminished in size; and, with the aid of metallic or other springs, to answer all the purposes of the common bellows generally used in those and similar instruments, substantially as described.

MARVIN SMITH.

No. 7948.—*Improvement in applying Friction Rollers to Hubs and Axles.*

We do not wish to confine ourselves to the use of spiral springs to the exclusion of springs of other forms, nor to two springs, as one can be made to produce the same result.

What we claim as our improvement, and desire to secure by letters patent in the herein-described method of applying friction rollers to the axles of wheel-carriages, is the interposition between the bearing of the axle and the faces of the friction rollers of a loose sleeve, through which the axle is free to slide endwise; while it at the same time carries the sleeve round with it in its rotation, the sleeve having a groove in its outer periphery to receive the friction rollers and prevent them from moving endwise on the collar.

JOSEPH B. WILSON,
STACEY WILSON.

No. 7949.—*Improvements in Planing Machines.*

What we claim, and desire letters patent for, is—

First. The combination of the shifting bed plate with the planes, Z, fig. 1, constructed in the manner herein described, the planes presenting any desired part of their edge for cutting the surface of the board after tonguing and grooving has been performed by the circular saws.

We also claim the rotating arm, *h*, fig. 1, with their cover, fig. 4, combined with the planes, Z, fig. 1, substantially in the manner and for the purposes herein set forth.

JOHN D. BEERS,
ISAAC WISNLOW.

No. 7950.—*Improvement in Electro-Magnetic Engines.*

Having now described my invention, I will proceed to state what I claim as new, and desire to secure by letters patent:

I claim the use and manner of arranging the helices and poles of the electro magnets, in combination with the revolving bars, or sets of bars—that is to say, the helices being upon the bends of the magnets from which the poles of the magnets extend towards and near to the centre of motion, and the revolving bars or armatures extending outwards from the centre of motion, and embracing the poles of the magnets sucessively as it rotates for producing a magnetic multiplying power engine, substantially in parts and principle as herein set forth.

THOMAS C. AVERY.

No. 7951.—*Improved connexion for the Beams and Co umns of Iron Buildings.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the method, herein described, of securing together the beams and columns of cast-iron fronts for houses by means of the lugs, with their flanges on the upper and under sides of the ends of the beam, and the projections on the inside at the top and base of the columns, as herein fully shown and represented.

JOSEPH BANKS.

No. 7952.—*Improvements in Sad Irons.*

What I claim as my invention is the above-described improvement in the construction of the bottom of the polishing iron, the same consisting in making it with ridges or projections and concavities, substantially as herein before explained.

EDWARD CLAPP.

No. 7953.—*Improved double acting Spring Hinge.*

Having thus described my improvements in the spring hinge for the entrance-doors of hotels, &c., I wish it to be understood that I do not claim the "combination of an adjustable curved inclined plane with a portion of a hinge, and an adjustable bearing roller with the other portion of the hinge."

But what I do claim as new, and desire to secure by letters patent, is the manner of combining the helical springs, L and M, with the cylindrical rotating tumbler, J, and cylindrical sectional case, so that, by the rotation of the cylindrical tumbler, J, the heart-shaped projection, K, will be made to traverse over the inclined plane, I, and cause the tumbler, J, to rise and fall, and thus compress and expand the helical springs lengthways their coils, and simultaneously therewith wind and unwind said helical springs around the spindle, F, and thus cause them to act (by the motion of the door in either direction) by torsion and expansion to close the door when it shall have been opened, as described and represented.

THEODORE F. ENGELBRECHT.

No. 7954.—*Improvement in Extension Tables.*

Having thus fully described the construction and operation of my improvement in extension tables, what I claim therein as new, and of my invention, and desire to secure by letters patent, is the arrangement of a screw, or other equivalent device, in combination with the slides, in such a manner that a screw, or its equivalent, of sufficient length to move out *one* pair of slides, will move out *any number* desired, substantially in the manner and for the purpose set forth.

FRANCIS HOGUET.

No. 7955.—*Improvement in Cooking Stoves.*

Having thus fully described my improvements, what I claim as new therein, and desire to secure by letters patent, is the transverse partition, (*c*,) in combination with the arrangement of front and back flues, as above described, for causing the several currents to unite after having traversed courses of nearly equal length, as set forth.

WILLIAM SOURS.

No. 7956.—*Improvements in Machinery for turning Irregular Forms.*

I do not claim merely the employment of two or more cutter wheels, or cutter shafts, or cylinders, provided with any number of cutters of any required form for cutting the whole surface of, and forming articles of any irregular form, without the use of the model of the article to be formed. But I claim this only when the cutting cylinders are sustained, revolved, and carried to and from the block, to be turned by a revolving cylinder, in whose periphery they are placed, without any longitudinal motion, while the block revolves slowly, without any longitudinal or lateral motion, substantially as described.

ABNER LANE.

No. 7957.—*Improvement in Spring Hinges.*

Having thus described our improvements, what we claim as new therein, and desire to secure by letters patent, is the piece *(f)* to one side of which the spring is attached, and which has on the other side a

projection, with a hole therein, by means of which and a pin the springs can be engaged and disengaged when the door is shut, substantially in the manner and for the purposes described.

HARVEY W. SABIN.
GEORGE DREW.

No. 7958.—*Machine for arranging and feeding Screw Blanks.*

I do not wish to be understood as limiting myself to the precise construction and arrangement of parts herein specified, as these may be variously modified within the principle of my invention; but I have described that particular mode of construction, which I have essayed with success.

What I claim as my invention, and desire to secure by letters patent, are the lifters, which select and lift the blanks, &c., from the hopper, substantially as specified, in combination with ways or conductors, or the equivalents thereof, substantially as specified, into or on to, which the blanks, &c., are transferred, as specified.

And I also claim giving to the lifters, or to the inclined ways, or their equivalents, a lateral motion, in combination with a stop, or detector, substantially as specified, for the purpose of arresting the operation of the lifters until a further supply is required, as specified.

THOMAS J. SLOAN.

No. 7959.—*Improvement in Paper Moulds.*

Having now described the nature of our said invention, and in what manner the same is to be performed, we wish it to be understood that we do not claim as of our own invention, nor do we claim the exclusive use of the apparatus and machinery herein described, and referred to for stamping and filing, except when employed in, and for the production of, our improved plates or moulds. We hereby declare that we claim as our invention the improved moulds for the manufacture of paper, as made in the manner herein specified—that is to say, by stamping or forming such moulds partly, or wholly, in and by dies, and afterwards removing the back of such moulds by filing, or other process analogous thereto.

WILLIAM BREWER,
JOHN SMITH.

No. 7960.—*Improvements in Power Governor.*

Having thus explained my improvement, what I claim as my invention, and desire to secure by letters patent, is communicating the action of governors to the valves, or other parts of machinery, governed thereby in such manner as to cause, by accelerating or retarding the motion of said valves, large amounts of regulating power to be added to or taken from the engine by a given change of the speed when the motion of the engine becomes too much retarded, whether such retardation arises from increase of work or resistance, or from diminution of the tension of the moving force; and also small amounts of regulating power to be added to or taken from the engine by a like change of speed, when the motion is too much accelerated, whether such acceleration arises from diminution of work, or resistance, or from increase in the tension of the moving force, as herein set forth.

Second. I also claim connecting the valve arm, or parts to be regulated, to the regulator by a cam or its equivalent, having progressive rates of action, when the same is employed for transmitting the action of governors to the parts of machinery to be governed, and for the purpose of causing the motions of valves, gates, weirs, or other analogous parts to take place rapidly for the regulation of low speeds, and slowly for the regulation of high speeds, substantially in the manner and for the purposes set forth.

Third. I also claim making the eccentric curve of the vibrating cam to vary its position with respect to its centre of vibration, for the purpose of varying the rapidity and extent of opening of the valve according to the pressure of steam, in the manner herein set forth.

JUNIUS JUDSON.

No. 7961.—*Improvement in Calculating Machines.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The logarithmic curves of the outer scale in combination with the diagonals and graduated arms to the curves, being laid out substantially in the manner herein set forth.

Second. I claim the trigonometric curves of the inner scale in combination with the graduated arms and logarithmic curves of the outer scale, the curves being laid out substantially in the manner herein described.

Third. I claim the two graduated arms constructed in such manner that they can be moved in connexion, or independently, substantially in the manner and for the purposes herein set forth.

J. W. NYSTROM.

No. 7962.—*Improved method of bracing the water spaces of Boilers.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the method, herein described, of bracing and securing the shells of boilers or fire-boxes of locomotive and other engines, by means of ribbons of sleeves, or stationary sleeves, so that, when a bolt or bolts are to be removed to cure leaks, or to renew the sheets in the fire box, the sleeves will remain in place, serving as a guide to punch the new sheets by, and affording greater support to the shells, both in backing out the old and riveting the new bolts, as herein fully described and shown.

BERNARD O'NEILL.

No. 7963.—*Improvement in Peppermint Droppers.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The construction of a "peppermint dropper," by combining a gar kettle (fig. 2, A) with a revolving cutter, (fig. 3;) and,

Second. The combination of such dropper either with a railway, (fig. 1,) the dropping sheet being stationary, or with a movable dropping sheet, the dropper itself being stationary, or with a railway and a movable dropping sheet combined, all substantially as herein described.

HENRY H. SNOW.

No. 7964.—*Variable Cut-off, regulated by the Governor.*

What I claim as my invention, and desire to secure by letters patent, is regulating a variable cut-off valve by a motion derived from and corresponding to that of the governor, by means of a toe or vibrating lever attached to the rock shaft, acted upon by revolving pins or cams, when either the cams are made to vary in position with respect to the toe, or the toe in length with respect to the cams; the whole machinery being constructed and acting substantially as herein described.

HENRY WATERMAN.

No. 7965.—*Method of adjusting the stroke of Trip Hammers.*

Having thus described my invention, some of its advantages I claim to be as follow:

First. Simplicity and cheapness of its construction; and,

Second. Its peculiar adaptability to water power, while at the same time it seems to combine nearly all the capacities and facility of regulation of the steam hammer.

What I claim as my invention, and desire to secure by letters patent, is the construction of a trip hammer, in which the hammer is raised by cams, not acting directly upon the hammer or the helve, or a projection from the same, commonly called the lifting leg, but by the intervention of a movable joint, so constructed as to grasp or clutch the lifting leg at any required height, the position of the same being governed by the regulator, which may be constructed in the form of an inclined plane or any equivalent contrivance for raising and depressing the joint at the will of the operator; the whole being constructed to perform the peculiar services substantially in the manner herein before set forth in this my specification.

LUTHER BRIGGS, Jr.

No. 7966.—*Improvement in Machines for Climbing Poles.*

What I claim as my invention, and for which I desire to secure letters patent, is the combination of the grappling levers with the sandals and handles, for the purpose of climbing telegraph poles, masts, &c., and holding the climber at any desired height, so as to give him free use of his hands when at rest, as herein described and represented.

HENRY D. CHAPMAN

No. 7967.—*Improvement in Cast Iron Car Wheels.*

I do not make any claim to the combination self-considered of wrought iron tire with a cast iron body, or yet for full plate sides, or for internal rams in section when cast solid with the side plates, of a railroad car wheel, for such have all been known and used before; but what I do claim as new, and desire to secure in letters patent, is the precise manner in which I have constructed and put together the parts of my wheel, by which, thus formed, they are free of strain from shrinkage in cooling, and have semi-internal flanges, as described, to protect the wheel when in use against lateral strain, and are bolted together and combined with a wrought-iron tire, in the manner set forth.

P. G. GARDINER.

No. 7968.—*Improvement in Machinery for making Tires by continuous rolling.*

Having described the operations of the machine sufficiently, as I here proceeded with the description of the construction of the same, I proceed to point out the new parts contained therein.

What I claim as new, and desire to secure in letters patent, is stopping the advancing movement of the movable towards the stationary roller when the tire shall have attained its proper section, by means of self-acting mechanism, acting and constructed substantially as herein described.

I also claim the combination of belts, pulleys, clutches, screws, and screw wheels, with the sway bar and triggers, by which a self-acting, advancing, and retrograding motion is given to the movable roller, each motion changing to the other, when caused so to do, by the hand of the operator, but self-arrested and stopped by the set of the triggers, substantially as specified.

P. G. GARDINER.

No. 7969.—*Improvement in connecting Trucks with Car Bodies.*

What I claim as my invention, and desire to secure by letters patent, is connecting the bodies of cars to the trucks by two bolts to each truck, working in the holes or mortices above described and represented, the whole being constructed and operating substantially as herein set forth.

THOMAS P. HOW.

No. 7970.—*Improved use of Slides in Bee-Hives.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the manner, herein described, of arranging the moth apartment with glass, paper, or other thin material, overlaying the vent holes in the top of the box, said glass or paper having placed upon it old comb or other suitable material, so as to be warmed by the bees in the boxes below, and ventilated as described, thus attracting the moths into said apartment while they are at night entirely excluded from the bee boxes by means of ventilating buttons, as described.

I also claim the arrangement by which the upper box or boxes are held in their places while the one below is removed and another inserted in its place.

Also, the arrangement at the rear and bottom of each box by which the tin slide is removed, thus allowing a convenient opportunity for clearing the bottom of the bee boxes as described.

NATHANIEL POTTER.

No. 7971.—*Improved Window Curtain Fastening.*

I claim the construction of rack-pulleys for window-shades, by fixing the pulley, over which the cord of the shade-roller runs, upon a stem, having a plate sliding on the front outer face of the rack box, attached to a thin plate or fin passing through a slot in said face, extending the length of the box, the said fin projecting upwards, and terminating in a point, which acts as a pall against ratchet teeth made in the bottom of said box, or else the said fin projecting downwards and having a cross pin through it, acting against ratchet teeth in the upper and inner side of said box; the said stem and plate, in addition to the sliding motion along the box, having an oscillating motion on the upper or lower edge of the plate, by means of which the upward pressure of the cord on the pulley holds the pall or pin against the ratchet teeth or the downward pressure of the hand, carries the pall or pin out of the line of the teeth and permits the pulley to be moved upwards when required, substantially as set forth in this specification.

HUGH GUYER.

No. 7972.—*Improvements in Steam Drilling Machines.*

What I claim as my invention, and desire to have secured to me by letters patent, is the combination of a direct action steam-drill, in which both engine and drill are mounted on a frame, which slides in a swinging frame, capable of being adjusted in any required position with the apparatus, substantially as herein above described, which is connected with, and actuated by, the cross head of the engine for causing the sliding frame to move along the swinging frame towards the rock.

JOSEPH W. FOWLE.

No. 7973.—*Improvement in Air-tight Franklin Stoves.*

What I claim as my invention, and desire to secure by letters patent, is making the fire-box with closed plate in front and behind, with a grate surface at bottom, occupying about one-third of the space between the front and back stove-plates, to constitute hot air chambers front and back, when such fire-box is combined with a sliding damper at bottom, substantially as and for the purpose specified.

And I also claim, in combination with a fire chamber constructed as above specified, and governed at bottom with a sliding damper, as specified, the open front, with vertically sliding doors as described, and for the purpose specified.

RENSSELAER D. GRANGER.

No. 7974.—*Improvements in securing Daguerreotypes in Monumental Stones.*

What I claim as my invention, and desire to secure by letters patent, is the mode, herein described, of securing the portrait plate against injury (from moisture or otherwise) by means of the two glass plates, D and F, the plaster, I, and back plate, H, the whole being arranged and combined substantially as herein set forth.

SOLON JENKINS, Jr.

No. 7975.—*Improvement in Cooking Stoves.*

Having thus fully and clearly described the nature, construction, and operation of our joint invention, what we claim therein as new, and desire to secure by letters patent, is the combination of the driving flue, d,) as described, with the driving flues, (a) and (f,) as described, the said flues occupying the whole breadth of the stove, with the exception of the space occupied by the fire-doors and the central reverting flue in the back.

We also claim the gravitating damper, (l,) operated as described; that is to say, by the rod, (n,) with its curved eye, (m,) and the pendant lever (i,) with its bend, (p,) and catch, (O,) the said damper being located upon the division plate between the back diving flues and the central back reverting flue.

JAMES GREER,
RUFUS J. KING.

No. 7976.—*Improvement in Piano-Forte Action.*

What I claim as new in my invention, and desire to secure by letters patent, is:

First. Hanging the hammer-shank on a hinge or joint, d, at a distance from its end, and effecting its communication with the fly lever or jack by means of a lever, L, which is hung on a fulcrum, i, at a distance from either end, and is connected at one end by a hinged or jointed link with the end of the hammer shank, in such a manner that when the fly-lever is raised by the key, the end of the hammer shank is drawn down, and the hammer thrown up to the string, or by any other means substantially the same.

Second. The universal repeating spring, m, attached to the lever or butt upon which is formed the projection, K, or its equivalent, through which the fly-lever communicates with the hammer, for the purpose of raising it, and working upon the end of the fly-lever, in the manner substantially as and for the purpose herein set forth. This I claim, without reference to the precise form of the projection, or of the spring herein shown, as various modifications may be made for producing the same effect.

Third. Attaching the check-wire to a hanging or hinged butt, Q, operated upon by the key, in the manner substantially as described, so as to produce the same effect as if attached to the key, for the purpose of allowing the key to be easily taken out.

Fourth. Securing or placing the regulating screw, r, for controlling or regulating the escapement of the fly-lever, in an arm, N, or its equivalent, upon the lever upon which the fly-lever acts, by which the action of the said screw upon the fly lever is more gradual and easy, and the jarring or concussion produced when the screw is stationary is avoided.

JOHN RUCK.

No. 7977.—*Improvement in Machines for Turning, Boring, &c.*

What we claim in the foregoing as our invention, and desire to secure by letters patent, is the tool and block-holder herein described, consisting

of two upright frames, capable of movement towards each other, and of being clamped at a greater or less distance apart, as may be required to adapt them to holding blocks of different sizes, and tools of different lengths or forms, each frame being provided with upright parallel guides, carrying adjustable jaws for holding, boring, or turning tools, at different heights and angles, and to aid in holding blocks of irregular forms; these frames being mounted upon a carriage capable of being turned or moved right or left, so as to hold the tool or present the substance to be bored in the required position, substantially as herein set forth.

MARTIN WAY,
THOMAS R. WAY.

No. 7978.—*Improvement in Copying Presses.*

What I claim as my invention, and desire to secure by letters patent, is the use of a lever handle, I, having its fulcrum on the pressing-plate, B, attached to the opposite plate, F, by links, H, H, as shown, working in the manner described, in *combination* with the adjusting arrangements, C, E, G, g, for the purposes expressed, and operating together, as shown, or in any substantially similar manner.

A. A. WILDER.

No. 7979.—*Improvement in the Teeth of Saws.*

I claim as my invention the insertion of teeth in circular saw blades, of the form and for the purpose above set forth.

GEORGE F. WOOLSTON.

No. 7980.—*Improvement in Dressing Mill Stones.*

What I claim as my invention, and desire to secure by letters patent, is the new and improved mode of dressing mill-stones, which I have described above as fully and correctly as I can.

E. P. GAINES.

No. 7981.—*Improvement in Trunk Handles.*

What I claim as my invention, and desire to secure by letters patent, is casting the article in two parts, in such a form that they may be put together without any alteration of the parts, and so that they cannot get out of place, when the handle is attached to a trunk or other article, when the whole is constructed substantially as herein described.

ELIJAH A. ANDREWS.

No. 7982.—*Improvement in delivering Parti-colored Warps in Weaving.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein specified, of producing figures that will match on tapestry carpets, or other fabrics woven with printed warps, by the employment of a clamp or clamps, to be clamped on to the warps, as specified, in combination with belts, or their equivalent, having a positive delivery motion, and to which the said clamp or clamps can be attached at given distances, as specified.

E. B. BIGELOW.

No. 7983.—*Improvement in Jacquard Looms for weaving Cut Pile Fabrics.*

I do not wish to be understood as limiting myself to the precise construction and arrangement of parts herein specified, as these may be greatly varied within the principle of my invention.

What I claim as my invention, and desire to secure by letters patent, is combining with the power loom for weaving cut pile fabrics double, substantially as described, a jacquard machine for producing the figures on such fabrics as described.

I also claim, in the weaving of cut pile fabrics double, with the figures produced by the jacquard, dividing the figuring warps so that one half (or nearly so) of the figuring warps shall be in connexion with each of the cloths or fabrics, substantially in the manner and for the purpose specified.

I also claim, for the weaving of cut pile fabrics double, as described, the double and reversed arrangement of the jacquards, substantially as described.

I also claim, in the weaving of fabrics of the kind herein described, passing the double fabric between two vibrating bars, having curved faces, to determine the length of pile between the two cloths, in combination with the two rollers or their equivalents, over and under which the fabrics pass after they have been separated, substantially as described; and this I also claim in combination with a vibrating knife or knives for cutting the pile to separate the two fabrics as described.

E. B. BIGELOW.

No. 7984.—*Improvement in fastening of Scythes to the Snath.*

What I claim as new in my invention, and desire to secure by letters patent, is setting the edge of the blade up or down, or more or less obliquely, by means of the adjusting screw, (*f*,) in combination with the edge of the aperture, *a*, which form the bearings of the two sides of the shank of the blade, substantially in the manner herein set forth.

E. S. CLAPP.

No. 7985.—*Improvement in Scythe Fastening.*

What I claim as my invention, and desire to secure by letters patent, is—

First. Making the shank, C, of curved or arch form longitudinally, as described, which enables it to be fitted to the snath so as it may be set in or out by giving it a slight motion in a curved direction.

Second. The mode of securing the shank, C, so as to admit of the edge of the blade being set up or down, by making the cavity in the projection, *a*, through which the shank passes, widest at the back, and making the back edge of the shank and the inner side of the tightening key, E, of corresponding arch form transversely, so that the shank may be held secure in any position.

OLIVER CLARK.

No. 7986.—*Improvements in the method of Casting the Backs upon the Teeth of Curry Combs.*

Having thus described the manner of procedure according to my invention, such as I have essayed with success, I wish it to be understood that I do not limit myself to the precise mode herein described, but that I cover all modes which are essentially the same, effecting the same end by means substantially the same.

What I claim as my invention, and desire to secure by letters patent, is the employment of a bar in combination with the cope of a two-part flask for casting the back on to the plates of curry-combs, the said bar being notched to receive and hold the said plates during the process, all substantially as described.

JAMES M. GARDNER.

No. 7987.—*Adjustable Cut off.*

Having thus particularly described the nature of my improvement, what I claim therein as my invention, and for which I desire letters patent, is:

First. The tappet (*t*) vibrated by the impact of projections upon the slide valve rod, and lifting thereby a poppet valve which admits steam to the slide valve chamber during periods varying with the height to which the tappet is placed by the elevation or depression of the sliding rod or other object to which it is pivoted, said rod being raised or depressed by a motion derived from the governor, or communicated to it in such other manner as may be deemed expedient.

Secondly. I claim the mechanism, substantially as described, for prolongation of the admission of steam beyond the period at which it would be cut off by the tappet, to wit: the sliding plate (*w*) and the intervening bar (*o*,) the former with a pair of receding inclined planes or edges, and the latter with an equal and parallel pair of salient planes, which, by sliding upon the former, hold up the poppet valve after the tappet has ceased to act for a period, likewise depending upon the movement of the rod, which latter may be actuated as set forth in the former claim.

SAMUEL H. GILMAN.

No. 7988.—*Improvement in Cylinders for Figuring Looms.*

What we claim as new, and desire to secure in letters patent, is the mode of connecting the movable cams, *d*, and the slide pieces, I, with the drum, H, substantially as set forth, and for the purpose herein stated.

E. M. HASTINGS,
JOHN SHEPHERDSON.

No. 7989.—*Improvement in Scythe Fastenings.*

I do not wish to limit myself to the specific construction of the parts as described and represented, as this may be varied without changing the principle of my invention; as for instance any other mode of securing the plate, which forms the bed of the scythe shank, when set in any given position, may be substituted for that herein described. As I have simply described and represented the mode of construction which I have essayed with success, what I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein specified, of securing or fastening the scythe to the snath by means of the clamp jaws acting on the beveled or curved edges of the wedged formed shank, in combination with the method of holding down the end of the shanks by mean of the till thereon, which works on to the toothed plate of the recess as described, whereby the scythe is held more firmly to the snath, to resist all strain, than by any other method heretofore practised.

And I also claim the method, substantially as described, of spotting the scythe, that is, regulating the line that it shall have relatively to the curves of the snath, by means of the movable or adjusting plate, *c*, the edge of which forms the bed for the shank of the scythe when drawn down by the clamps as described.

EBEN'R. G. LAMSON.

No. 7990.—*Improvements in Jacquard Machines.*

What we claim as new in our invention, and desire to secure by letters patent, is—

Firstly. The manner of operating the cylinder by means of the double lockers, O, O, in combination with the springs, P, P, whereby its complete operation is effected by the upward motion of the trap board, C, substantially as and for the purpose herein described.

Secondly. The application of the weights, *l, l, l, l*, to the tail cords above the harness, for the purpose of more effectually keeping them tight, or straight, and thereby insuring the more correct operation of the trap boards and needles upon them, substantially in the manner herein set forth.

JOHN SCOTT,
JOHN TANNAHELL.

No. 7991.—*Improvement in the Construction of Bee Hives.*

What I claim as my invention, and desire to secure by letters patent, is having the comb placed within the trap, I, fortified or protected from the moth, or other insects, by the diaphragm, M, substantially in the manner herein fully explained.

A. J. SURLES.

No. 7992.—*Improvement in Removable Handles to Sad Irons.*

What I claim as my invention, and desire to secure by letters patent, is the method, herein described, of constructing sad, tailors', and other hand-smoothing irons with handles, which can be readily and securely attached to the iron, and easily detached therefrom, substantially as herein specified.

T. R. TIMBY.

No. 7993.—*Improvement in the Construction of Metallic Buildings.*

Having thus described the nature of my improvements in the construction of metallic buildings, what I claim as new, and of my own invention, and desire to secure by letters patent, is carrying up the vertical *u*-shaped flange-binders between the flanges of the roof-plates, to which they are attached, thus supporting the roof, and binding it firmly to the building.

I also claim such binders attached in such a manner in connexion with the tie plates, or rods, Q, attached at the same spot between the flanges, and by the same bolts; and this I claim, whether the suspension bars, R, be employed or not.

SIMON WILLARD.

No. 7994.—*Improvement in Adjustable Land Sides of Ploughs.*

Having thus described our improvements in the plough, we wish it to be understood that we do not claim the employment of an adjustive plate for elevating the rear portion of the plough to regulate the depth of the furrow.

But what we do claim as our invention, and desire to secure by letters patent, is providing a right angled heel-plate, L, with a hook, P, for the purpose of interlocking with a hooked shaped projection, Q, attached to the land-bar, forming a hook joint, said heel-plate, L, forming the bottom and side of the land bar, and having its rearward portion susceptible of vertical adjustment by means of a screw, T; and, when adjusted, being clamped by a horizontal screw bolt, N, its shank being placed in a segmental slot, to admit of its moving with the heel-plate, as described.

GEORGE HEFFLEY,
SAMUEL CONRAD,
JAMES WIGLE.

No. 7995.—*Apparatus for securing Shutters in any required position.*

What I claim is the right to the rods, pintles, sockets, screws, and apertures, connected, arranged, and acting substantially in the manner and for the purposes described.

CHARLES W. KREBS.

No. 7996.—*Improved Sash Lock.*

What I claim consists in the spring, F, to throw the turning hook *outwards*, the spring catch, G, (applied to the frame of the hook,) and the projection, H, (extending either from the curved rail or the lower window sash,) in combination together and with the said clamp-hook and rail, the whole being made to operate substantially in the manner as herein before specified.

MICHAEL NORTON.

No. 7997.—*Improvement in Extension Tables.*

Having thus fully described the construction and operation of my improved extension table, what I claim as new, and of my invention, and desire to secure by letters patent, is—

First. The slides, E and F, in combination with the cross bars, G, and folding rails, I; and, second, the recess for the reception of the loose leaves, being formed substantially in the manner and for the purpose set forth.

LEWIS THORN.

No. 7998.—*Apparatus for moving and securing Shutters, &c.*

What I claim as my invention, and desire to secure by letters patent, is the manner of opening and closing window shutters from the inside, and securing them firmly at any point in their semi circuit by means of the horizontal screw shaft, B, inserted in an opening in the lower portion of the window frame, metallic nut, E, surrounding the same, and the bar or plate, F, attached to the shutter, substantially as described.

A. W. SPEERS.

No. 7999.—*Improved Apparatus for drawing and measuring Liquids.*

What I claim as my invention, and desire to secure by letters patent, is the combination of measures with faucets, cocks, or gates used in drawing liquids from cans, casks, barrels, &c., in such a manner that by opening the faucet attached to the cask, the measure will be filled; then, by closing the same, the desired amount may be drawn by opening the corresponding faucet in the measure, the whole combined substantially as described, and for the purpose set forth.

RICHARD F. STEVENS.

No. 8000.—*Improvement in Scythe Fastenings.*

What I claim as my improvement, is the combination of the two wedge shaped bearers, H, I, the confining bolt, F, and the support at the extreme, or other end of the shank, as constructed, substantially in the manner as specified, the whole being for the purpose of enabling a person to change the position of the blade of the scythe in a direction transversely of the plane of the blade.

NATHANIEL LAMSON.

No. 8001.—*Improvement in Machines for preparing Clay for Making Brick.*

What I claim as my invention, and desire to secure by letters patent, is the use of a revolving screen, constructed of bars, *a, a, a, a*, set at a slight inclination from the horizontal position, having lugs or crushers, *c, c, c, c, c*, within it; each lug being hung or suspended at one end, on a bar, *o*, and prevented from touching or rubbing the screen by cord or chain, *i*, attached to its other extremity, and rod, *p*, supporting or constructed, and operating in any manner substantially the same and for the purpose set forth.

HEMAN WHIPPLE.

No. 8002.—*Improvement in Upright Piano Fortes.*

What I claim is the arrangement of the sounding board in upright pianos, between the strings and the performer, substantially in the manner described.

HENRY KLEPFER.

No. 8003.—*Improvement in Scythe Fastenings.*

I claim the arrangement of the hole or holes, *f, f, f*, at the head of the confining clasps in such manner, with respect to the axis, *g*, of the screw, H, that when the said screw is turned one hundred and eighty degrees, the position or positions of the same (*i. e.* the hole or holes) may be changed in such manner as to secure one or more new and different positions for the shank, the same being for the purpose as specified.

NATHANIEL LAMSON.

No. 8004.—*Improvement in Balanced Valves.*

I do not claim as my invention valves having seats of such relative diameters that they shall be retained thereon by the pressure of steam; but what I claim as my invention, and desire to secure by letters patent, is in the above description of valve, where the disk is held by a support running up through the hollow valve, so forming the valve that the upper seat shall be larger in diameter than the lower one, by means of the ring, *r*, attached to the valve, and by means of the ring, *s*, attached to the seat, or by any means substantially the same, for the purpose of retaining the valve on its seat, by the pressure of steam, whenever its position or location in respect to the steam passages is such that the pressure of steam is below the valve when closed.

FRANCIS B. STEVENS.

No. 8005.—*Improvement in Machines for Folding and Measuring Cloth.*

Having thus fully described my invention, I will proceed to state what I claim as new, and desire to secure by letters patent:

I claim—first. Folding the cloth as it passes through or between the calender rollers during the process of calendering, or by passing it through or between a pair of revolving rollers, E, E′, similar to calender rollers, the said calender or other rollers being hung in a carriage, F, F, G, which receives a reciprocating motion above or across a table, C, and a tilting motion at each end of its stroke, so as to bring each roller alternately to bear on the table as it (the carriage) moves in different directions across it, thereby laying the cloth under the rollers on the table in folds or layers, in the manner substantially as herein described.

I claim—second. Making the reciprocating motion of the calender rollers of a certain fixed length; such length determining the length of the fold, and thereby measuring the cloth, substantially in the manner herein described. At the same time I wish it to be understood that I do not claim the measurement of cloth by folding it in layers or folds of a certain length, unless such layers or folds are laid by calender or other similar rollers.

HENRY BOOT.

No. 8006.—*Improved Horse Shoe Nail Machine.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is making a horse-shoe nail by means of a stationary, former, and a series of travelling and rotating cams, arranged and operating substantially as herein described and fully shown.

MARSHALL BURNETT.

No. 8007.—*Improved Machine for sticking Pins on paper.*

In the machine which I have now fully and exactly described—for sticking pins crosswise of narrow fillets of paper, to prepare it, when so stuck, for winding, and winding the same into coils—there are several parts which are common, or such as have been used by others, which I do not claim separately nor in other combinations.

I do not claim the upper feeding channel, or inclined conductors, when made of straight bars; nor cylinders with parallel sides, which have been used for conducting wood screws and similar headed articles; nor the downward curved conductors; nor any other feeding channels, unless they are combined with the conical form of rollers or the separator.

I do not claim the crimps, nor any peculiarity in inserting the pins through them, if made crosswise of the sheet, and the pins inserted lengthwise of it, and not crosswise of both the crimps and fillet, or ridges raised in it.

I do not claim nor use any kind of crimping "bars," "jaws," or "clamps," as they have been heretofore used.

And, generally, I wish it to be distinctly understood, that I do not limit myself to the precise form or arrangement of parts, nor the particular devices for moving them; for these may be much varied without changing the principle of my invention as set forth; nor do I limit myself to the single process of inserting only one pin at once, or only one edge of the fillet: for on the same principles, with only circumstantial variations of the machinery, I can insert several pins at once on the same edge of the fillet, or on both edges of it; and other similar variations can be made by any competent machinist without any essential or substantial variation from the character of my invention, as herein described and set forth.

First. I do claim the conical form of rollers to constitute my feeding channel for arranging the pins and moving them forward in the channel, with the most suitably decreasing rates of descending velocity, as herein described.

Second. I do claim also as my improvement and invention, and desire to secure by letters patent, the combination of the parts and the adaptation of my machine for feeding the pins, separating and delivering them, crimping the fillet, and sticking the pins crosswise of such fillet, and finally rolling the fillet into a coil, substantially in the manner described.

I claim also the screw separator, as described, placed in the feeding channel to restrain the natural descent of the column of pins, so that they may be delivered as fast, and no faster than they are required for sticking, substantially as herein described and set forth

C. O. CROSBY.

No. 8008.—*Improvement in Wheat Fans.*

Having thus fully described my invention, what I claim herein as new, and desire to secure by letters patent, is two or more chambers and areas, in combination with a fan, for the purpose of cleaning and separating grain, by using one and the same blast (to clean it) over and over again any number of times, as herein fully described and represented.

JOHN HOLLINGSWORTH.

No. 8009.—*Improvement in Mills for grinding Paints and Drugs.*

I do not intend to confine myself to the precise forms of construction herein described, as those may be varied in many ways to produce the same results; as, for instance, the rotation of the mullers may be effected by the use of gearing, or the spindles of the mullers may be firmly fixed and the bed stone be made to revolve—all of which methods involve the principles of my invention.

What I claim as of my own invention, and desire to secure by letters patent of the United States, is the construction of a mill in which the grinding surfaces shall consist of a plane or planes operating upon a cone, as herein described.

I claim also the lever (k) in combination with the muller, for the purpose of regulating the feed; the whole being constructed substantially in the manner as set forth herein.

G. D. JONES.

No. 8010.—*Improvement in Rice Hullers.*

Having described my invention, I will now state what I claim as new, and desire to secure by letters patent.

I claim operating the pestle by having it attached to a rod passing through the bottom of the mortar, and receiving motion through a crank, or its equivalent, placed below it, substantially as and for the purpose herein set forth.

PETER McKINLAY.

No. 8011.—*Improvements in Blasting Rocks, &c.*

Of course I do not mean to suggest the use of cartridge as anything new in blasting; and I am aware that clay has been used around a charge in wet holes, by way of puddling, to fill the little fissures and stop the leaks; and also as to the use of water, where a *depth* of it can be had sufficient to make its *weight* available, I am aware that this would not be new. But as to my device of packing around the cartridge for the object before indicated, and with water—irrespective of the consideration of its weight—I do not know whether this device is new or not; and that I may be upon the safe side, I shall not claim it. Moreover, it is not important for me to claim it, inasmuch as it is a device which can in no other way be so conveniently available as in connexion with the use of said *binder*, which I do claim.

And now, to sum up in brief what I claim as my invention, and desire to secure by letters patent, it may be sufficient to state—

First. I claim the use of an artificial binder, by means of which to restrain the action of the blast in opposite directions, by off-setting said action against itself, substantially as herein before explained.

Second. I claim the use of the little packing wedge, or wedges, within the charge or blast chamber, substantially as described.

CHARLES MONSON.

No. 8012.—*Improved Machine for forming a Lock on Sheet Metal.*

Having thus fully described my invention, I will now proceed to state what I claim therein as new, and desire to secure by letters patent. I claim the employment of a cam or cams, *g*, *g*, on the tumbler, D, operating on levers, E, E, connected with the under side of the movable jaw, C, in combination with a spring or springs, *l*, substantially in the manner described, for the purpose of closing the lip, *e*, and securing the plate while folding, and raising the lip and releasing the plate after the folding is completed.

JABEZ WALKER.

No. 8013.—*Improvement in Wheat Fans.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the fan, air-trunk, and head, constructed and operating substantially in the manner and for the purpose herein described.

JESSE WHITE.

No. 8014.—*Improvement in Bran-Dusters.*

Having thus fully described our improvements, we wish it understood that we do not claim the beater and fan revolving within an upright stationary beater and bolt, as these have before been used; but what we do claim, and desire to secure by letters patent, is the combination of the openings, (*d* and *l*,) both provided with valves or registers, with the runner and fan revolving within an upright cylindrical casing, the upper part of which acts as a beater, and the lower part as a bolting apparatus, substantially as described, for the purpose of separating the flour which adheres to the bran after undergoing the ordinary bolting; the said process being regulated and adjusted to suit the circumstances of weather, &c. by admitting more or less air, either above or below, by means of the registers, as set forth.

JNO. M. CARR,
JAS. HUGHES.

No. 8015.—*Improvement in connecting and disconnecting Wheels and Axles.*

I do not claim the cap, the nut, or the axle; but what I *do* claim as my invention, and desire to secure by letters patent, is the dog and the spring combined, and operating as above set forth.

SIMEON HEYWOOD.

No. 8016.—*Improvement in the Manufacture of India-rubber.*

Having described my invention, and the best mode known to me of manufacturing the same, what I claim as my invention, and desire to secure by letters patent, is the combination of potash with rubber and sulphur, and submitting the same to a high degree of heat, whereby to produce the change upon rubber known as vulcanizing.

DAVID McCURDY.

No. 8017.—*Improvements in Splint Machines.*

What I claim, and desire to secure by letters patent, is the combination of the cylinders, F and G, with their cutters, J, J, attached, (for the purpose of giving a rounded form to the splints,) and the cylinder, K, with its spurs, *l*, (for the purpose of dividing the splints in one direction,) with the circular cutter or saw, N, (for the purpose of separating the splints from the timber,) and the guide, *v*, to guide the splints in the channel, *u*; the whole being arranged substantially in the manner and for the purposes above set forth.

HENRY MELLISH.

No. 8018.—*Improvement in Seed Planters.*

Having thus described the nature of my invention and improvement, and the operation of the same, what I claim as new, and of my own invention, is placing two or more hollows, drill teeth, in a direct line, one behind the other, managed and drawn by the same drag-bar; the front tooth being made the longest, and so placed as to run somewhat deeper in the soil than its successor or follower, for the purpose of depositing fine manure, or chemical agents, beneath the grain when planted in rows or otherwise, as herein fully set forth and represented.

ARCHIBALD WIETING.

No. 8019.—*Improvement in Machines for cutting Screws on Bedstead Rails.*

Having thus fully described our improvements in cutting screws, what we claim as new therein, and which we desire to secure by letters patent, is the peculiar form and manner of securing the V-cutter to the cylindrical head, as described; that is to say, making the cutter as represented, and letting the tapered end of the shank into the recess, bringing the angular shoulder against the cylinder, and sustaining the bevelled points against the interior bevelled surface of the cylinder head, by which arrangement the instrument, during the operation of cutting, is forced firmly against the head, the strain upon the confining screw being thereby greatly reduced, and the cutting tool itself strengthened.

H. GROSS,
W. CAMPBELL.

No. 8020.—*Stone and Metal Conglomerate for Paving, &c.*

Having thus described the nature of my invention, what I claim therein as new, and for which I desire letters patent, is forming a block suitable for paving, masonry work, or analogous purposes, of a conglomerate of iron and stone, by running the molten metal among broken stone within a mould, either with or without the devices, substantially as herein described, for jointing and locking together the contiguous blocks.

GEORGE H. KNIGHT.

No. 8021.—*Improvement in Brick Presses.*

Having thus fully described the nature of my invention, what I claim herein as new, and desire to secure by letters patent, is the lip, *e*, hugging closely the rim of a wheel containing moulds; the said lip being a prolongation of a gradually narrowing feed-trough, formed and operated after the manner and for the purposes substantially as herein described—namely, the formation (by pressure of untempered clay) of a uniform and coherent brick.

JOHN J. RIDDLE.

No. 8022.—*Improvement in Sawing Machines.*

Having thus pointed out the nature of my invention, and the manner in which I have essayed the same with success, I will state that I do not wish to limit myself to the precise mode of constructing and arranging the parts, as these may be variously modified without departing from the principle of my invention.

But what I claim as my invention, and desire to secure by letters patent, is making the circular saw with both faces convex, in the manner and for the purpose substantially as specified, when this is combined with the guide, substantially as specified, for spreading apart the plank to prevent the binding of the saw, as specified.

PEARSON CROSBY.

No. 8023.—*Improvement in fastening down Table Leaves.*

What I claim as my invention, and desire to secure by letters patent, is the combination of devices, by means of which table-tops of different forms and dimensions can be readily secured to and disconnected from the same frame, as herein set forth.

LEWIS J. MASON.

No. 8024.—*Improvement in Brick Presses.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the mould wheel with the grooved and smooth pressure roller, substantially as herein described; the grooved roller gauging and partially compressing the clay into the moulds, and forming a projecting band of clay, which is subsequently compressed into the moulds by the smooth-pressure roller.

I also claim the grooves in the mould wheel, in combination with the flanges of a hopper, which is supported on the frame of the machine, independently of the mould wheel, by which arrangement the clay is prevented from escaping laterally, and working in between the teeth of the driving wheels; hence the latter can be placed near to the moulds, and the machine thus made more compact, while, at the same time, the danger of breakage is diminished.

I likewise claim detaching the bricks from the pistons of the mould wheel by means of the tappets and lever, as herein set forth.

J. Z. A. WAGNER.

No. 8025.—*Improvement in Apparatus for Bolting Flour.*

Having thus clearly and exactly described the nature and operation of our joint invention, we wish it distinctly understood that we do not claim the broad principle of bolting meal by an air blast, as this has been imperfectly done before; but what we do claim as new, and desire to secure by letters patent, is the application of a blast cylinder with spiral issues, as described, to the process of bolting flour or other pulverized materials; by means of which, during a continuous blast, the meal is consecutively thrown against the bolting cloth, and so much as is not passed through at once is given an interval of time to fall from the cloth, and leave open the meshes, and is thus, as it were, refed to the impulse of the blast from each succeeding issue; the intermittent action at the same time causing eddies that loosen, and, as it were, rip up the bran and flour from the cloth, separate the bran from the flour, and twirl the particles of bran in such a manner as to leave the flour free to pass through; while the bran, from the twirl thus given it, is caused to present its broadest surface to the bolting cloth, the specking of the flour being thereby prevented and avoided; the several parts being arranged substantially in the manner and for the purpose described.

We also claim the insertion of a set of beaters at a suitable distance down the bolting cloth and blast cylinder, which, during the bolting process, shall interrupt the same at a time when the bran requires beating, in order to loosen the flour from it preparatory to the further continuance of the bolting process, substantially in the manner and for the purpose described.

We also claim the chambers (Y) and (I,) by means of which the light flour, carried up by the escape of the blast, is regathered, and returned to the usual gathering chamber (S,) substantially in the manner and for the purpose described.

LEWIS FAGIN.
HENRY C. HAYMAN.

No. 8026.—*Improved Saw Set.*

Having thus described the construction and operation of my improved saw-set, what I claim therein as new, and desire to secure by letters patent, are the following particulars:

First. Supporting the lever, by which motion is given to the jaws, by means of an adjustable stirrup, constructed substantially as described; whereby said stirrup serves as a gauge, in addition to performing its ordinary duties.

Second. I claim the arrangement of the jaws, constructed of one bent piece of metal, with the lever and stirrup; the handle of said lever projecting backwards, towards the rounded part of the jaws; the whole being constructed substantially as herein described.

ELIJAH S. HOLKINS.

No. 8027.—*Apparatus for setting up Tenpins.*

What I claim as my invention, and desire to secure by letters patent, is elevating the pins of a bowling alley by means of a set of elevating sockets, operated from the head of the table when this is combined with any well-known device or devices, which will permit the pins to fall, and sustain them in a vertical position, after they are elevated, substantially as described.

THOMAS J. SLOAN.

No. 8028.—*Improvement in Horse Powers.*

What I claim as my invention, and desire to secure by letters patent, is the manner of arranging and connecting the whipple-tree and brake, so that when the horse is drawing, the brake is off the wheel or pulley; and when not, is on, and acting as a governor, as hereinbefore described, for the purposes herein before set forth.

AARON D. CRANE.

No. 8029.—*Tool for making Jack Chains.*

Having now fully described my invention, I disclaim all right to the grooved pin. But I claim the combination of the stud pins, *i* and *i'*, with the bending stud and holding dog, arranged and acting substantially as described.

WILLIAM TODD.

No. 8030.—*Improvement in Ladies' Work Tables.*

Having thus fully described my improvement, what I claim as new, and desire to secure by letters patent, is the mounting of the upper leaf, B, and disk, G, with the drawers, R, R, Q, on the rotary standard, X, thus raising or lowering the whole, to suit different persons, by the screw, L.

Second. I claim the rotary disk, with drawers hung thereon by the screw, U, supported by the pin, K, which can turn round the standard, independent of the leaf or standard, B, X, and raised or lowered, as herein set forth.

CELIA R. P. WOOD,
(Now CELIA R. P. FOSTER.)

No. 8031.—*Improvement in Grain Separators and Fans.*

What I claim as my invention, and desire to secure by letters patent, is constructing the elevator with double troughs, *c*, *e*, in the manner herein described, for the purpose of preventing the grain from falling through between the cells.

I moreover claim the combination of the herein described elevator, J, wind-channel, L, and plate valve, *m*, with a grain-threshing and winnowing machine; the former being constructed and arranged as herein described.

ROSWELL T. MERRILL.

No. 8032.—*Improved Saw Set.*

What I claim as of my own invention in the saw doctor, and wish to secure by letters patent of the United States, is the "adjustable double beveled slide saw rest," constructed and used substantially as herein described, by means of which its beveled bed, the tooth rest, upper jaw, and punch saws of all kinds can be firmly held, and their teeth be either set in V-form, shouldered in U-form, or be both shouldered and set to any amount required to insure any degree of smoothness or roughness in sawing, whether their points are sharp or rounded.

HIRAM STRAIT.

No. 8033.—*Improvement in Winnowing Machines.*

What I claim as my invention, and desire to secure by letters patent, are the blast passages, F, G, and *k*, arranged and controlled by the shutter, J, in the manner and for the purposes substantially as herein set forth.

JONATHAN L. BOOTH.

No. 8034.—*Improvement in Cooking Stoves.*

Having thus fully described the nature of my invention, what I claim therein as new, and desire to secure by letters patent, are the air passages *p*, *q*, *r*, between the fire-back, *l*, and the upper oven, the said passages receiving external air at the sides of the stove, and discharging it into the back flue, in combination with the damper, *m*, and flues *b*, *c*, *d*, *e*, *f*, *g*, *h*, substantially as herein described and represented, for the purpose of equalizing and regulating the heat to all parts of the ovens.

RUFUS K. PAINE.

No. 8035.—*Improvement in Material for transferring colors in Calico Printing.*

Having thus described the nature of my invention, and the manner in which the said invention must be used, I claim the use of extract of fibrine to form, with or without any other oily or fat matters, by the means which I have described, or any other equivalent means, a mastic adequate to thickening and retaining on fibres, threads, tissues, of every description, and of every material or substance, the archil color, and such other colors as are incorporated with that mastic.

I also claim the above process of preparing and purifying the extract of caseine, in order, by the means which I have specified, or any other equivalent means, to impart to fibres, threads, and tissues, of vegetable nature of every description, by means of a preparation of mordant, the property of better uniting to, or attracting, the coloring matter of archil, and, in general, other coloring matters, either in printing or dyeing, whether this preparation, or mordant, be applied on the fibres or threads of vegetable nature, previous to the weaving, or whether it be applied after the weaving on tissues of vegetable nature, or on tissues composed partly of vegetable and partly of animal substances.

C. A. BROQUETTE.

No. 8036.—*Improved Milling Tool.*

The rotary die for making impressions on metals and other substances is a well known instrument, and we make no claim founded on that instrument in itself considered.

But what we do claim, and desire to secure by letters patent, is the combination of such die with an axle, on which the same may vibrate, which axle is at right angles with the axis of rotation, and not in the same plane, substantially in the manner and for the purposes herein set forth.

JOHN BUCKINGHAM,
JOSEPH H. BAIRD.

No. 8037.—*Improvement in Mill Stones.*

What I claim as my invention, and desire to secure by letters patent, is constructing the running-stones of mills with oblique apertures, or passages, through the body of the stone, and provided with hoods or funnels, to collect the air during the rotation, and connected on the grinding face of the stone with furrows, substantially as described, when this arrangement is combined with the use of vertical pipes, leading from the extremity of one of the apertures or passages, to a funnel leading to the next succeeding oblique passage in the body of the stove, substantially in the manner and for the purpose specified.

E. T. HANON VALCKE.

No. 8038.—*Improvement in Iron Railings.*

What I claim as my invention, and desire to secure by letters patent, is securing the pailings permanently to the horizontal rods or bars of iron, for the purpose of constructing an entire section of railing by means of the methods of operating the rods or bars with the pailings, having jaws, recesses, and bearings, as described therein, and, together with other devices in castings, termed saddles or troughs, having dovetails and tenons cast to them for the purposes herein named; and this I claim, whether the several parts be formed and adapted to each other and operated precisely as represented and described, or otherwise; the results always produced being effected by means equivalent to those within named.

JOHN KRAUSER.

No. 8039.—*Improvements in the Steam Engine.*

What we claim as our invention, and desire to secure by letters patent, is—

First. The construction and arrangement of the columns by which the steam cylinder is connected with the bed frame in such manner that they constitute the air-pump and condenser, substantially as herein set forth.

Second. The method, herein described, of actuating the cut-off valve of one steam cylinder by a motion derived from the valve or valve-rod of the other cylinder, substantially as herein set forth.

Third. The adjustable supplementary valve (*i*) in connexion with apertures or ports (*o*) in the steam valves, by means of which the steam can be worked at full pressure throughout the whole length of the stroke without disengaging the cut-off valve.

R. F. LOPER,
J. W. NYSTROM.

No. 8040.—*Improvement in Cooking Stoves.*

Having thus fully described my improvements, what I claim as new therein, and desire to secure by letters patent, is the apertures (*l'*) and passages (*n* and *o*) by which the air containing the surplus heat from the oven (*b*) is conveyed to the back of the fire-chamber, where it receives an access of heat, and afterwards to the flues, (*e*,) by which arrangement the heat is equalized between the two ovens, and the upper one is ventilated, as set forth.

JAMES S. MARSH.

No. 8041.—*Improvement in Window Curtain Fixtures.*

Having thus described my improvement in window-curtain fixtures, I shall state my claim as follows: I do not claim generally confining one end of the curtain to the roller on which it is wound and unwound by means of a groove in said roller, and a confining strip; but what I do claim, and desire to have secured to me by letters patent, is the method or means, herein-above described, of fastening the confining bar in the groove of the roller in which the cloth is pressed—that is, by having the ends of said bar rebated as described, and fitting the caps at the ends of said roller, over said rebated ends of said bar, as above set forth; this arrangement of the caps and bar (the said caps, or one of them, being loose, so as to move laterally, but not to revolve, the sides of the rebated ends of the bar operating as shoulders to prevent a revolution) enables me to adapt my improved fixture to windows of different widths.

S. S. PUTNUM.

No. 8042.—*Improvement in setting Logs in Saw-Mills.*

Having thus fully, clearly, and exactly described the nature and operation of my invention, what I claim therein as new, and desire to secure by letters patent, is—

First. The vibrating dog (*i*) having the distance of its head or tongue, (*i'*) with respect to the saw, adjustable laterally by a set screw, (*g*,) substantially as represented, so that, by placing the tongue of the head in each successive curf, and bringing the face of the log in contact therewith, the thickness of each consecutive board is exactly counterpart with the first.

Second. I claim, for analogous purposes, at the rear end of the log, which is destitute of a curf, the vibrating dog, (*p*,) whose distance in respect to the stationary block (*q*) is adjustable by means of a set screw, (*l*,) the range between the head of the dog and the block affording an easy and determinate means of giving exactly the same thickness to the boards at the rear end of the log.

JOHN W. ROBBINS.

No. 8043.—*Improvement in agitating Grate Bars.*

I do not claim the employment of a movable grate formed by bars C, C, and strips, *c*, *c*, the bars, C, C, working within the bars of the stationary grate; but what I do claim as my invention, and desire to secure by letters patent, is the application to the movable grate of two separate mechanical movements, whereby it may receive a rocking or a vertical vibratory motion at pleasure, the several parts constructed and operating substantially in the manner shown and described.

A. D. SPOOR.

No. 8044.—*Machine for cutting out the corners and scoring the edges of Paper for Boxes.*

Having thus fully described my machine for cutting boxes, what I claim as my invention, and desire to secure by letters patent, is the combination of the knife and dye, substantially in the manner and for the purpose herein described.

ANDREW DENNISON.

No. 8045.—*Improvement in Apparatus for operating Window Blind Slats.*

I am aware that cog-gearing has been employed for the purpose of operating window-blind slats from the interior of a building. I therefore do not claim such device in general.

But what I do claim as my invention, and desire to secure by letters patent, is making the cog wheel, E, with such a length of teeth that, when its spindle is forced outwards by the spring, they shall engage with the teeth on both sides of the cog wheel, F, thereby locking the same, and securing the slats in any desired position, substantially as herein described.

SAMUEL AVERY.

No. 8046.—*Improvement in Ornamenting Marble.*

What we claim as ours, and wish to secure by letters patent, is the above-described ink, and the wax color and etch water used in combination therewith, substantially as described above.

HENRY HOFFMAN,
CHARLES FREDERICK HILL.

No. 8047.—*Improvement in Cooking Stoves.*

My improvement, and what I claim, consists in the peculiar arrangement or manner of combining the fire-place—the descending or diving flues, the ash-pit, the lateral chambers, the ascending flues, the central discharge flue, the oven, or air heating chamber, and its surrounding flue space, all as represented in the drawings, and as hereinbefore specified.

DENNIS G. LITTLEFIELD.

No. 8048.—*Improvements in the process of manufacturing Glazed Sheet Iron.*

What we claim as our invention, and desire to secure by letters patent, is the employment of thick plates of iron as shield plates; or, in other words, placing four (more or less) thin plates between two shield plates of double weight, in forming packs for rolling, so that each shield plate will make two plates of proper size to constitute the inside plates of another pack, for the smoothing and finishing process of rolling.

JOHN WOOD,
WILLIAM W. WOOD.

No. 8049.—*Improvement in means of Renovating and Correcting Sight.*

What I claim as my invention, and wish to secure by letters patent, is the cups and caps to produce a pressure upon the periphery, in case of old age or front of the eye in case of nearsight, which will increase or diminish its convexity, as the nature of the case may require, with their application, as set forth in the accompanying specifications and drawings, using for that purpose any of the materials named in the above specifications.

JONATHAN BALL.

No. 8050.—*Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The arrangement of the flues which conduct the heated air to the space under the oven bottom, from which it is discharged into the oven at the corners thereof, and without any enlargement to permit the expansion of the air before it reaches the oven, as described, when this is combined with the arrangement of fire flues on each side thereof, as described, whereby the air passing to the oven is heated along the whole distance of its passsage by the products of combustion from the fire place, as described.

I also claim as my invention the heating of the air in its passage through the back hot air chambers, by combining with such air chambers and the main fire flues the branch fire flues which pass back of the said air chambers, substantially as described.

CHARLES W. GRANNIS.

No. 8051.—*Improvement in machines for Gutta Percha tubing and covering Wire.*

What I claim as my invention, and desire to secure by letters patent, is the use, for the purposes specified, of feed rollers, C, C, in combination with the stomach, G, G, having a lip, or mouth, *h*, arranged and operating substantially as shown and described.

JAMES REYNOLDS.

No. 8052.—*Improvement in Machines for Stretching Leather.*

I do not claim the shafts, wheels, chains, and vises by which the process of stretching is done; that may be effected by various mechanical arrangements.

I claim the method, or device, of stretching leather, especially for belting, by the use of apparatus so arranged that after a piece of leather has received, by an equable strain, applied to its ends for their whole width, the proper stretch that the material can bear on or along one edge thereof; if it be found that the other edge, and parts intermediate between it and the first edge, (from the difference in quality of fibre,) has not received its proper tension, the further stretching of the first side shall be stopped, whilst by the application of the mechanical stress at the other edge of the leather, it, and the parts between it and the first side, shall be duly stretched, substantially in the manner set forth in this specification.

I claim the holding board as essential in all leather-stretching apparatus, where it can be applied in keeping the material, whilst being stretched, from contracting in width, and becoming defective thereby.

I claim the holding board, with its clamps and wedges, in combination with the apparatus of stretching, for the uses and purposes substantially as set forth in the above specification.

BRADFORD ROWE.

No. 8053.—*Improvement in Clogs or Pattens.*

What I claim, therefore, as my invention, and desire to secure by letters patent, is the application of an elastic loop or strap attached to the sole piece, and going around the heel, substantially as in the manner above described.

CHARLES W. STEARNS.

No. 8054.—*Improvement in Machines for Stretching Leather.*

We claim the construction of the stretching apparatus, by connecting the free rod to the clamp, by entering the end or tenon of the rod into a mortise with angular sides, and securing them together by a pivot pin, substantially as set forth in this specification.

WILLIAM STREVELL,
DANIEL BROWN.

No. 8055.—*Improved Apparatus for rolling Tapered Metallic Rods.*

What I claim as my invention, and desire to secure by letters patent, is permitting the rollers to recede from each other by means of the hydraulic apparatus, constructed and arranged substantially as described.

And, secondly, the adjustable screw, K, figures 1 and 2, in conjunction with the apparatus claimed above, whereby bars of metal are enabled to be rolled taper for a portion of their length, and parallel for the remaining part thereof.

WILLIAM CLAY.

No. 8056.—*Improvement in Saw Mills.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of driving belt saws by the friction surface of two cylindrical pulleys or drums, which gripe the saw plate below the wood which is being cut, but at some part of its tangent line, so that the strain to which it must be subjected in cutting to keep it in the line of the tangent shall not beat any part of its curved path; but this I only claim in combination with straining rollers, which gripe the saw above the lumber on which it acts, the said rollers being controlled by a brake, or the equivalent thereof, substantially as described, whereby the saw, during its action, is kept in a strained condition along its entire line of action, that it may cut in a straight line, and to avoid its being under tension where the flexions take place along the curved portions of its track, as specified.

I also claim, in combination with the mode, herein specified, of driving a belt saw by means of cylindrical rollers or pulleys, the employment of a belt passing around the outer one of said driving rollers, and applied to the outer surface of the saw when it passes around the lower deflecting or guide pulleys, substantially as herein described, by means of which the saw is bent by the pressure of the belt, applied to its outer surface, instead of being communicated through the metal itself, thus avoiding, in a great measure, the tendency to break the metal.

And, finally, I claim, in combination with the mode, substantially such as herein described, of driving a belt saw, the employment of fenders or scrapers, interposed between the driving rollers and the wood to be sawed, and placed each side of the saw, as described, to catch the sawdust and conduct it away from the bight of the driving rollers or the saw, and thus avoid clogging.

LEMUEL HEDGE.

No. 8057.—*Improvement in Coffee Roasters.*

What I claim is the combining or arrangement of the fire place or chamber of combustion, the roasting cylinder, and its surrounding chamber, substantially in the manner as above described, and as represented in the drawings; also the arrangement of the flue of the fire chamber, with respect to the latter, and the enclosing chamber of the roaster, the said arrangement of the said flue consisting in carrying it over and in contact with the top of the said enclosing chamber, as specified.

I also claim the arrangement of the proving tube within the hollow journals and central part of the roaster; not meaning to claim the device termed the proving tube, but simply its arrangement, as specified.

EDWARD WHITELEY.

No. 8058.—*Improvement in Straw Cutters.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the manner, herein described, of arranging one or more cutters on the periphery of a vertical wheel, at such angle with, and so extending over, the face of said wheel as will give a "drawing cut" through the straw or other material to be cut, and at the same time catch and carry the material as it falls to the opposite side of the wheel from where it is cut, thus removing the cut material out of the way of the feeding box and uncut material, as fully set forth and shown

T. F. WINGO.

No. 8059.—*Improvement in Car Seats.*

Having thus described the nature of our invention, what we claim as new, and desire to secure by letters patent, is the mode, herein described, of reversing the back of car seats from one side of the seat to the other, without turning them over, by means of arms, constructed and arranged as set forth, by which any desired height of back is obtained, as described.

Secondly. We claim the manner, herein described, of reversing the concave back on a movable frame, in combination with the side locking projections, as described.

RICKASON STILWELL,
E. L. BRUNDAGE.

No. 8060.—*Improved Lock and Key.*

What I claim as my invention is the wedged or cam key, I, and the separate bitt, or secondary wedged or cam key, H, in combination with the vibrating block, F, the key recess, and the tumbler elevator; the whole being constructed, arranged, and operating substantially as herein before specified.

JAMES R. BUGBEE.

No. 8061.—*Improvement in Smut Machines.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the manner, herein described, of scouring and freeing wheat of smut and other impurities, by throwing up the grain into the inclined face of a chimney, fitted to an opening along the top of the concave, in combination with the inclined aprons, U, for transferring the grain from end to end of the cylinder, that it may be discharged as set forth.

JEHU HOLLINGSWORTH.

No. 8062.—*Improved Compound Metallic Door for Vaults, Safes, &c.*

What I claim as my invention, and desire to secure by letters patent, is a door or wall for a vault or safe, made by securing to each other, at a certain distance apart, two plates of sheet metal, provided with a rim or curb, and filling the vacant space between them with immalleable cast-iron, poured in while melted, substantially in the manner herein described.

IRA L. CADY.

No. 8063.—*Improvements in Winnowing Machines.*

Having thus fully described my improved wheat-fan, what I claim as new therein, and which I desire to secure by letters patent, is, first, placing the screen (*d*) in an inclined position above the fan, and extending the whole length of the machine, by which the wheat is thoroughly sifted before being acted on by the blast, in combination with the direction of the blast at right angles, to the screen as above set forth.

OLIVER ETNIER.

No. 8064.—*Improvement in Spring Saddles.*

Having thus described my bridge-spring saddle tree, what I claim therein as new, and desire to secure by letters patent, is the pommel-spring, in combination with the seat-springs, substantially as herein set forth.

I also claim the method of suspending the stirrups by connecting them with the same springs which support the seat, whereby the elevation and depression of the one is simultaneous with the elevation and depression of the other.

JOSEPH C. SMITH.

No. 8065.—*Improvement in Apparatus for giving ease to the Arm in Writing.*

Having thus described our invention and improvement, and shown the application of the same to the arm of the pendulum, what we claim as our invention, and desire to secure by letters patent, is constructing an arm-supporter, or rest, so formed and shaped as to fit the arm below the elbow-joint, and serve as an elastic or flexible support, or rest, on which the arm of the penman is supported and balanced, and permitted to move or turn with the motion of the arm, with the utmost freedom and ease to the writer, by which all numbness, contraction of the muscles of the fingers, and crampness or stiffness of the arm are effectually prevented, and the arm rendered free in its movement, and under the complete control of the writer, as fully described and represented.

JOSEPH G. GROSHEN.
WILLIAM H. TOWERS.

No. 8066.—*Improvement in Machinery for Making Matches.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The mode of feeding in the plates of wood, by means of the feeding apron, with its cleats, spring pulley, F, and rollers, *g*, *g*.

Second. The mode of separating and dipping the splints by means of the grooved cylinder, C, cutter, *n*, endless bands, B, and revolving wheels, *e*, *e*.

IRA H. SMITH.

No. 8067.—*Improved Horse-shoe Machine.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is in combination with a rotating travelling-draw roller, adjustable pattern, and champering tool, for forming the shoe, the gauge plate, for holding up the roller, so as to allow it to return over the shoe thus formed, and smooth down the feathered edges, raised by the champering tool, as herein described and represented.

ROBERT G. BABCOCK.

No. 8068.—*Improvement in Bats for Felting.*

I am aware that flock has been incorporated with wool in the manufacture of felting, by passing it through the carding machine with the wool, and also that it has been fulled on to the surface of the cloth during the process of finishing.

I therefore do not claim either of these, as such, as my invention; but what I claim as my invention, and desire to secure by letters patent, is preparing the web for felt fabrics, by the introduction of layers of flocks between or upon the layers of wool, without passing the flock through the carding-machine, but by preparing it in a separate machine, and introducing it immediately from that machine on to the web of wool, while it is passing from the carding-machine, in the manner substantially as herein described.

And I also claim as my invention the combination of the endless apron, (K,) which feeds the flock to the cylindrical brushes, with the series of cylindrical brushes, by which the flock is taken up from the inner extremity of the endless apron, and (passing through the series) is prepared, and sent down through the spout, or conductor, (A,) and deposited on the web of wool, (as before described,) when the same is constructed and combined substantially as herein described.

LEANDER W. BOYNTON.

No. 8069.—*Improvements in Splint Machines.*

What I claim as my invention, and desire to secure by letters patent, is a cutter wheel, constructed substantially as herein set forth, to split, point, and gauge the size of match splints, in combination with the method of preventing the splitting knives from cutting across the grain of the wood by supporting the block upon a stock, which is constructed to turn, as herein set forth, to present the grain of the wood, where the splitting knife is acting, in line with the plain in which the knives revolve.

LEWIS L. GILLILAND.

No. 8070.—*Flexible Hose, or Float for supporting Vessels.*

Having thus fully described my invention, that which I claim, and desire to secure by letters patent of the United States, is as follows:

First. I claim a plan of supporting a vessel, in whole or part, upon or by means of a *flexible*, movable, endless hose, or "air float," or on an endless, movable chain of flexible, buoyant compartments, for the purposes set forth.

Second. I claim making my flexible hose, "air-float," or its equivalent, *collapsible*, for the purposes herein before mentioned; not limiting myself, in or by these claims, to any particular forms or arrangement of the buoys or floats, &c., so long as the peculiar features of my invention, as described and claimed, are substantially fulfilled.

WM MT. STORM.

No. 8071.—*Improved Lock and Key.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The self-detaching and attaching key for the purpose and object described.

Secondly. In combination with said key, I claim a powder-proof keyhole, consisting of two or more parts, so constructed that the outer part is turned by the key, while at the same time the inner parts, with the pod or pods of the key enclosed, are disconnected and moved entirely away from the outer; the same movement causing solid metal to occupy the space left, and thus to effectually bar an entrance of any kind to the lock when its parts are in a position possible to be unlocked.

LINUS YALE, JR.

No. 8072.—*Improvement in Meat-Cutting Machines.*

What I claim as my invention, and desire to secure by letters patent, is the herein-described mode of adjusting the cutters, J, by means of the adjusting plates, K, as described.

THOMAS VANDERSLICE.

No. 8073.—*Exploding Harpoon.*

I do not claim the invention of the harpoon as ordinarily made, but what I claim as my invention, and wish to secure by letters patent, is—

First. The interior of the harpoon made as a pistol barrel, with percussion lock, protected from water or outward accident, and the trigger of which can be actuated by means of a pull on the line and the resistance of the flesh, substantially as described.

Second. I claim the making the point of the harpoon, the projectile which is shot into the whale, in the manner and for the purposes substantially as described.

Third. I claim the arrangement of the trigger, in the shank under the barb, in the mode described, preventing the explosion of the charge till the line is drawn by the whale or the harpooner.

CHARLES BURT.

No. 8074.—*Improvement in Hand Logs.*

All the parts, taken separately, and described herein, as used by me for this purpose, are well known, and have long been applied to other uses. But I do not know of any invention in which the application, arrangement, and combination of these parts have been used to produce an instrument, that, through mechanical means, denotes, with nearly or quite mathematical certainty, the rate in miles per hour at which a ship travels through the water during a fixed, limited, and known time.

I therefore claim as new, and of my own invention, and desire to secure by letters patent of the United States—

First. The arrangement of the log glass, F, lever, *g*, pinion, *e*, and wheel, *f*, whereby the motion given to the clock-work by the reel, G, is communicated to the index, 9, during a definite period of time, determined by turning the log-glass on or off the lever, *g*, the parts being so proportioned, and the dial so divided, that the index, moving while the sand is running in the log-glass, F, shows the rate of speed at which a vessel is moving per hour of time, during 14 seconds, or any other known space of time, the parts being arranged and operating substantially as described, or in a manner equivalent, to produce the same results by like means.

Second. The application of a parachute, K, to the purpose of a "*log-ship*," and the combination therewith of the cylindrical wedge, *m*, or its equivalent, to enter between the tubes, *k* and *n*, to keep the "*log-ship*," K, spread when in the water, and disengaged when hauled on to "*fetch home*," so that the log ship closes, and turns end for end in the water, and is easily hauled on board, said log-ship being used with the reel and registering parts herein described and shown, or with any other means of supplying and determining the amount of line run out, during a known period of time, substantially as described and shown.

JOHN R. ST. JOHN.

No. 8075.—*Improvement in the manufacture of India Rubber.*

I do not claim the heating or curing process, as it is termed; that having been patented by Charles Goodyear.

What I do claim as my invention, and desire to secure by letters patent, is the combining of India rubber and sulphur, either with or without shellac, for making a hard and inflexible substance, hitherto unknown, substantially as herein set forth.

And I also claim the combining of India rubber, sulphur, and magnesia, or lime, or a carbonate, or a sulphate of magnesia, or of lime, either with or without shellac, for making a hard and inflexible substance, hitherto unknown, substantially as herein set forth.

NELSON GOODYEAR.

No. 8076.—*Improvement in Bedstead Fastenings.*

Having thus described our improvement on the bedstead fastening, what we claim therein as new, and desire to secure by letters patent, is providing the upper section or part, B, of the cylindrical box with a triangular and two parallel wedge-shaped wings, D, E, E, made sharp, and projecting from its periphery in such a manner that the triangular projection, D, shall open a groove or way in the post, which shall be closed by the entrance of the parallel wedge-shaped wings, E, E, which follow, as the section, B, is driven into the post, and thus crowd the wood in front of the shoulder (*a*) of the triangular projection, D, and form a complete lock thereto, as described.

We also claim dividing the cylindrical box longitudinally into two equal parts or sections, B, F, the line of division inclining upward at an angle of about ten degrees from a horizontal plane, by which the edges of the upper section, B, are made to serve the purpose of wedges for forcing the teeth of the lower section, F, into the post and holding it securely, as described.

JAMES R. KAIN,
SPENCER LEWIS.

No. 8077.—*Improved Spark-Arrester.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is—

First. The air-flues (F) in the lower part of the diaphragm, (O,) constructed in the manner and for the purposes herein described.

Second. I claim the pipes or conductors, (H,) in combination with the air-chamber, (I,) and (B,) arranged substantially as herein described.

Third. I claim the combination and arrangement of the air flues, F, with the air-chamber, (B,) reverberating cone, (C,) inclined and curved flues, (D,) for the purpose and in the manner herein fully set forth and described.

JAMES A. CUTTING.

No. 8078.—*Improvement in Pumps.*

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the valve chest, water-passages, pump-cylinder, and air-vessel, as herein described, so that the whole can be cast in a single piece, and the valves and suction pipe supported and secured in place by another piece, also cast in the form herein described, whereby the cost of making the pump, and its liability to get out of order, are both lessened, without impairing its efficiency, or rendering it more difficult to repair.

NELSON NEWMAN.

No. 8079.—*Improvement in Lime-Kilns.*

Having thus fully described the construction and operation of my improved lime-kiln, what I claim therein as new, and desire to secure by letters patent, are the flues, *d, d*, encircling the cupola, and provided with apertures or flues, *e, e, e, e, e*, for admitting the heat and flame to the action upon the lime-stone from various points, substantially as described, in combination with the air-chamber, K, encircling the cupola, as described; and I claim also the aperture, *p*, and passage therefrom, for saving the heat arising from the manufactured lime while being removed; all operating conjointly in the manner and for the purpose herein fully set forth.

RICHARD E. SCHROEDER.

No. 8080.—*Improved process for the artificial production of Ice.*

Having thus fully made known my improved process of manufacturing ice, and explained and exemplified suitable machinery for carrying the same practically into operation, I wish it to be understood that I do not claim, as my invention, any of the several parts of the apparatus in themselves; but what I do claim as my invention, and desire to secure by letters patent, is—

First. The employment of a liquid, uncongealable at the low temperature at which it is required to keep the engine, to receive the heat of

Second. I claim the employment of an engine for the purpose of rendering the expansion of the condensed air gradual, in order to obtain its full refrigeratory effects, and, at the same time, render available the mechanical force with which it tends to dilate to aid in working the condensing pump, irrespective of the manner in which the several parts are made, arranged, and operated.

Third. I claim supplying the water gradually and slowly to the freezing vessels, and congealing it by abstracting the heat from its under surface, substantially as herein set forth; and,

Lastly. I claim the process of cooling or freezing liquids, by compressing air into a reservoir, abstracting the heat evolved in the compression by means of a jet of water; allowing the compressed air to expand in an engine, surrounded by a cistern of unfreezable liquid, which is continually injected into the engine and returned to the cistern, and which serves as a medium to absorb the heat from the liquid to be cooled or frozen, and give it out to the expanding air.

JOHN GORRIE.

No. 8081.—*Improvement in Purifying Illuminating Gas.*

What I claim as of my own invention and discovery, and desire to secure by letters patent of the United States, is the purifying powder for illuminating gas, said powder consisting of sulphate of lime, either natural or artificial, in connexion with some inert substance or substances, partly inert and partly rendered purifiers when compounded in the proportions substantially as described herein.

FLORENTINE JOSEPH DE CAVAILLON.

No. 8082.—*Machine for assorting Screw Blanks, &c.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the series of shifting ways with the main or stationary ways, for the purpose and in the manner substantially as specified.

And I also claim the detector, substantially as specified, in combination with the stationary and the shifting ways, substantially in the manner and for the purpose specified.

THOMAS J. SLOAN.

No. 8083.—*Improvement in Grain Harvesters and Binders.*

Having thus specified our improvements in harvesting machines, what we claim as our invention, and desire to secure by letters patent, is—

First. The method of raking and binding grain at one operation by the mechanism herein specified, or its equivalent, substantially as herein set forth.

Second. We claim the arms, *m*, in combination with the levers, *p*, by means of which the rake teeth are alternately raised and depressed as the rake is moved alternately in opposite directions by endless rake chains, which move continually in the same direction.

Third. We claim the method of adapting the binding apparatus to the length of the cut grain by varying the respective positions of the cutting and binding apparatus, substantially as herein set forth; that is to say, by moving the front of the platform with the cutting apparatus, backward or forward, or by moving the binding apparatus nearer to or further from the front of the platform in such manner that the sheaf may be bound near the middle of its length, whether it be long or short.

Fourth. The method of binding grain by the mechanical devices herein specified, or their equivalents, acting in connexion, and automatically by motion derived from, or dependent upon, the movement of the machine to which they are attached.

Fifth. We claim the cord finger (B,) operating substantially as herein set forth, by the aid of which the grain is encircled by the binding cord.

Sixth. We claim the tying forceps, or the equivalent thereof, operating in connexion with mechanism for encircling the grain with cord or band, substantially as herein set forth.

WILLIAM WATSON,
E. SABINE RENWICK,
P. HILL WATSON.

No. 8084.—*Improvement in Straw Cutters.*

Having thus fully described my improved straw cutter, what I claim therein as new, and desire to secure by letters patent, is, in combination with the toothed grooved cylinder, and curved stationary knives, the cleaners, *g*, *g*, arranged and operating substantially as herein represented and fully shown.

JONATHAN SULLIVAN.

No. 8085.—*Improved method of supporting the Vanes of Aquatic Velocimeters.*

Having thus described my invention, and set forth the means I employ, and the differences between my invention and those that are known to have preceded it, I do not intend to claim any of the parts herein described as taken separately; all are well known, and in common use; but what I do claim as new, and of my own invention, and desire to secure by letters patent of the United States, is the attaching the disk or plate, *a*, to the sliding frames, *b* and *c*, which frame, *c*, carries the shaft, *d*, of the paddle blades, B, when said frame and plate are fitted to be lowered into or raised out of a tube, A, in such a manner that when in place for use, the plate, *a*, prevents any indirect current of water from ascending into, or descending out of the tube, A, to disturb or destroy the accuracy of the instrument, leaving the paddle blades, B, subject only to the direct action of the vessel's progress through the water, substantially as described and shown.

JNO. R. ST. JOHN.

No. 8086.—*Improvement in Planing Machines.*

What we claim as our invention, and desire to secure by letters patent, is the employment on one or both sides of the grooving cutters, *b*, *b*, *b*, of a chain or band, *c*, applied and operated in the manner substantially as and for the purpose herein described.

RUFUS BIXBY,
CYRUS S BIXBY,
JOHN GARST.

No. 8087.—*Improved Apparatus for relieving the helmsman from the shock of the Rudder.*

What I claim as my invention, and desire to secure by letters patent, is the combination of two sets of pawls, between which two sets of pawls a wheel is placed loose upon the shaft, having an endwise motion thereon, by means of the male and female screw, as described; said wheel being provided with a hub, so fitted as to disengage the pawls when the hub arrives at the limit of its end play, in either direction; the result being that the rudder secures itself through the agency of the pawls, and is unlocked, so as to be free to move in either direction by the first motion of the same wheel which afterwards moves the rudder; in other words, I claim the combination of the hub secured to the wheel, the male and female screws, or their equivalents, and the ratchets and pawls, substantially in the manner and for the purposes describe in this specification.

CHANDOS HOSKYNS.

No 8088.—*Improved Apparatus for indicating the height of water in Steam Boilers, &c.*

What I claim as my invention, and desire to secure by letters patent of the United States, is the combination of the chamber, D, with the boiler or other vessel, in which the height of fluids is to be measured, by means of tubes, so formed and attached as to act as springs, to indicate the weight of the water at any time within said chamber, for the purpose and substantially in the manner herein set forth.

GEORGE FABER.

No. 8089.—*Improvements in Flouring Apparatus.*

Having thus described my improvements, what I claim as new therein, and desire to secure by letters patent, is—

First. I claim the arrangement of the "hopper boy," revolving on the same centre as the stone, and the chamber beneath the stone, by which the flour is cooled as it is conveyed to the centre opening of the bolt, substantially as set forth.

Second. I claim the annular or endless conveyers for conveying the flour, &c., in the several annular chambers to the spouts, the same being operated in the manner herein described.

Third. I claim, in combination therewith, the air passage (W) for returning the particles of flour which would otherwise escape to the centre hole of the floor of the bolting chamber, to be drawn in again by the draught, substantially in the manner set forth.

JAMES M. CLARK.

No. 8090.—*Crane Hinge for Doors, Shutters, &c.*

What I claim as my invention, and desire to secure by letters patent, is the crane door-hinge, constructed in the manner and for the purpose as herein substantially represented and set forth.

No. 8091.—*Improvement in Setting Teeth.*

What I claim as my invention, and desire to secure by letters patent, is attaching artificial teeth to a plate in the roof of the mouth, by means of a wedge-formed recess in the tooth, and a pivot of corresponding shape, soldered, or otherwise attached to the plate, when the union of the two is effected by the use of platinum and tin, or solder, substantially in the manner and for the purpose specified.

ADOLPH F. AHRENS.

No. 8092.—*Improvement in Setting Teeth.*

What I claim as my invention, and desire to secure by letters patent, is securing artificial teeth to a plate in the roof of the mouth by means of a rebate in the inner face of the tooth and a slide, fitting the same and soldered, or otherwise attached to the plate in the mouth, for the purposes and in the manner described.

ADOLPH F. AHRENS.

No. 8093.—*Improvement in Brick Presses.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The form of the pressing plates, *n*, *n*, *n*, thicker at one edge than the other, as shown, and for the purpose described.

Second. The motion of the followers, or plungers, E^2, E^2, E^2, by rollers moving in fixed grooved channels, F, F, and acted upon by revolving cams, *k*, *k*, producing a drop movement, and operating as herein shown and explained.

Third. Propelling the machine forwards by means of wheels, D, D, keyed on the mould cylinder-shaft, for the purpose of depositing the bricks, as made in regular layers, for drying.

JOS. GRANT.

No. 8094.—*Improvements in Saw Mills.*

Having thus fully described the nature of my improvements, and the manner in which they operate, in producing the desired effect, what I claim as my invention is—

First. The tightener and key, and the manner in which they are used in tightening the dogs, as herein set forth.

Second. I claim the movable arm to regulate the thickness to be sawed, when changing from one thickness to another in the same log, without taking the dog out of the log, as herein described.

Third. I claim the placing the second dog upon the main plate and adjusted by the bolt and key, constructed in the form and manner and for the objects and purposes hereinbefore particularly set forth.

No other part of the said above-described dogs do I in this, my specification, claim as new or original, excepting such as above enumerated.

MARTIN RICH.

No. 8095.—*Improvement in Scarificators.*

What I claim as my invention, and wish to secure by letters patent, is the use of the said hollow pivot, lever, and slide racks, combined and arranged as described, secured in their proper places by the plate and screws, and operating in connexion with the trigger and springs, substantially as hereinbefore specified.

FREDERICK LEYPOLDT.

No. 8096.—*Improved Compound Coupling for Hose or Pipe.*

What I claim as my invention, and desire to secure by letters patent, is the manner, if desired, of keeping the several threads or screws always in contact, whether the coupling be formed or disconnected, for obtaining the advantages set forth, by employment of an interior box, C, situate in an outer box, B, and having a loose ring or collar, D, or its equivalent, on it, in combination with a washer, F, connecting nut, E, and box, A, formed with the lips for locking the coupling, the several parts constructed, fitting, and operating together substantially as shown and described.

JAMES W. OSGOOD.

No. 8097.—*Improvement in Smut Machines.*

What I claim as my invention, and desire to secure by letters patent, is—

First. In connexion with a close case surrounding the machine, the arrangement of the fan, as herein described, in the annular space surrounding the beaters between the outer case and the fluted cylinder, and at the entrance of the pipe, M, through which the dust is discharged, so that currents of air will set into the machine through any cracks or openings in the same from the room in which it is placed, by which means the escape of pulverized dust or smut into the room is effectually prevented.

Second. I claim the arrangement of the air chamber, W, having currents of air passing through and across it, between the upper part of the beater and the space through which the descending current of air passes to the fan, for the purpose of collecting any portion of the grain accidentally thrown out of the scouring cylinder by the blast or beaters, and returning the same, so that it may pass through the machine with the rest of the grain in the proper direction.

Third. I claim the conical rim or shield for the purpose of protecting the conical screen below it from abrasion by the descending grain, and at the same time keeping the pores of the screen open for a free passage of air through it into the fluted cylinder.

Fourth. I claim the tube or passage (K) for discharging the cleaned grain, as set forth, and also for receiving and transmitting air to and through the tube, J, as described.

NELSON PLATT.

No. 8098.—*Improvement in Planing Machines.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the yielding stock and cutter, when made to yield upon an axle, the centre of which is in line with the cutting edge of the knife; and this I claim, whether the socket bolt, hinged bar, and nut are, or are not, used for the purpose of graduating and adjusting the cutters, as herein set forth.

GEORGE W. BEARDSLEE.

No. 8099.—*Coupling for Cords.*

What I claim as my invention, and desire to secure by letters patent, is the use of half couplings, A, A, (each of similar shape and construction,) formed with lips, *a*, *a*, having slots, *b*, *b*, into which projecting hooks, C, C, fit, having notches, *c*, *c*, serving for the bolts, D, D, to enter and lock the coupling, or constructed and operating for the purposes shown, in any manner substantially the same.

LAWTON J. WARE.

No. 8100.—*Improvement in India Rubber Shoes.*

Having described the advantages of my improvement, and the best way known to me of manufacturing the same, what I claim as my invention, and desire to secure by letters patent, is the manufacture of rubber boots and shoes without cloth, being made of separate pieces of different degrees of elasticity, and each piece having its peculiar and requisite degree, the shoe to possess different degrees of elasticity in different parts, and uniform elasticity in each different part, and having no part without some elasticity in every direction, by the means herein described, or any other substantially the same, whereby I lesson the cost, obtain a shoe not liable to break, which can be kept clean, stretched in every direction at the same time, easier to the foot, adjustable to larger boots, and yet not rendered useless to wear over smaller, light and elegant, and retain permanently their shape.

HORACE H. DAY.

No. 8101.—*Improvement in Reflecting Fire Plates.*

I do not claim as my invention a reflector made to partially surround the fire; but what I claim as my improvement is the extension of the curved reflector entirely around the fire grate, in combination with having an opening through it, immediately under the fire grate, for the passage of the ashes, as specified.

And, in combination with the fire grate and the extension of the reflector under or below the grate, essentially as explained, I claim the ash-guard, F, the same being applied in manner and for the purpose as set forth.

And, in combination with the reflector, B, and its sustaining frame, I claim the hinged slide, H, and the sustaining rollers, K, K, K, K, or their mechanical equivalent; the same being applied so as to enable the reflector to be moved outward for the purpose of providing easy access to the chimney, or for convenience of removing the ashes, whenever such may be deemed necessary.

ROBERT JOBSON.

No. 8102.—*Improvements in the Manufacture of Wire-Strengthened Spoons.*

I do not claim employing a wire within the handle, as such has already been done; but what I do claim as my invention, and desire to secure by letters patent, is the manner, substantially as herein shown and specified, of enclosing a wire of the required exact length within the handle, by supporting it on "points" secured to the mould, and projecting midway or partly into the form.

LUTHER BOARDMAN.

No. 8103.—*Improvement in Steam Traps.*

We do not claim to be the first to remove the water of condensation from steam-warming or other apparatus by means of a float and valve or cock, but we do not know of any means by which this water of condensation is taken off through the float by a cock. Therefore, what we claim as new, and of our invention, and desire to secure by letters patent of the United States, is the construction and application of the float, E, with its mouth, 6, opening, 5, pipe, *l*, and barrel, *k*, on the plug, *i*, with the openings, 3 and 4, for the purpose of retaining the steam in warming apparatus, or in other steam pipes, and passing out the water of condensation through the float near the bottom, substantially as described and shown.

CHARLES M. GUILD.
JOHN BROWN.

No. 8104.—*Improvement in Hot Air Furnaces.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement, substantially as herein described, of the heating chambers in connexion with the furnace, when this is combined with the method, substantially as described, of connecting the heating chambers with each other with the furnace and with the exit pipe leading to the chimney, whereby the gaseous products of combustion are carried into and through, and made to spread out in thin films in the said heating chambers, and therein retained to give out heat without seriously impeding the draught, substantially as described.

SAMUEL PIERCE.

No. 8105.—*Improvement in Carriage Springs.*

What I claim as new, and desire to secure by letters patent, is the constructing of springs, whether of wood or part wood and part metal, or other elastic or non-elastic substances, as adapted and applicable to carriage springs, and springs for other purposes, in the manner substantially as herein described.

LEVI BISSELL.

No. 8106.—*Improvement in Cast Iron Car Wheels.*

What I claim as my invention is the above-described improvement or wheel, made with a chilled rim, either a solid hub or one divided crosswise of its axis, two plates or disks, B, C, united in a serpentine curve at their outer peripheries, a third plate, D, not only made serpentine concentrically with the hub, but curved in radical directions, as described, all cast or founded, and combined together in one piece, substantially in the manner as hereinbefore specified.

ALBERT HEBBERD.

No. 8107.—*Improved Gauging and Heading Movement for Spike Machines.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the spring gauge and catch, *o, p, r*, constructed as herein described, with the dies and with the header, F, for the double purpose of gauging the length of the spikes or nails, and aiding in forming the heads thereon, substantially as herein set forth.

PURNEL JEFFERSON.

No. 8108.—*Improvement in Cast Iron Car Wheels.*

Having thus explained my invention, I claim a cast iron railroad wheel, constructed with the solid hub, A, and the tube, C, the said tube being united to the hub by a curved plate, B, with curved projecting braces, *b, b*, on it, and connected to the tread, T, by a curved plate, D, with the curved braces, *d, d*, on it, the whole being constructed substantially as described, for the purpose set forth.

ISAAC VAN KURAN.

No. 8109.—*Improvement in Ventilating Furnaces.*

What I claim is the arrangement and mode of operating the valves, A, A, in reference to the air-heating space around the stove, by which the amount of air from within and without is graduated by a single movement.

I claim also the arrangement of the horizontal air heating trunk, the vertical, D, leading thereto, and its valve, S, in combination with the air-heating space, G.

H. RUTTAN.

No. 8110.—*Improvement in Lifting Jacks.*

I do not claim any of the parts employed, irrespective of the manner in which they are combined and arranged. But what I claim as new, and desire to secure by letters patent, is the combination, in the manner substantially as herein described, of the pawls, *f, f'*, the spring, *o* and *i'*, *i'*, and the spring lever, *k*, having projections, 1, 2, on each side of its fulcrum, with the lever, D, and the ratchet, *a, b*, on the lifting rod, B, whereby the lifting rod may be forced out from or drawn into the post, or standard of the jack, according to the position of the spring lever.

BOLIVAR NEWBURY.

No. 8111.—*Improvement in Lap Anvils for Shoemakers.*

What I claim as my invention, and desire to secure by letters patent, is a metal anvil, shaped substantially as set forth and described in the within specification, with its drawings—that is, with a form adapting it to be held conveniently upon and between the knees and thighs of a workman, having a projection above the mass of metal, conveniently formed into an anvil face, with a small prismatic block near the extremity of one of the arms, as a fulcrum for nippers, when the same are used in stretching or manipulating leather.

HENRY BRUNK.

No. 8112.—*Improved Combination of Dies for Sheet Lead Machines.*

Having thus described my invention, and the manner of its application to the foregoing machines for the manufacture of sheet lead, what I claim as my invention, and desire to secure by letters patent, is the adjustable interior cylindrical and the exterior stationary conical dies, in combination, and for the purposes described, irrespective of the precise manner in which they are applied, or by which the adjustment is effected.

JOHN ROBERTSON.

No. 8113.—*Improved Vise Jaw for Saw Filing Machinery.*

What I claim as my invention, and desire to secure by letters patent, is the jaws of the vise shaped to correspond to the shape of the saw teeth, and support the same, so as to prevent vibration during the operation of filing, as herein set forth, whereby a better edge is given to the tooth, the wear of the file is diminished, and the process of sharpening expedited.

GEO. W. PUTNAM.

No. 8114.—*Improvement in alloy of Iron, Zinc, and Nickel.*

What I claim as my invention, and desire to secure by letters patent, is the making of wrought or malleable iron, either from ordinary iron or from the ore, by the use of application of metallic zinc or spelter, and by the use of zinc and nickel, combined as hereinbefore described and set forth.

OTIS BOYDEN.

No. 8115.—*Improvement in Machinery for Hardening and Straightening Saws, &c.*

Having thus fully described my improvements in the method of straightening and hardening saws, &c., what I claim therein as new, and for which I desire to secure letters patent, is the employment of the apparatus above set forth for straightening and hardening steel plates for saws, &c., at one operation, consisting of the fingers or cams, substantially as described, which support the article to be straightened, compressed, and hardened, combined with and griped by the drop, in the manner and for the purpose above specified.

HENRY WATERMAN.

No. 8116.—*Improvement in Seed Planters.*

Having thus fully described the nature, construction, and operation of my seed drill, what I claim therein as new, and desire to secure by letters

patent, is the conical cups attached to segmental rods, extending from levers working on a horizontal shaft, raised and lowered by the eccentrics and rods, substantially as described, operating in the manner and for the purpose herein fully set forth and represented.

JACOB BARNHILL.

No. 8117.—*Improvement in Portable Swings.*

Having thus fully described the construction and operation of my improvement in portable swings, what I claim therein as new, and of my invention, and desire to secure by letters patent, is the suspension of a swing to the hinged frame, supported or strengthened by the adjustable brace, C, substantially as herein set forth.

ENOCH S. FARSEN.

No. 8118.—*Improvement in Carriages.*

What I claim as my invention, and desire to secure by letters patent, is making the sides of the bodies or boxes of carriages of a series of springs, slats, or bars, when the same are constructed, and operate, substantially as herein set forth and described.

GEORGE B. DURKEE.

No. 8119.—*Improvement in Omnibus Steps.*

Having thus described the nature of my invention, and the manner in which it is constructed, what I claim as new, and desire to secure by letters patent, is the manner of constructing the step as described, viz: by having a portion (B) of the body of the omnibus projecting downwards a suitable distance, the bottom of said projection, B, forming the step, C, and so arranged as to be perfectly covered and protected by the door, D, when closed, substantially as described.

W. H. HOYT.

No. 8120.—*Improvement in Carriages.*

What I claim as my invention and desire to secure by letters patent, is the manner of construction, as described, viz: forming the body of two separate parts, A, B, united by a joint which allows the body to vibrate and act upon a single spring, and also admits of a direct attachment of the body to the axles, substantially as set forth.

JAMES C. SPENCER.

No. 8121.—*Improvement in excluding Dust from Railroad Cars.*

What I claim as my invention, and desire to secure by letters patent, is the application of vertical blinds, shutters, or screens on the outside of railroad cars, employing the same to prevent the entrance of dust, smoke, cinders, &c., into the windows of the cars, as herein described.

EDWARD HAMILTON.

No. 8122.—*Improvements in Hemp Brakes.*

What I claim as my invention, and wish to secure by letters patent, is the combining a sufficient number of slats to break the full length of the hemp at once, in combination with the manner of feeding, substantially as set forth.

PARIS M. WALKER.

No. 8123.—*Improvement in Self-weighing Machines for Grain.*

Having thus described my self-weighing machine for grain, and shown the operation of the same, I desire that it shall be understood that I do not claim a self-weighing machine operated by the weight of the grain, so as to form an automatic weighing machine, by which, with the aid of a register or index, the amount weighed is ascertained, nor do I claim opening a gate or door in the bottom of a receiving hopper by the descent of a steelyard simultaneously with the discharge of the grain from a rotating hopper; but what I do claim as new, and of my own invention, is the employment of the metallic plate, C, or its equivalent, attached to the receiving hopper, B, and made to rise and fall by the action of said hopper and a gauge, Q', in such a manner that on the descent of a suspended hopper, F, the gauge-plate, Q, connected therewith, will disengage a catch-plate (*f*) from the right end of the metallic plate, C, and permit the latter to fall and cut off the discharge of the grain, and simultaneously therewith open a trap-door, H, in the bottom of the suspended hopper, and on the ascent of the same the receiving hopper, B, will be made to tilt frontward by the weight of the grain, so as again to raise the plate, C, and open the hinged door, D, of the said plate, C, simultaneously with the closing of the trap-door, as fully described and represented.

I also claim the employment of the gauge-plate, Q', when combined with the lower or discharging hopper, F, for the purpose of determining the quantity of grain to be weighed by limiting the descending movement of the suspended hopper, F, and consequently gauging the action of the projection, Q^2, on said gauge-plate, Q', to actuate the plate, C, to cut off the discharge of the grain from the receiving hopper.

I also claim the employment of the vertical pendant rods, P, R, confined to either side of the frame when combined with a suspended hopper, F, provided with a trap-door, H, for the purpose of opening and closing said trap door by their descent alternately, said vertical pendant rods, P, R, being respectively actuated by the descent of the metallic plate, C, to disengage the spring catch (*t*) from the rod, P, to open the trap-door, and by the tilting frontward of the receiving hopper, B, to disengage the spring bar, O, from the vertical rod, R, and allow its descent to close the trap-door, H, as set forth in the specification and shown in the drawings.

WILLIAM BIDDLE.

No. 8124.—*Improvement in Bran Dusters.*

What we claim as our invention, and desire to secure by letters patent, is the combination of the scouring, beating, and distributing brush with the perforated guard plate surrounding it, whereby the bran to be dressed is more equally distributed and fed to the bolt than has been done by devices heretofore in use for the purpose.

WILLIAM A. McFARLAN,
THOMAS C. CARPENTER.

No. 8125.—*Improvements in Planing Machines.*

Having thus fully described my improved machine for planing, tonguing and grooving planks, &c., what I claim therein as my invention, and desire to secure by letters patent, is—

First. The jointing or hinging of the plane stock-supporting frame, E, J, *f*, *f*, or its equivalent, at one end, and giving it an elastic bearing at its opposite end, substantially as herein set forth, whether the said plane stock-supporting frame to be used in connexion with individually vibrating plane stocks, or with other descriptions of plane stocks, or planing-knives, or cutters, for the purpose of reducing or planing planks, or boards, upon their sides or edges.

Second. I claim the combination of the supporting frame, containing the adjustable plane stocks, H, H, with the self-adjusting supporting frame, containing the plane stocks, G, G, by which the inner or under surfaces of the plane stocks, G, G, are made to form a self-adjusting bed, one side of a plank; whilst the knives in the stocks, H, H, are operating upon and facing the opposite side of the same, and by which the inner or under surfaces of the plane stocks, H, H, are made to form an unyielding bed on one side of a plank; whilst the knives in the plane stocks, G, G, are operating upon and reducing its opposite side; and by which a plank can be faced on one side, and reduced and faced upon its opposite side, at simultaneous operations, substantially as herein set forth.

Third. I claim the combination of the supporting frame, containing the self-adjusting plane stocks, G, G, with the arbor of the roller, A, at its forward end, and with the supporting frame, containing the plane stocks, H, H, at its rear end, for the purpose, in the first place, of so guiding the transversely reciprocating movements of the said plane stock supporting-frames as to keep the inner sides of the respective series of plane stocks contained therein, parallel with each other, and parallel with the surfaces of the pairs of rollers, A, A', and B, B'; and in the second place, for the purpose of enabling the supporting frame, containing the self-adjusting plane stocks, G, G, to be detached from the supporting frame containing the adjustable plane stocks, H, H, and be swung outwards upon the shaft of the roller, A, to afford free access to the inner sides of the plane stocks in both the said plane stock supporting frames, substantially as herein set forth.

Fourth. I claim the combination of the rollers, *d*, *d*, with the plane stocks, G, G, when they are so arranged that the roller in one plane stock will form a rotating and self adjusting mouth-piece to the planing knife that succeeds it, and at the same time form a bed on one side of a plank for a planing knife, acting upon its opposite sides, substantially as herein set forth.

Fifth. I claim the giving to straight-edged planing or reducing knives, or cutters, that are arranged athwart the surfaces of the boards or planks operated upon, a transversely reciprocating movement, whilst a continuous longitudinal movement is imparted to the said boards or planks.

Sixth. I claim the manner of producing a uniform elastic pressure upon the upper and lower bearing boxes of the arbors of the pressure rollers, A, B, C, viz: by means of pairs of screws, k, k', arranged as herein described, and having threads inclining at angles of about thirty degrees with their axes, which are banded together, and operated upon by a weight, (N,) substantially as herein set forth.

Seventh. I claim the within-described improved stock, that receives the tonguing cutters, v, v and r, r, composed of the central governing plate, S, combined with the projections, o, o, on the side plate, Q, and the projections, o'', o'', on the side plate, R, substantially as herein set forth.

Eighth. I also claim the manner of combining the stationary cutters, v, v, with the governing centre plate, S, by means of the inclined projections, o, o'', on the sides of the said plate, the flaring notches in the plate, and the gibs, p, p, having lugs at each extremity, placed in the said flaring notches, and acting upon the edges and front sides of the said cutters, v, v, substantially as herein set forth.

NELSON BARLOW.

No. 8126.—*Improvement in Breech-Loading Fire Arms.*

What I desire to secure by letters patent, and claim as my invention in that class of breech-loading fire arms in which the barrel is disconnected from the breech, and is pivoted at some point intermediate between its but and its muzzle to the stock, is a lever beneath the stock, by means of which the barrel is turned upon its pivot, to raise and to depress its but, and is locked to its breech when the but is depressed, and is unlocked therefrom to allow the but to be raised, the several members of the implements being arranged and operating substantially as herein set forth.

In combination with the above-claimed device, I claim a piston breech pin, which, by the movements of the lever to depress the but of the barrel, and to lock it in place, is made to move the cartridge forward in the barrel and to close the but thereof, and which, by the movement of the lever, to unlock and raise the barrel, is made to unclose or open the but of the barrel before the latter rises under the action of the lever.

I likewise claim the sliding bolt, I, constructed with slot and hook, or their equivalents, and arranged as herein set forth, in combination with a lever handle, for the purpose of imparting motion to the piston breech-pin from the lever beneath.

EDWARD MAYNARD.

No. 8127.—*Improvement in Boot Crimps.*

Having thus fully described our invention, what we claim therein as new, and desire to secure by letters patent, is the combination of the spring frame, B, crimping plates, C, and boot tree, D, with the adjustable side springs, F, F, for the purpose of crimping boot fronts, and adjusting the pressure of the crimping plates to the particular point in

which the creases have a tendency to run; the whole being arranged in the manner herein described and represented, or in any other manner essentially the same.

NATHAN DAWES,
HIGGINS HARRISON.

No. 8128.—*Improved Self-adjusting and Locking Switch for Railroads.*

Having thus fully described this form of self-adjusting railroad switch, what I claim as my invention, and desire to secure by letters patent, is the combination of the counterpoise weights, R, R, R, R, or their equivalents, with the toggle levers, D, D, and stops, Q, Q, substantially as described, operating in the manner and for the purpose herein substantially set forth and made known.

JOHN C. PAST.

No. 8129.—*Improvement in Comb Cutting Machines.*

I do not claim the invention of a single chisel, made to operate by successive blows or cuts, each of which is in advance of another, and so as to create a series of cuts through a plate of horn or shell, such as will separate such plate into two combs without what is termed a bottoming—that is to say, with the roots of the teeth of each of the said combs in a *straight* line and not in a *curved* line, as they are when made with the "*bottoming;*" nor do I claim a die so made of stationary chisels or cutters, (that is to say, those which are removable with respect to one another,) and for the purpose of enabling a person, by pressure of the *whole series* of cutters at once, against a plate of horn or shell, to separate it into two combs, either with or without a bottoming; but what I do claim is my improvement in comb cutting machinery, the same consisting in making the cutters to operate or move separately and independently of each other, and in regular succession, in combination with making them of different and the required lengths, so as to produce the separation of two combs from a comb plate, substantially in the manner, and with the bottoming to their teeth, as hereinbefore specified.

HORACE S. COOK.

No. 8130.—*Improvements in Hand Machines for Spinning Wool.*

What I claim as my invention, and desire to secure by letters patent, is the clamp, D, D', the inclined planes, E, E, the lifters, F, F, the adjustable stop, G, the trip, H, the hand and ratchet, L, with the hand and ratchet, K''', M, M', and N, combined and arranged as set forth and described, or any analogous device for the purpose of spinning wool.

MARGARET HULINGS.

No. 8131.—*Improved arrangement of Machinery for Actuating the Crank Indicator.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of bevel wheels, c, f, g, e, and their shafts, F, I, H, herein represented and described; the first, c, in the series being actuated by a motion derived from the eccentric by means of a crank, *a*, and pin, *b*, and the last, *e*, giving motion to the indicator hand; the whole being constructed in the manner and for the purposes herein set forth.

SAMUEL B. HUTCHINS.

No. 8132.—*Improvement in Seed-distributors of Seed planters.*

Having thus described our improvements on the machine for planting corn and other grain, what we claim therein as new, and desire to secure by letters patent, is in combination with the notched transverse bar, X, the employment of the jointed clearers, (*n*,) projecting from the recesses of said bar, X, into the apertures (*a*) of slide bars, T, for preventing the choaking of the apertures.

DAVID WOLF,
HERMAN WOLF.

No. 8133.—*Improvement in Collars for Harness.*

I do not claim generally the hame in one piece with pads of limited length, but what I do claim as my invention, and desire to secure by letters patent, is the U-shaped metallic breast plate, B, suitably padded and made to fit around the neck of the horse, the same being so limited in length as not to reach the shoulder blades of the animal, and being suspended from the neck by a neck strap.

JOSEPH W. BRIGGS.

No. 8134.—*Improvement in Processes for treating Vegetable Fibre.*

What I claim as my invention and discovery, and desire to secure by letters patent of the United States, is—

Firstly. The preparation of vegetable fibre capable of being spun or felted by submitting the plant from which the fibre is to be derived to the action of caustic, soda, or other solutions of like properties, and then to that of sulphuric or sulphurous acid, in the manner set forth, whereby the gummy, glutinous, and other matters which connect the fibre with the woody portion of the plant, are dissolved and discharged, and at the same time effecting the discharge of the oleaginous and other coloring matters contained within the woody portions, or "straw," without straining the "fibre," as more fully described herein.

Secondly. I claim splitting the fibres of vegetable matter in preparing them for spinning, by the generation and liberation of carbonic acid or other gas within the cellular portions of said fibres, in the manner described, or in any other manner by which gas may be generated and liberated for the purpose set forth.

P. CLAUSSEN.

No. 8135.—*Improved Sash Stopper.*

What I claim as my invention, and desire to secure by letters patent, is arranging a sash stopper, composed of a friction plate, bolt, and helical spring, with the friction plate parallel to the side of the sash, and the bolt rising obliquely upward therefrom, in the manner herein set forth, so that the upward motion of the sash will relieve the same from the frictional resistance of the friction plate by counteracting the force of said spring, and that the downward motion or tendency of the sash will augment the frictional resistance of said friction plate by aiding the force of said spring.

JOSEPH OSBORN.

No. 8136.—*Improvement in Horse Powers.*

What I claim as my invention, and desire to secure by letters patent, is, first, the employment of rollers, G, G, mounted or hung on the main shaft, B, and lower guide shaft, F, in combination with the flanches on the wheels, *k*, to retain said wheels upon their axles when passing from one platform to the other, and to check their revolution, as described.

CYRUS AVERY.

No. 8137.—*Improvement in machines for expressing Cane Juice.*

What I claim as of my own invention, and desire to secure by letters patent of the United States, is—

Firstly. The extraction of the juice from cane by submitting the stalks of the same in perforated tubes, or other vessels constructed on the principle described herein, to a continuous pressure in the manner set forth, whereby time is afforded for the juice to flow from the cellular tissues, and reabsorption into the exhausted cane is avoided.

Secondly. The perforated compressing tubes, having either a straight or a tapering bore.

Thirdly. The combination of the pistons with the perforated tubes and hoppers, whereby the operations of regulating the feed, cutting the canes into equal lengths, pressing and discharging the same, are effected substantially as herein set forth.

HENRY BESSEMER.

No. 8138.—*Improvement in the gearing of a Seed Planter.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the combination and arrangement of the double bolt, *h*, with its slotted arm, *k*, rock shaft, *n*, with its arms, *m* and *p*, and pitman, *g*, for the double purpose of giving motion to the feeding apparatus, and also regulating the quantity of seed to be sown, when said pitman is operated by a long crank, upon which it travels, as herein fully shown and represented.

MARSHALL J. HUNT.

No. 8139.—*Improvement in Revolving Frames for drying Fruits and other articles.*

What I claim as my invention, and desire to secure by letters patent in the above described portable frame, is the centre, E, with three or more arms, to support a cord, netting, or cloths for the purpose of exposing, cloths, clothes, glue, fruits, seeds, &c., with facility to be dried, so constructed that the arms may be raised up and brought together, to expedite the collection of the articles dried, and so that it may be conveniently removed when not in use, substantially as described.

I do not intend to limit my invention to the precise form of construction described, but to vary it to suit the circumstances in which it is to be used, while I accomplish the desired object by means substantially the same.

J. C. DICKEY.

No. 8140.—*Improvement in Ornamenting Baked Earthenwares.*

I do not intend herein to claim the general application of oil-painting to china or earthenware; but what I do claim as my invention, and desire to secure by letters patent, is—

First. The application of coloring water mixed with varnish, or its equivalent, to the surface of baked earthenwares, for the purpose of giving to such ware a surface of sufficient body, and of sufficient brilliancy, for ornamental purposes; thus obviating the necessity of the glazing process, substantially as herein described.

Second. The inlaying of pearls, gems, &c., on china and baked earthenware, for ornamental purposes, substantially as herein above described.

Third. The peculiar cement and process by which I affix pearls and gems to the china or baked earthenware.

RALPH B. BEECH.

No. 8141.—*Improvement in Carving Machines.*

What I claim as my invention, and desire to secure by letters patent, is the use of the pendant lever, suspended from a ball and socket joint, in combination with a horizontal table for the pattern and block; the said table being affixed to the end of the pendant-lever by a ball and socket joint; the whole being arranged with respect to the tracer and cutter, substantially in the manner, and for the purpose described.

I also claim preventing the pendant lever from changing its centre of motion, or from rotating on its own axis, or on any line passing through the centre of its motion, by the use of the bent arms, working in balls in spherical sockets, substantially as described.

I also claim combining with the pendant-lever two or more tables, substantially in the manner described, or in any other, substantially the same, and arranged each with a tracer and cutter, respectively, in order that large carvings may be obtained from a small pattern, or *vice versa*, or both at the same time, and with the same machine, substantially as described.

LEWIS S. CHICHESTER.

No. 8142.—*Balanced Rudder.*

What I claim as my invention, and desire to secure by letters patent, is the employment, for the purpose of steering ships and other vessels in water, of two rudders, hung upon, and at equal distances from, the same centre of motion, and with their surfaces parallel, or nearly so, with each other, in such a manner that the same resistance is offered to each by the vessel's motion through the water, and both are balanced, substantially as herein described.

C. F. BROWN.

No. 8143.—*Improvement in Churns.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the combination and arrangement of the arms, H, H, with their rollers, I, I, which are controlled by the crank and the swinging arms, G, G, with their floats, *g*, *g*, kept in proper place, both in churning and gathering, and working the butter by the resistance of the cream, as herein described and shown, and for the purposes herein represented.

DAVIS DUTCHER.

No. 8144.—*Improvement in Comb-cutting Machines.*

I do not claim the mere use in a die of a clearer for forcing out of the die the articles produced thereby; but what I do claim as my invention is the combination of the two series of lifters and bent levers, *n*, (arranged upon the travelling carriage, A,) with the pressure roller, in such manner that the continued motion of the carriage shall operate the lifters after the combs are cut, substantially as hereinbefore described.

THOMAS W. HILL.

No. 8145.—*Improvements in Permutation Safety Locks.*

What I claim as new, and of my own invention and improvement, and desire to secure by letters patent of the United States, is—

First. The application of the lever, *b*, 5, and dog, *b*, 6, with the tusk, 40, to be acted on by the talon, 39, and allow the spring, 38, to throw the tusk, 40, into the notches on the lower part of the followers, and auxiliary followers, so as to prevent any motion of these parts, if any of the tumblers are lifted, after any end-shake motion has been given to the bolt, by any improper attempt to unlock it.

Second. The combination of the tumblers, *a*, slides, *b*, 1, and followers, *a*, 9, through the tenons, 18, notches, 30, tongues, 29, and jaws, 24, to lift the slides, *b*, 1, and followers, *a*, 9, to the same extent as the tumblers, *a*, are lifted by the key sections on locking the bolt; and to sustain the slides, *b*, 1, until the tusk, 33, takes the notches, 31, on the slides, and holds them, so that the bolt cannot be retracted until all the tumblers, *a*, are lifted to meet the notches, 30, and allows the springs, 25, levers, *a*, 0, and auxiliary followers, *a*, 8, to lift and place the followers, *a*, 9, in the same positions as when the bolt was projected, substantially as described and shown.

Third. The mode, described and shown, of so arranging and combining the cylinder, *c*, 4, by the flanches, *c*, 5, angles, 60, tumblers, *c* and *a*, and pins, 47 and 49, with the detector-lever, D, at the part, *c*, 1, so that no one of the tumblers, *a*, can be separately lifted without placing the part, *c*, 3, of the detector-lever over the key-hole, with the edges of the notch, 55, covering the open space around the drill pin, 57, by which arrangement no movement of the cylinder, c, 4, can be made without producing the same effect; so that if powder is introduced into the cylinder, c, 4, and the cylinder is moved with the intent of entering a blow-pipe to spread the powder on either side of the cylinder, the part, :, 3, and notch, 55, instantly cover the key-hole, and prevent the entry of the blow-pipe for such a purpose; these parts being constructed, arranged, and operating substantially as described and shown.

Fourth. The combination of the cylinder, c, 4, block, 62, and hole, 63, to receive and pass out any gunpowder put in for the purpose of exploding, to destroy the lock, and, at the same time, prevent the powder from reaching any other part of the interior of the lock.

Fifth. The application of the safety-valve block, 64, to vent the explosion of any gunpowder that may be confined in the cylinder, c, 4, by plugging both the key-hole and the hole, 63.

Sixth. The mode of fitting the key-hole cover, c, 3, with the notch, 55, on the detector-lever, D, to match the neck, 56, on the key-shank; such means also preventing the introduction of any pick, or false instrument, after any movement has been given to the cylinder, c, 4, by the notch, 55, being as small as the drill pin, 57.

Seventh. The application of the guard piece, 65, on the detector-lever, D, to prevent a pick reaching the pin, 45, of the detent dog, b, 8.

Eighth. The application of the cam-pointed piece, c, 6, on the detector-lever, D, to move the pin, 47, and detent dog, b, 8, so attached that if the key-hole cover is cut or drilled off the piece, c, 6, falls away, and leaves the detent dog, b, 8, still holding the bolt.

ROBERT NEWELL.

No. 8146.—*Improvement in Churns.*

Now, what I claim as my invention, and desire to secure by letters patent, is the combination of the rock shaft, levers, connecting rod, and swing, for the churn, for the purpose of producing the perpendicular movement of the dasher, substantially in the manner herein described, to be denominated "the oscillating perpendicular dash churn."

J. S. RICHARDSON.

No. 8147.—*Improvement in crossing the fibres in forming the bats for Felt Cloth, &c.*

What I claim as new in my invention, and desire to secure by letters patent, is—

First. The employment, for the purpose of carrying webs, sheets, or layers of any fibrous material, of an apron, B, B, of material pervious to air, having a box, E, in which a vacuum is produced, placed at the back, the side of the box next the apron being perforated, or otherwise rendered pervious, so that the external air, rushing through the apron to fill the vacuum within the box, forces the material close to the apron, and confines it there, in combination with the manner herein described of throwing off or releasing the material from the apron by suddenly closing the valve, S, in the pipe, G, communicating between the box, E, and the apparatus for producing the vacuum, and at the same time opening the valve, l, in the said pipe, to admit air into the box, or by any means substantially the same.

Second. The flap, t, operating in the manner and for the purposes substantially as herein specified.

ALONZO C. ARNOLD.

No. 8148.—*Improvement in Governors.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein specified, of steadying the movement of governors or regulators of motion, by apparatus herein described, or the equivalent thereof.

GEORGE H. CORLISS.

No. 8149.—*Improvements in Railings.*

What I claim as my invention, and desire to secure by letters patent, is making the dove-tailed tenons, whether to the paling or top and bottom rails, wedge-shaped in the length of the railing, the taper at the opposite ends being reverse, and making the grooves in the rails or palings in the same manner, that the palings cannot slide in either direction, binding the whole firmly together, substantially in the manner described.

SOMMERS CROWELL.

No. 8150.—*Improvement in Machines for Facing and Polishing Stone and other Substances.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as herein described, of grinding, facing, or polishing the surface of stones, and other substances, by means of a grinder, rubber, or polisher, connected and combined with a spindle, from which it derives a rotary motion by means of universal and sliding joints, substantially as described, that the said grinder, rubber, or polisher may be carried over any and all parts of the surface, to be worked whilst its surface is self-adapting, as described.

ALBERT EAMES.

No. 8151.—*Improvement in Governors.*

What I claim as my invention, and desire to secure by letters patent, is the employment of a loose wheel or pulley, A, propelled by the prime mover, and driving its shaft, B, through the action of a separate elastic force, weight, or pressure, such as procured by the spring, H, in combination with the several racks and pinions, or their equivalents, as described, for operating the adjusting or regulating slide, J, substantially in the manner shown and specified, and for the purposes set forth.

WILLIAM GARDNER.

No. 8152.—*Improvement in Carriage Springs.*

Having thus fully described my improvements in buggies, &c., what I claim as my invention, and desire to secure by letters patent, is the connecting of the axles of wheeled vehicles by means of curved spring perches, which are combined with the supporting springs of the vehicle, that have a greater degree of curvature than themselves, substantially in the manner and for the purposes as herein set forth.

CHAUNCEY H. GUARD.

No. 8153.—*Improvement in Washing Machines.*

What I claim as my invention, and desire to secure by letters patent, is the triple and concentrated action of pressure blocks upon the clothes, being constructed and operated substantially in the manner herein set forth and described.

JOHN O'NEIL.

No. 8154.—*Improvement in Lan'erns.*

What we claim as our invention, and desire to secure by letters patent, is the mode of attaching the lamp to the lantern by means of the springs and flanges, as herein substantially set forth.

HUGH SANGSTER,
JAMES SANGSTER.

No. 8155.—*Improvements in the method of finishing the Heads of Screws.*

I have herein described the construction and arrangement of machinery which I have essayed with success; but I do not wish to limit myself to the specified construction and arrangement, as these may be modified without changing the principle of my invention.

What I claim as my invention, and desire to secure by letters patent, in the method, herein described, of finishing the heads in the manufacture of wood screws, is partly shaving the head with a cutter before nicking, and after nicking subjecting it to a second shaving operation, to complete the shaving by means of a cutter, whose edges form with each other a more acute angle than the edges of the cutter first employed, as herein specified.

THOMAS J. SLOAN.

No. 8156.—*Improvement in Centrifugal Sugar Drainers.*

What I claim as my invention, for which I desire to secure letters patent, is the contrivance for discharging, and at the same time cleansing, the strainer whilst in motion, by means of an elevator rising in a spiral groove, substantially as described, or by an elevator rising in vertical or inclined grooves, which is essentially the same.

WILLIAM VAN ANDEN.

No. 8157.—*Improvement in Grain Harvesters.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is gearing the operating parts of the machine from both the wheels, in combination with the arrangement by which portions may be driven by either, so as to equalize the driving power upon each, and thus to allow the machine to be much more easily guided and controlled.

N. T. ALLEN.

No. 8158.—*Improvement in Brick Machines.*

Having thus described my improvements in the machine for making bricks, what I claim, and desire to secure by letters patent, is the rotating mould wheel, A, G, H, I, *e*, constructed, as herein described, with a series of moulds in its periphery and an annular plane, A, outside of the moulds, and furnished with pistons, J, arranged, as herein described, for the purpose of discharging the bricks from the moulds, as set forth.

I also claim the mode, herein described, of changing the positions of the pistons, J, by means of the bar, (*m*,) (attached to the horizontal presser,) with its block (*o*) and plate, (*u*,) which are made to impinge upon the vertical plates, (*n*,) which are attached to the pistons for that purpose.

I also claim the combination of the hopper, L, horizontal presser, P, vertical presser, V, and hook rod, (*w*,) with the traverse horizontal lever, Y, and with the mould wheel; the whole being constructed and arranged in the manner and for the purposes herein described.

MAHLON GREGG.

No. 8159.—*Improvement in the construction of Dies.*

I do not claim to be the first to construct a die with a lined surface, to deaden the metallic surface operated on; but what I do claim as new, and of my own invention, and desire to secure by letters patent of the United States, is the application of a die with a lined or corrugated surface, with the figure or pattern cut out counter sunk, so that the lined surface deadens the plate of polished metal, and leaves the polished surface of the figure untouched, for producing ornamental designs on polished metallic surfaces.

HIRAM W. HAYDEN.

No. 8160.—*Improvement in Cooking Stoves.*

Having thus described the nature of my invention, what I claim therein as new, and desire to secure by letters patent, are the cold air passages, substantially as here arranged, to wit: having each an external aperture near their upper part on each side, beneath which projects a plate, (*f*,) which carries the air to the centre of the stove, whence, by a second plate, (*g*,) beneath the middle of the passage, it is again deflected to the outer ends of the passage, (thus counter-balancing the cooling effects at its entrance,) whence it is distributed in hot blasts to the fire.

ELIAS YOUNG.

No. 8161.—*Improvement in Wash Boards.*

What I claim, and desire to secure by letters patent, is—

First. I claim fastening cloth, or its equivalent, on the board to prevent fabrics from slipping and from being torn or rubbed too much; but I do not claim lining the grooved wash board with India rubber, or other equivalent material.

Second. I claim hinging the wash board, A, to the frame, B, C, for the purpose of holding the clothes while being washed, and, at the same time, allowing the board to be turned over, substantially as herein se forth.

WILLIAM T. BARNES.

No. 8162.—*Improvement in Augers.*

What I claim as my invention, and which I desire to secure by letters patent, is the form of the lips, or cutting edges, of boring implements, as illustrated in figures 1, 2, and 4—that is, such lip commencing at the screw or centre point, and running nearly at right angles thereto, until, about half way from the centre to the outer part of the boring implement when it assumes a curve upward, or toward the handle-end of the instrument, which curve is continued until it is nearly semi-circular, or until it turns within the periphery of the auger, or bitt, as shown in fig. 1, the curved edges being also under-cut or back-sloped, as illustrated in figs. 2 and 4, between A and B, but without being confined to any particular angle of such back-sloping or under-cutting; all as hereinbefore set forth.

RANSOM COOK.

No. 8163.—*Improvements in Knitting Machines.*

What I claim as my improvement is the arrangement of the needles in the plane of the endless belt, instead of at right angles to it, in combination with the arrangement of the driving pinion, *b*, and the projecting joints, *x*, *x*, *x*, *&c.*, of the links of the belt, on the outside of the belt; the belt being supported, and the whole being applied to the stitch hook, yarn guide, and presser, and made to operate together, and with the work hanging on the inside of the belt, substantially as hereinbefore specified.

RUFUS ELLIS.

No. 8164.—*Improved Connexion of Telescopic Masts and Spars.*

What I claim as my invention, and desire to secure by letters patent, is connecting and adjusting the several joints of masts, yards, and all spars constructed for telescopic tubes, or tubes fitting one within another, by means of a screwed rod, C, or screwed rods, C and C′, nuts and female screws, F, and set screws, *d*, or their equivalents; the whole being inserted in, and secured or attached to, the tubes, and operating in the manner substantially as herein set forth.

C. F. BROWN.

No. 8165.—*Improvements in Machines for Dressing Shingles.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the head block, *t*, with the springs, *u*, *u*, cams, *v*, *v*, the rollers, *o*, *o*, and stops, *x*, *x*, for the purpose of passing the shingles between and out from the cutting cylinders, in combination with the arrangement for depressing the upper cylinder while in motion, for the purpose of giving a taper to the shingle; the whole combined and arranged substantially as set forth in the above specification.

SEYMOUR CARVER.

No. 8166.—*Improvement in Running Gear of Locomotives.*

What I claim as my invention is the combination of the bent levers, (*o*,) the connecting rods, (P, P′,) and tractile bar or spring, or other equivalent contrivance or contrivances, with the main frame, or its housings, and the boxes or pedestals of the journals of the driving wheels, and for the purpose substantially as hereinbefore specified.

GEORGE S. GRIGGS.

No. 8167.—*Improvement in Ventilators.*

Having thus described my improvements in ventilators, I shall state my claim as follows:

What I claim as my invention, and desire to have secured to me by letters patent, is a ventilator, as herein above described, composed of two series or sets of curved slats, arranged one within the other, and running from the edge of the flue, or other orifice, to a small circle, or plate, over the centre of the same, the whole forming a conical or globe-shaped ventilator, the spaces between the several outer slats being protected by the inner slats, leaving spaces or apertures between the two sets of slats, the only openings to said apertures being in an oblique or sideways direction; all as hereinabove described and set forth.

THATCHER C. HATCH.

No. 8168.—*Improvement in Regulators for the Pen Beam in Ruling Machines.*

I do not claim to be the inventor of the flexible hooked regulator attached to the pen-beam, as heretofore constructed, but what I claim as my invention, and desire to secure by letters patent, is—

First. I claim the pieces, G, H, A, B, in combination with the hinge joints, (1, 2, 3,) arranged and combined substantially and for the purpose as herein described.

Second. I claim the sliding piece, B, the bearings, C, C, C, and the finger wheel, F, in combination with the pieces, G, H, A, uniting by hinge joints, or in any other manner substantially the same, using in the construction of the whole machine any material adapted to the purpose of forming, as herein described, a pen beam regulator for ruling machines.

W. O. HICKOK.

No. 8169.—*Improvements in Revolving Boilers.*

Having thus fully described my invention, I will proceed to name what I claim as new, and desire to secure by letters patent. I claim lining the inside of that part of a revolving boiler which comes in contact with the fire or heat with wire gauze or cloth, or any perforated or pervious metal work, I, in the manner and for the purpose substantially as herein described.

CHARLES ANDERSON.

No. 8170.—*Improvement in Ploughs.*

What is claimed as the invention of Benjamin Giger, and as not previously known, is the peculiar form and construction of the standard, with its sockets at the upper extremity, and flanges at the lower, and the method of uniting them so as to form a double machine, capable, also, of being used for cultivation in its separate parts, as set forth.

The whole machine, as above described, constitutes "Giger's Corn Planter."

JOHN COOPER,
Administrator of the estate of Benjamin Giger, deceased.

No. 8171.—*Self-acting Guard Frog.*

What I claim as my invention, and wish to secure by letters patent, is the combination of the rising and falling guards, $f', f,^2$ with the levers, e, e, and $h', h,^2$ by means of an arrangement of levers, connecting rods, &c., substantially such as herein specified, and acting in the manner and to produce the results herein set forth.

CHARLES A. POSTLEY.

No. 8172.—*Improvements in Knitting Machines.*

What I claim as my invention, and desire to secure by letters patent—

First. Is a sinker, to be used in machines for knitting, so constructed as to form the loops upon the needles, used in knitting two separate fabrics at the same time and at one operation, and of sufficient weight to draw the requisite quantity of yarn from the supply to form the loops required.

Second. Is a slur, to be used in knitting machines, so constructed as to let each sinker drop to the falling bar, and draw the requisite quantity of yarn from the supply to form the loop, or loops, between the needles, before it allows the succeeding sinker to drop, and act upon the yarn.

Third. Is a falling bar, so constructed that the slurs and slur boxes traverse upon it, instead of traversing a separate bar.

Fourth. Is the combination of the sinkers, stop bars, combs, and needles that traverse, so arranged as to knit two separate fabrics at the same time with one and the same set of sinkers and slur.

Fifth. I do not intend to limit myself to the precise construction described in the foregoing specifications, but to use such forms of construction as will answer the purpose intended.

JOHN PEPPER.

No. 8173.—*Machinery for making Wrought Iron Car Wheels.*

I claim the machinery and apparatus set forth and described in figures 1, 2, 3, 4, 5, 6, to wit, the mould blocks or welders, the hammer, or ram, with the wedges thereto attached, and the mandrel, in combination with each other, for the purpose of making wrought-iron sheets, substantially as set forth in this specification.

MARIA VAUGHN.

No. 8174.—*Improvement in Machines for splitting Horn and Shell.*

What I claim as my invention or improvement is the cylindrical rotary bed, or drum, A, in combination with the water cistern, or trough, and its furnace and machinery over the drum for bearing the shell or material down upon it during its revolution, as specified, the said drum being provided with a roughened or friction-curved surface, such as will adhere to the shell, and cause it to move with it, and against the knife, as described.

JABEZ ROBINS.

No. 8175.—*Improvement in printing Names of Subscribers upon newspapers, &c.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement and construction of a machine for printing names of persons or places on newspapers and other papers after the manner substantially as described, viz: of a form containing the column of names to be printed, set up in types, and being brought under the action of a stamp by means of a slide, moving by degrees, together with the application of a slitted plate, allowing the paper (to be printed) to be pressed down on the line right beneath the slit of the plate, and shielding the paper from the lines adjoining that under action of the stamp, as hereinbefore described.

HENRY MOESER.

No. 8176.—*Improvement in Lubricating Compounds.*

Having thus described the mode in which my anti attrition is compounded and used what I claim therein as new, and desire to secure by letters patent, is the combination of ingredients herein described, whether the proportions be the same as herein set forth, or varied to any extent that the same may admit of without changing the peculiar character of the compound as a lubricator.

J. SELGRATH.

No. 8177.—*Improvement in Cars for Transportation of Coal.*

Having thus fully described my invention, I wish it to be distinctly understood that I do not claim the use of cylinders for conveying material upon common roads, as this has been done heretofore; but what I do claim as of my invention, and desire to secure by letters patent, is the combination of a partition or partitions with a metallic cylinder or cylinders provided with flanged rims, as herein described, for the purpose of carrying material in bulk on rail or other roads where high velocities are attained, said material being held in place by centrifugal force whilst in motion, and prevented from falling or rolling in the cylinder by the partition or partitions whilst in the act of stopping or starting, as herein fully described and shown, or by any other means essentially the same.

LAURENCE MYERS.

No. 8178.—*Improvement in Machinery for Cutting Ratan, &c.*

What I claim as my invention, and desire to secure by letters patent, is—

First. I claim the combination of the cutters, *a*, as described, with the levers, C, and springs, *e*, and cams, D, or their equivalents, and also handles, D′, and links, *d′*, for the purpose of applying said cutters or scrapers, so as to act upon the stick of ratan, in the manner herein described, and by which they may all be operated simultaneously, substantially in the manner herein described.

Second. In the process of cutting cane or ratan into strands, as described, I claim beading the stick at the point at which the cutter is removing the strand from the surface.

Third. I claim the combination of the elements which compose each simple section of the cutting apparatus; that is to say, of the cutter, H, and gauge, I, with the stock, G, and guide, *g*, and bed roller, F, or their equivalents, substantially as described, for the purpose of bending the stick and removing the strand therefrom, whether said section is used alone or is combined with others as described.

Fourth. I claim the combination of that part of the machine called the "scraper" with the feeding rollers, or their equivalents, and the several sections of the cutting apparatus, said sections being so arranged in relation to each other as that the stick, in passing from one to the other, shall be properly bent; and also that the several cutters shall act upon different points of its circumference; the whole being arranged and operating substantially in the manner herein described and set forth.

SYLVANUS SAWYER.

No. 8179.—*Improvement in Machines for finishing the backs of Books.*

I do not claim to be the inventor of "backing books" by means of a roller, as rollers having concave peripheries have been used, which were passed longitudinally over the back; nor do I claim the construction of the clamps or jaws between which the book is held; nor do I claim to have invented the use of circular engraved tools or rollers for embossing books; but what I do claim is—

First. The use, for the purpose described, of a roller, G, of the whole length or part of the length of the back of the book, either plain for a plain back book, or grooved for a raised banded book, or having a figure or figures cut or engraved, or otherwise made upon it, rolling over the back of the book from side to side, or from the centre to the sides, and having a yielding pressure applied to it by weighted levers, or their equivalents, in the manner substantially as described.

Second. I claim clamping or holding the book in a swinging book-holder, E, E, or its equivalent, which hangs on pivots or journals, *o*, *o*, and is capable of being swung back and forth so as to cause the back of the book held in it to describe an arc of a circle, and bring each part of the back to the roller, so that it shall receive an equal pressure all over its surface, substantially as and for the purpose herein set forth.

Third. The gauges, *v*, *v*, sliding upon an inclined bar or bars, *w*, *w*, that they may be set to form guides for placing both ends of the back of the book at an equal or nearly equal elevation in the clamp, so as to cause each part to receive a uniform pressure, and may be drawn back from the book without dragging or rubbing the surface of the back, in the manner substantially as herein shown.

CHARLES STARR.

No. 8180.—*Improvement in making Gutta Percha Hollow Ware.*

What I claim as my invention, and desire to secure by letters patent, in the process above described, is the method, as described, of moulding articles of gutta percha, or the compounds of gutta percha with other substances, by first making the same in the form of a pipe, and whilst in a partially heated and plastic state, giving to it the form required in a mould, by forcing a liquid inside to expand the gutta percha, as described.

S. T. ARMSTRONG.

No. 8181.—*Improvement in Fastening Pedestals to Columns.*

Therefore, what we claim as new, and of our own invention, is the application of the piece, *c*, and different shaped lugs, 8 and 9, on the end of the column to enter the hole, 2, and notches, 3 and 4, so that, on turning the column, the lugs, 8 and 9, take the inclined seats, 5 and 6, to attach the column to the pedestal, in combination with the locking piece, *d*, to prevent the column turning, substantially as described and shown.

WM. LEWIS,
W. H. LEWIS.

No. 8182.—*Improvement in Grain Harvesters.*

Having thus described my improved grain and grass cutter, what I claim as my invention, and desire to secure by letters patent, is—

First. The standard to which the steering wheel is attached, constructed as herein described, so as to perform its own office proper, and also to adjust the cutter at the required height above the surface of the ground.

Second. The discharging rake, which is moved, as described, in combination with the endless apron, for collecting and discharging the cut grain, as set forth.

WILLIAM H. START.

No. 8183.—*Improvement in Mashing Tubs.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The employment of buckets, formed by the revolving arms, *g*, *g*, working within the hopper, H, for delivering the grain, through suitable openings, *d*, *e*, into, and operating in combination with, the mashing cylinder, A, A, having an outlet, C, (or outlets,) for supplying the cooler, J, J, substantially as shown and described.

Second, The use of a mashing cylinder, A, A, having beaters within it, and operating in combination with a cooler, J, J, carrying any number of barrels, or shafts, L, L, fitted with projecting pins, *m, m, m, m,* essentially as shown and described for the purposes set forth.

JOSEPH WRIGHT.

No. 8184.—*Improvement in making Hemp from Okra.*

What I claim as my invention, and desire to secure by letters patent, is the preparing of hemp from the bark of the okra plant, in its green state, and the herein-described method of preparing it for use.

JEAN BLANC.

No. 8185.—*Vise Saw Set.*

What I claim as my invention, and wish to secure by letters patent, is constructing a vise for the purpose of compressing saws to be set or filed, in the following manner, namely: with only one supporting arm to each jaw, hinged at their lower extremities, and having an extra arm on one side of, and parallel, or nearly so, to said supporting arms; to the upper extremity of which is attached an eccentric lever, or its mechanical equivalent, for compressing the two jaws together, constructed substantially as herein described.

WILLIAM HINDS.

No. 8186.—*Arrangement of Catches on the Upper Sash, operated by moving the Lower Sash.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement, herein described, of the catches and window sashes, for the purpose described.

WASHBURN RACE.

No. 8187.—*Improvement in Boxes and Axles for Saving Oil.*

I claim causing the beveled edges of the oil-box to enter the grooves of the axles and rest against their outer shoulders, but not against their inner shoulders—thus at the same time preventing end play and the escape of the oil; the journal bearing being lower than the beveled edges of the oil box, and sufficiently above the bottom of it to prevent the oil coming from the box to the journal.

BENJAMIN KRAFT.

No. 8188.—*Improvement in Inkstands.*

I do not claim the invention of the elastic diaphragm for inkstands, but I claim my inkstand as a new article of manufacture, in which the following features are for the first time associated, viz: an elastic diaphragm, covered and secured from injury by a metallic cap, and regulated by a screw passing through the cap, and, in combination with the diaphragm, the funnel-stop, *l*, and waste-cap, *n*.

HENRY WHITNEY, Jr.

No. 8189.—*Improvement in Iron Fences.*

Having thus fully described the nature of my invention, and the manner of constructing the same, what I claim therein as new, and desire to secure by letters patent, is the manner, herein described, of securing the rails of iron fences by means of sectional or divided posts, having slots therein, which are so arranged that, when in place, they break joint with each other, the slot in one section extending upward, and the slot in the other downward, so closing the slots as to prevent the rails, which have a loop or dead-eye turned on each end for that purpose, from passing through or coming out, as herein fully set forth.

JOHN B. WICKERSHAM.

No. 8190.—*Improvement in Bedsteads.*

What I claim as my invention, and desire to secure by letters patent, is the knuckle joints for holding the rails of the bedstead together, in combination with the rods, G and L, substantially in the manner and for the purpose described; said rods being also employed to support the slats forming the bottom of the bedstead.

HARVEY W. SABIN.

No. 8191.—*Improvement in Spectacle Frames.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the spring, B, and cylinder, C, with the temple bow, A, and the glass frame, the whole being substantially as specified.

JOHN P. PAINE.

No. 8192.—*Improvement in Grain Harvesters.*

What we claim as our invention, and desire to secure by letters patent, is the discharging the cut stalks and heads of grain from the platform, D, by means of the combination of the rake, C, with the lever, B, and the co-operation therewith of the series of teeth, *p, q*, on the face of the wheel, A, and the inclined rail, *d*, rising above the curved guard of the platform, D, substantially in the manner herein set forth.

AARON PALMER,
S. G. WILLIAMS.

No. 8193.—*Improvement in Bread Cutters.*

What we claim as our invention, and desire to secure by letters patent, is the use of a series of knives or cutters, (E,) made in the form of eccentric circles or scrolls, with the cutting edge on the periphery, so as to represent a spiral line or curve (as seen in the drawings) when combined with the bars or ribs (C, C) of the bed piece, which serve to sustain the loaf, and also to guide the knives, and with the fingers or prongs, (D,) which hold the loaf against the knives whilst cutting, and also act as outside guides, when the whole is constructed, arranged, combined, and operating substantially as herein described.

A. E. LAZELL,
DAVENPORT LAZELL.

No. 8194.—*Improvement in Piano Fortes.*

What I claim as my invention, and desire to secure by letters patent, is the spring acting on the valve at D, in combination with the weight of the key, resting on the valve at F, for the purposes substantially as herein described and represented.

MICHAEL MILLER.

No. 8195.—*Improvement in machines for making Hat Bodies.*

Having thus fully described my inventions, and pointed out some of the modes in which I contemplate using them, and having referred to what was previously known in this branch of the arts, in order that my invention may be the better understood, I do hereby declare that I do not claim the combination of a picker and chamber having an aperture for the admission of air, such a combination having long been known and used for opening and cleaning the fibres of furs; nor do I claim the combination of these with a perforated exhausted former, such a combination having been described, and referred to as applicable to forming hats, and other irregular forms, in an application for a patent by T. R. Williams, in 1840, though it was not then claimed as invention; nor do I claim the use of water to harden or to wet the hat body, such use being as old as the felting process, and is indispensably necessary in all hardening and felting processes; nor do I claim the hardening of a hat body on a cone, such a process having been described and patented to Wells, James, & Peck, in 1837, they using a solid cone upon which a web was wound to form the body, and numerous jets of steam were used to harden the same or to wet it as it was wound on the cone, there being no exhaust; and processes for hardening bodies on a perforated cone have also been described—in 1840 by Williams, and by Wells in 1846, they both using outer pressure to hold the fibres, while the cone and fibres are immersed; nor do I claim any of the parts as my invention, except as they are used in new combinations and producing new and important results.

But what I do claim as my invention, and desire to secure by letters patent of the United States, is the exhausting and suspending fan, C, with its casing and aperture, M, constructed, arranged, and operated substantially as and for the purposes hereinbefore particularly described, in combination with the picker, B, chamber, R, perforated exhausted former, E, and exhaust fan, F, arranged substantially as described and shown, by which arrangements and combinations the several parts, or their equivalents, perform their several and combined functions in a better manner, and produce better results, than have been heretofore attained without any chamber trunk, or tunnel, or any other means to control the fibres after being suspended in the air by the fan, or between the fan and perforated exhausted cone or former, substantially as described and shown.

I also claim the combined action of the currents of air and the currents of numerous jets of hot water in the hardening or wetting process, the currents of air performing the triple duty of holding the fibres on the former and of aiding the water to penetrate the hat body, and at the same time to carry the surplus water through the perforations into the exhaust, thus effectually preventing injury to the hat body from the accumulation of the surplus water—to wash it while the wetting or hardening process is greatly facilitated and the perfection of the work is secured; the whole process being accomplished by the combination of the several parts named, or their equivalents, for producing the currents of air and water with the perforated former over the exhaust, in the manner and for the purposes substantially as herein described and shown.

The effect of these improvements are the production of a machine combining the best means for opening fibrous materials and suspending them in the air surrounding a perforated and exhausted former, and also of a new combination of means for hardening the fibres and completing the process without removing the hat or applying any pressure preparatory to the suspension of the pressure of the air, by which means a great improvement is effected as well in the forming of the hat and in the process of hardening as in the facility of operation; the whole being by combination of machinery heretofore unknown.

DANIEL BARNUM.

No. 8196.—*Improvement in Lathes.*

What I claim as my invention, and desire to secure by letters patent, is controlling the poppet centre, L, so that it releases itself, after the turning is finished, by connecting it with a sliding bar, N, having a weight, W, or its equivalent, attached, and carrying a ratchet, T, which is held by a catch, *t*, attached to the stationary bed; the said catch having an arm, *v*, attached, which is struck by part of the cutter head after the cut is finished, and released from the ratchet, substantially as herein shown.

THOMAS R. BAILEY.

No. 8197.—*Improvement in Running-gear of Railroad Carriages.*

Having thus fully explained the general features of the several parts used in my invention, and specifically the novelty and advantages possessed by my improvements, I will proceed to state that I do not claim exclusively the employment of inclined wheels, either with or without flanges, as such have already before been used; but what I claim as my invention, and desire to secure by letters patent, is the employment of wheels in any number of pairs, attached on either side to the truck or frame of railway vehicles, and set at any inclination to the horizon, converging to a point in or below the rail; so that both wheels of any one pair will rest or travel on opposite sides of the upper surface of either one or the same rail, essentially as shown and described.

DANIEL W. EAMES.

No. 8198.—*Improvement in Wire Hooks and Eyes.*

Having thus declared the nature or character of my invention, and specified the forms and manner of application of my improvements on wire hooks and eyes for garments, and their purposes and uses, I do not claim any of the forms of hooks and eyes heretofore made of wire, nor any peculiar difference in what belongs to any of the various kinds of them, except in the eyelets or loops. What I do claim as my invention, and desire to secure by letters patent, is—

First. The addition of side springs to the common forms of hooks for wire hooks and eyes, substantially in the manner and for the purposes set forth.

Second. I claim the small ridges, or elevations on each side of the beak of the hook, made by binding the wire of the side springs, or by other means equivalent thereto, for the purposes set forth.

Third. I claim the jewsharp form, or partly circular eyelets, extended to form loops, adapted to receive tape, in connexion with the small elevations to keep the tape in its proper place, substantially as set forth.

CHARLES ATWOOD.

No. 8199.—*Improvements in Machinery for Cutting Files.*

What I claim as my invention, and desire to secure by letters patent, is connecting the file blank to be cut with a bed, which has a positive feed motion, substantially as described, in combination with an incidental rolling motion, depending upon the shape of the blank, and the angle which the cutter forms therewith, substantially as described.

I also claim connecting the chisel with its stock by a joint, as described, in combination with a rolling bed, as described, by which they are rendered self-adapting, as described.

I also claim holding the file down on to the bed during the operation of cutting, and near to the cutter, by means of a roller, or its equivalent, combined with the rolling bed, substantially as herein described; but this I only claim when the end of the file is so connected with its bed, that it shall be free to move up and down, that the pressure of the roller may keep that part of the file that is being cut firmly down on to the bed, as herein specified.

I am aware that before the date of my invention the cutter of file-cutting machines has been jointed to a helve or bar, but in such cases it has not been combined with a rolling bed; and, therefore, I do not wish to be understood as claiming broadly the making of the cutter with a joint; but to claim this only under the limitations pointed out above.

I am also aware that the file blank has been made to slide during the feeding motion over a rolling-bed to adapt the transverse plane of the file blank to the line of the cutting edge, for cutting the different ranges of teeth; and, therefore, I do not wish to be understood as claiming broadly the employment of a rolling-bed; but to claim such rolling bed, when made to move with the file during the feed motion, from end to end, under the limitations above specified.

JOHN CRUM.

No. 8200.—*Improvement in Handles of Brushes and Brooms.*

Having thus described my improvements, what I claim as new therein, is the lever jaws, held together by the head-piece of the screw, *(g,)* in combination with the conical end of the handle, substantially in the manner and for the purpose set forth.

LUKE F. CAVANAUGH.

No. 8201.—*Improved arrangement of the Steam Engine.*

What I claim as my invention, and desire to secure by letters patent, is the method, herein described, of connecting the steam piston of a steam engine with the crank thereof by means of a piston rod, fixed cross head, side bars forked, connecting rod, and belts, or the equivalent thereof, the several devices being arranged and operating substantially as herein set forth, in such manner that the cross piece of the connecting rod, which is placed transversely to the crank-shaft, shall be on opposite side of the axial line of said shaft, at opposite extremities of the stroke of the piston

I also claim the belts or gimbal rings, or the equivalents thereof, arranged substantially as herein set forth, for the purpose of transmitting the movement of the cross head to the connecting rod of a steam engine.

FR. P. DIMPFEL.

No. 8202.—*Improved mode of papering Pins.*

I am aware that by other mechanical devices, such like pin rolls (as represented by figs. 3, 4, and 5) may be coiled or wound up nearly as well, and substantially the same, as by the process herein described, but which do not constitute the novelty nor the substance of this my invention.

What I claim, therefore, as my invention, and desire to secure by letters patent, is the producing of a new manufacture of "pin rolls," either oblong, oval, cylindrical, square, or other shape or form, (so that it combines in effect the common sheeted pin paper, or fillet, stuck or inserted pin paper, or pins wound in closely between the layers, laps, or folds of fillet paper, with the common pin cushion,) whether the centre of the cushion is elevated or plain—that is, whether coned up or level, or whether the pins are inserted through crimps or not, and embraced by the fillet paper—the fillet embracing the shank or barrels of the pins, while the heads of the pins are not so embraced, but open and conveniently accessible to be withdrawn for use without unfolding, unwinding, or disturbing the pin roll, substantially as herein described by the specification and drawings.

C. O. CROSBY.

No. 8203.—*Improved Portable Hydraulic Press.*

What I claim as my invention, and desire to secure by letters patent, is a hydraulic press, quite portable, in which the ram is hollow, and serves as the reservoir to supply the cylinder with water or other liquid, while the force pump and its appendages are contained within the ram, so that, by working this force pump, the ram is forced up until the liquid in such ram is exhausted, and by moving the handle of the pump down it will come in contact with a rod attached to a valve in the pump piston, and the latter comes in contact with a valve in the end of the ram, opening them both and allowing the water to return into the ram again through passages.

RICHARD DUDGEON.

No. 8204.—*Mechanical Hooker-up.*

What I claim as my invention, and desire to secure by letters patent, is in combination with a plate, or the equivalent thereof, for receiving the mass issuing from a rolling mill, the friction drums, the periphery of one of which is shaped substantially as described, and operating substantially as herein set forth, in such manner that by their action the plate, or its equivalent, is quickly raised and held stationary, at the proper height to permit the mass upon it to be passed to the front side of the mill, and is rapidly lowered to the proper position to receive the mass issuing from the rolls.

DAVID J. HAPPERSETT.

No. 8205.—*Improvement in Silk-covered Buttons.*

I do not mean to limit myself to the shape of the mould, nor to the pattern or color formed on the silk covering; neither do I claim to be the first who has used the split shank, plate, and washer, as that has been used with a glass bead for ornamental purposes; but I do not know of any one who has used this plate, shank, and washer as a means for fastening a silk-covered button, and at the same time secure and hide the ends of the silk cover in the hole of the mould, thereby making a durable, finished, and handsome ornamental button.

Therefore, what I claim is the application of the plate, shank, and washer, to a silk covered button, for the purposes specified, and as described and shown.

H. HEINEMANN.

No. 8206.—*Improvement in Machines for Grooving Lumber.*

Having thus fully described our improvements, what we claim to have invented, and desire to secure by letters patent, is the method, herein described, of forming grooves by circular saws and a deflecting throat, in combination with suitable cutters, as set forth.

BIRDSELL HOLLY,
JOHN W. WHEELER.

No. 8207.—*Improvement in Harvesting Machines.*

Having thus fully described the construction and operation of my grain harvester, what I claim therein, and desire to secure by letters patent, is the use of rotating cutters, in connexion with the rotating rake and teeth, (*d*,) operating substantially as described.

I also claim the novel manner of gearing the horses, or animal power, under the machine, so as to conduct the grain over them and discharge it in a straight line in the wake of the machine, substantially as herein described and made known.

WM. JONES.

No. 8208.—*Improvement in Cork Cutting Machines.*

I do not confine myself strictly to the precise form of construction herein described, but claim to vary the same as desirable, while I produce the like results by equivalent mechanical means.

What I claim as of my own invention, and desire to secure by letters patent, is the lifting block, (*h*,) susceptible of such adjustment, with reference to the edge of the knife, while the machine is in motion, that, from squares of varying sizes, perfectly formed corks may be cut, of the largest size each square will afford; the whole being constructed and operating substantially in the manner herein set forth.

WILLIAM KING.

No. 8209.—*Improvement in Seeding Machines.*

Having thus fully described the construction, use, and operation of our several improvements on the seeding machine, what we claim therein as new, and desire to secure by letters patent, is—

First. We claim the employment of the oblique, recessed washer, K, in combination with the cylindrical cap, I, provided with inclined wings or projections, I^2, which match with the oblique recesses, *k*, of the washer, K, in such a manner that the pressure produced thereupon shall securely hold the cylindrical cap in the required position when adjusted to increase or diminish the size of the seed receptacles.

Second. We claim scalloping the end of the cylindrical cap, L^2, of the distributing cylinder, and using, in connexion therewith, clamp-screws, (*o*, *o*,) for holding the cylindrical cap in the required position.

Third. We claim the employment of the pin, (m^2,) fig. 12, or its equivalent, when used in connexion with a clamp screw, o^4, and interior cylindrical cap, M^2, when properly adjusted, to increase or diminish the size of the seed receptacles.

Fourth. We likewise claim providing one of the journal pins, q^1, of each depositing tube, U, with a cog, q^2, which is made to fit an opening in the the arm, *j*, of the drag bar, j^2, when it shall be turned frontward nearly horizontal, for the purpose of detaching the depositing tube from the drag bar, j^2, with facility, as described and shown in fig. 18.

Fifth. We further claim the employment of the trifurcated holding lever, L, in combination with the drag bar, j^2, and suspended depositing tube, U, for the purpose of holding the depositing tube in its proper position during the operation of forming the drill and depositing the seed, and by which said trifurcated holding lever, L, may be disengaged from the pin, c^2, when an obstruction is visible, and allow the depositing tube to turn rearward when it shall have been struck, and thus save the pin (C^2) from being broken; and this trifurcated holding lever we claim, or its equivalent.

Sixth. We likewise claim causing the depositing tube to assume its proper position, after it shall have cleared the obstruction, by the action of the long arm (i^4) of the trifurcated holding lever, L, upon the cam or projection (*r*) of the depositing tube; and this we claim as in the arrangement herein described and represented.

Seventh. Lastly, we claim so combining a separate, double arm, P, with the frontward end of each drag bar, *j*, that it may be detached therefrom, as well as from the eyes or loops, R, of the front transverse beam of the frame, as described in the specification, and shown in the drawings at figures 16, 17, and 19.

SAMUEL PENNOCK,
MORTON PENNOCK.

No. 8210.—*Improvement in Revolving Breech Fire Arms.*

Having thus described my self-loading repeating fire arm, what I claim as my invention, and desire to secure by letters patent, is—

First. In combination with a cocking lever, I claim the two triggers, (M, M',) arranged and operating in such manner that the tripping of the hammer can be effected either in the ordinary manner, by pulling a trigger, or by the return movement of the cocking lever.

Second. I claim the combination of the sliding bolt (K) with the cap primer, (X.) the two being so arranged that as the hammer is tripped, by pulling the trigger, a cap is applied to one of the nipples of the chambered breech, by which means the chambers are revolved by the back motion of the cock, and capped by its forward motion, the capping by this arrangement being effected in one half the time in which it can be done by others, heretofore devised.

Third. I claim the construction of the cap and bullet passages, the powder magazine, and the exterior case, in such manner that the bullet and cap passages, and the included powder chamber, can be withdrawn from the exterior case which encloses them, to give free access to every part of said passages, and to facilitate the removal of obstructions therefrom, as described.

Fourth. In combination with a revolving disk breech, I claim a spring powder charger, constructed and operated by the movement of the breech, as herein set forth.

Fifth In combination with a revolving chambered breach, I claim the stationary cap stripper, constructed and operating as herein set forth.

Sixth. In combination with a revolving breech fire arm, I claim the spring dust plate, (Z,) which permits the escape of smoke, but prevents the entrance of dirt.

Seventh. I claim the forward inclination of the spout of the bullet passage, in connexion with a turning breech, the two being so arranged that when the latter is turning, the bullet, dropped into the chamber, is pressed against the inclined portion of the spout, and is by it forced down in the chamber of the breech, the inclined surface of the spout thus performing the office of a rammer.

PARRY W. PORTER.

No. 8211.—*Improved Apparatus for Punching Designs in Sheet Metal.*

What I claim as my invention, and desire to secure by letters patent, is the leather bed, or die, in combination with a set of punches, for puncturing purposes, when such set of punches, and the die, are used in connexion with proper rollers, substantially in the manner and for the purposes herein set forth.

WM. T. RUDD.

No. 8212.—*Improvement in Rakes to Harvesting Machines.*

What I claim as my invention, and desire to secure by letters patent, is the rake attached, for raking the grain from the machine without hand labor, constructed and operated substantially as described.

WM. H. SEYMOUR.

No. 8213.—*Improvement in Machines for Pressing Hats.*

What I claim as my invention, and desire to secure by letters patent, is the method of alternately lowering the pressing irons upon the hat block, and raising them therefrom by mechanism, operating substantially as herein described, which is readily controlled by the attendant.

JOHN STEARNS.

No. 8214.—*Improvement in Lifting Jacks.*

What I claim as my invention, and desire to secure by letters patent, is the catch or button, S, operated by the index bar, K, for the purpose of directing the action of the lever, I, J, substantially in the manner herein set forth.

JAMES ST. JOHN.

No. 8215.—*Improvement in Washing Machines.*

I do not claim the constructing or using of a revolving wash barrel, with or without a rolling or tumbling pounder therein; but what I do claim, and desire to secure by letters patent, is the peculiar form of the revolving barrel, with its fluted semi-cylindrical recesses, in combination with a pounding frame, constructed with a weighted hub and three parallel pounders, as herein described.

JOHN BOARDMAN.

No. 8216.—*Improvement in securing Pinions, &c., of Watches in Lathes.*

What I claim as my invention, and desire to secure by letters patent, is the employment of adhesive cement for securing staffs and pinions of watches or time pieces for lathe operation, in combination with a chuck, A, with a sliding tube, B, and a female centre, *a*, as described and set forth, or in any manner substantially the same.

JAMES M. BOTTUM.

No. 8217.—*Improvement in Machines for cutting wood into shreds, and crimping them for Mattress Stuffing, &c.*

I do not claim the combination of fluted cutters with smooth cutters for the purpose of making this article; nor do I claim or use the fluted cutters at all; nor do I cut the wood into round threads, but into flat strips, which are light and more elastic; nor do I claim the arrangement of fluted and smooth cutters in the plane stock; nor the apparatus for holding timber, and feeding it up to the plane, as it has heretofore been used and patented; but what I claim as my invention, and desire to secure by letters patent, is the use of the splitters with the plane iron, and the holder, *i*, and the movable weighted lid, *f*, or anything which is substantially the same, combined and arranged in the plane stock, E, for the purpose of producing the article herein described.

EDWIN K. BROWNING

No. 8218.—*Improvements in Machines for dressing Sisal Hemp, &c.*

What I claim as my invention, and desire to secure by letters patent, is the hinged jaw connected with the driving shaft, substantially as described, in combination with the cylinder to which it is hinged, and provided with a corresponding jaw, substantially as described, whereby the driving power, in carrying around the substances to be dressed, clamps and holds them firmly during the entire operation, as described.

And I also claim, in combination with the cylinder and clamp for presenting and carrying around the substances to be dressed, as described, the knives and combs attached to one or more hinged bars, and provided with the necessary means for operating them, substantially as described.

And I also claim, in combination with the cylinder, as described, the vat of water, in which, at each rotation of the cylinder, the substances to be dressed are immersed, substantially as described, and for the purpose specified.

S. A. CLEMENS.

No. 8219.—*Improvement in Churns.*

What I claim as my invention, and wish to secure by letters patent, is the application of the spring wire, fig. 5, which connects the crank with the dashers, in the manner and form and for the purpose above set forth.

SAMUEL G. DUGDALE.

No. 8220.—*Improvement in Axle Boxes for Journals for Railroad Cars.*

What I claim as my invention or improvement is to support the case, A, on the bearing, B, by projections, *c*, *c'*, or analogous contrivances applied to its sides, in combination with making the top plate, *a*, of the case and the cap or side plate, *b*, in one piece, separate from the rest of the case, and holding them in place by recesses and projections, or analogous contrivances, substantially as described; the whole being to enable me to entirely dispense with the use of the screws, or screws or nuts, in the construction of a railway car axle box, and thereby avoid not only the injurious consequences which frequently result from their becoming loose, but also the necessity of that care and attention on the part of the carman or attendant so necessary when boxes are used having any of their parts secured by screws.

OLIVER N. FRENCH.

No. 8221.—*Improvement in Carriage Springs.*

What I claim as my invention, and desire to secure by letters patent, is the employment of a semi-elliptical spring, F, G, in combination with a C-spring, H, formed by the extension of one of the arms, G, the combined springs thus produced being set transversely with the axle, and attached thereto, and the body of the vehicle, in the manner substantially as shown and described.

GUSTAVUS L. HAUSSKNECHT.

No. 8222.—*Improvement in Buggy Tops.*

What I claim as my invention, and desire to secure by letters patent, is the mode of connecting carriage tops with the seats by means of bearers, D, and clasp, F, so that they may with facility be removed from one carriage body and applied to another, in the manner substantially as described.

HARMON HIBBARD.

No. 8223.—*Improvement in Fire Proof Safes.*

Having thus described the nature of my invention, what I claim as new, and desire to secure by letters patent, is the combination of wrought and cast iron, the same forming a safe, in the manner and for the purpose substantially the same as described.

LEWIS LILLIE.

No. 8224.—*Improved means for adjusting the effective length of Bridge Counter Braces.*

What I claim as my invention, and desire to secure by letters patent, is the method of lengthening or shortening the counter braces of a girder or bridge truss, so as to produce and maintain any desired, vertical strain or deflection of the girder or truss by means of the counter brace, H, whether all of wood or provided with a metallic end or sheath, the plate of metal, *b*, bearing upon the metallic end or sheath, (or upon the end of the wood when the metallic end or sheath is not used,) at the top of the girder, and the nuts, and the bolts, *e*, *e*, passing through the clamping pieces, *c*, *c*, the upper cord and the posts, by which the plate of metal, *d*, is drawn down upon the metallic end or sheath, and the adjustment of the length of the counter brace is effected, substantially as herein described.

D. C. McCALLUM.

No. 8225.—*Improved Rake to Harvesting Machines.*

Having thus described the nature and construction of my harvesting apparatus, what I claim therein as new, and desire to secure by letters patent, is the guide, (*p*, *q*, *r*, *s*,) arranged, as described, in connexion with the tilting roller, (*u*,) for the guidance of the rake in a path similar to that which it would receive from the human hand, by which it removes periodically the grain or grass from the bed, and frees itself by the retraction of the teeth of the rake endwise.

SYLVANUS MILLER.

No. 8226.—*Improved arrangement of the Flues and Water Spaces of Steam Boilers.*

I do not mean or intend to limit myself to the precise form of construction herein set forth, as it is obvious that, if desirable, the flues (*c*) and (*d*) may be placed vertically, and the others may be horizontal.

What I claim as of my own invention, and which I desire to secure by letters patent of the United States, is the general arrangement of the tubes and flues of the boiler in the manner described—that is to say, the water tubes, connected with an upper and lower tube sheet, in combination with the flues of less length than the tubes, which flues are also connected with an upper and lower flue sheet, whereby two horizontal flues are formed in such connexion with each other, by means of the vertical flues, that the product of combustion from the fire-place shall pass into the upper horizontal flue, and thence down the vertical flues into the lower horizontal flue, having thus the facility of parting with its heat on the one hand by radiation though the flues to the water spaces surrounding them, and the other through the tubes to the water circulating through those—and this whether the said tubes and flues are placed vertically or horizontally; the whole being constructed and operating substantially as herein set forth.

W. E. MILLIGAN.

No. 8227.—*Improvement in Machines for splitting Leather.*

I do not claim as my invention, in connexion with the upper feed roller, the use of a lower one, such as is usually termed a spring or pressure roller, or one having a hard or practically inelastic surface.

But what I do claim as my improvement in machinery for splitting or dressing wet hides is the employment of an elastic surface roller, (or roller made of gum-elastic, or other like material, placed around an axle, or shaft,) and an inelastic roller, (as feed rollers,) in connexion with the cutting-knife, made either stationary, or, what is better, to have a vibratory or reciprocating motion, all substantially as hereinbefore specified.

WILLIAM PANTON.

No. 8228.—*Improvement in Molasses Gates, or Faucets.*

What I claim as my invention is the arrangement of the spring, which bears the gate against the seat, (said spring being arranged so as to bear against the outer edge, instead of the central part of the gate,) in connexion with making the said gate separate from the lever, and to work on a projection or screw therefrom, essentially as specified.

ERASTUS STEBBINS.

No. 8229.—*Improvement in Revolving Breech Fire Arms.*

What I claim as of my own invention, and desire to secure by letters patent of the United States, is the arrangement for securing the barrel to the stock, viz: the combination of the stud *(c)* with the notch in the back strap *(f)* and with the notch *(d)* and pin, *(i,)* as described, the whole being constructed and operating substantially as set forth herein.

JAMES WARNER.

No 8230.—*Improvement in Machines for sawing and dressing Staves.*

I do not claim the use of a cylindrical saw, H, as such has frequently been used; but what I do claim as my invention, and desire to secure by letters patent, is the employment of the saw, H, seated loose upon a pulley, G, so as to form an eccentric position with the same, as specified,

in combination with the cutters, L, L, the several parts constructed and operating together, for the purposes set forth, substantially as shown and described.

DENNISON WOODCOCK.

No. 8231.—*Improvements in Brick Machines.*

Having thus fully described the nature and construction of my improvements in brick machines, what I claim therein as new, and desire to secure by letters patent, is the block, or lip, *(d,)* substantially as described, hugging closely the mould wheel immediately behind its point of contact with the pressure roller, in order to prevent any disturbance of the mass after having passed the point of contact.

JOHN J. RIDDLE.

No. 8232.—*Improvement in Combined Fountain and Evaporator.*

Having thus described my invention and improvement of a self-supplying evaporating fountain, what I claim therein as new, and desire to secure by letters patent, is constructing a vase, or other like article, with two apartments, or chambers, B, C, having a continuous as well as a periodical communication with each other, by which it is rendered a self-supplying evaporating fountain, the continuous communication of the lower chamber, C, with the upper apartment, B, or evaporator, being effected by the pressure of steam upon the surface of the water in the lower chamber, and the periodical communication, by means of the valve, H, secured in the screw nut, F, which will be opened by the pressure of the accumulated water in the upper apartment when relieved of the pressure of the steam in the lower chamber, as fully described and represented.

GEO. H. THATCHER.

No. 8233.—*Improvements in mode of changing Reciprocating into Rotary Motion.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The employment of curved or inclined forks, D′, D², and E, E², having a reciprocating rectilinear movement, operating on or operated by cams, *a*, *b*, *c*, in the manner and for the purposes herein set forth.

Second. The use of cams, *a*, *b*, *c*, constructed or attached so that they may be turned or set in order to produce a change in direction of the motion, and acting in connexion with forks, D′, D², and E, E², (or their equivalents,) substantially for the purposes expressed, as shown and described.

JOEL V. STRAIT.

No. 8234.—*Improvements in Hanging Carriage Bodies.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the manner, herein described, of raising the body on to the springs, or lowering it on to the reaches, as may be desired, and for the purposes herein fully set forth.

JOHN JONES.

No. 8235.—*Improvement in Buffing Apparatus for Daguerreotype Plates.*

We do not claim heating the buffer, as that has been done by lamps operating on the plate on which the buffing material is stretched; but in that form the heat is uneven, and the vapor from the spirit lamp is liable to come in contact with the buffing material. But what we claim as new, and of our own invention, and desire to secure by letters patent of the United States, is the enclosing drum, constructed with the sliding segment or cover, (*g*,) flanch, 12, and lip, 11, sliding in the grooved plate, 10, and retained by the spring, 13, for the purpose specified, in combination with the drum, *m*, and pipe, *n*, to pass the heat from a spirit lamp, or other heater, to the drum, *m*, for the purpose of heating the buffer, the drum, *m*, being fitted with a pipe, or other means, to pass any vapor from the spirit lamp, outside the case enclosing the buffer, substantially as described and shown.

WM. LEWIS,
W. H. LEWIS.

No. 8236.—*Improvements in Hanging Carriage Bodies.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is—

First. The combination, herein described, of the turning compensating plate, M, with the rock shaft, B, C, and the connecting rods, N, for the purpose of equalizing the action on the helical spring, I.

Second. I claim the stop lever, P, in combination with the turning plate, M, used in fastening down the body, substantially in the manner herein described.

Third. I claim the stays, O, O, for the purpose of keeping the axle trees in their true set or upright position, as herein described and fully set forth.

JOHN JONES.

No. 8237.—*Improvement in Faucets.*

What I claim, therefore, as my invention, and desire to secure by letters patent, is the application of a hollow conical packing around the waist of the valve stem, in combination with an open space between its lower end and the stem, the interior of the tubular projection being smooth, or of such form as to allow a tight joint between it and the conical packing, substantially as above described.

CHARLES W. STEARNS.

No. 8238.—*Improvement in Saddle Trees for Harness.*

I do not claim as my invention the yoke, the terrett, or the pad iron, separate from each other; but what I do claim as my invention, and wish to secure by letters patent, is the combination and arrangement of the yoke, the terrett, and the pad iron, in such manner that the pad iron may be adjusted at any angle required for use, and immediately secured firmly in its place by a screw on the terrett iron, passing through the yoke into the pad iron, substantially as shown in the drawings and herein set forth.

JAMES A. LAWRENCE.

No. 8239.—*Improvement in Pumps for Raising Water, &c.*

What I claim as my invention or improvement, is as follows: I claim the rod, H, and its arms, or other equivalent contrivances, and its valve collar, as applied to or combined with the rod, F, of the lower box, and the valve or valves made to operate therewith, substantially as above set forth.

JOSEPH F. FLANDERS.

No. 8240.—*Improvement in Cloth Folding Machines.*

What we claim as our invention, and desire to secure by letters patent, first, is the measuring and folding of cloth, paper, and other articles, by means of two revolving cylinders, each of which is provided with a tongue and jaws, the tongue to feed the cloth into the jaws, which seize it and form the fold, and deliver it upon the table, leaving it properly measured and folded.

D. R. AMBROSE,
O. L. REYNOLDS.

No. 8241.—*Improvement in Flour Bolts.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the combination and arrangement of the inclined boards, I, with a case of graduated screens, constructed and arranged substantially as herein described and represented, and for the purpose specially set forth.

SAMUEL COOK.

No. 8242.—*Improvement in Parlor Cooking Stoves.*

Having thus described my improvements in parlor cooking stoves, I shall state my claim as follows: What I claim as my invention, and desire to have secured to me by letters patent, is the arrangement of flues, as herein above described, about the oven of a parlor cooking stove, by which the heat, smoke, &c., are first made to pass over the top of the oven, and then down the passage formed between the front side plate and the side of the oven, across the bottom of the oven up through the passage formed, between the rear side plate and the other side of the oven, and finally out through the smoke-pipe, the heat, &c , being made to pass to the part of the oven most remote from the fire chamber by the partitions, *w*, *w*, *x*, *x*, on the top and bottom of said oven, substantially as herein above described.

N. A. BOYNTON.

No. 8243.—*Improvements in Mills for Grinding Corn and Cobs.*

What we claim as our invention, and desire to secure by letters patent, is the chopping and feeding apparatus, constructed and operating as herein described, in connexion with a grinding apparatus.

We also claim the recess (p) in the concave, which prevents the escape of fragments when struck by the teeth of the cylinder.

SIDNEY A. BANTZ.
WILLIAM ANDREW.

No. 8244.—*Improvements in Carriage Springs.*

Having thus fully described my improved spring reaches for carriages, what I claim therein as new, and for which I desire to secure letters patent, is the combination of the rockers and spring bars of a carriage, substantially as herein set forth, and for the purposes described.

M. G. HUBBARD.

No. 8245.—*Improvements in Stave Dressing Machines.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the arrangement for starting each stave, or introducing it to the feed at the proper moment, consisting of the wheel, k', with its stud, k'', the bent lever, l, the pitman, l', lever, l'', shaft, l''', lever, l'''' sliding rod, m, spring, m'', and adjustable starting bar; in combination with the apparatus for giving the reciprocating motion to the jointing cutters, so that the greatest width of the stave may be given on different lengths of staves, uniformly at the middle, or such other point as may be desired; the whole being combined, arranged, and operated in the manner substantially as herein specified.

WM. HAWKINS.

No. 8246.—*Improved Machine for dressing Boot Forms.*

What I claim as my invention is the circular motion of the cutters attached to one end of a lever, the other end being so confined on the opposite side of the boot form as to allow the cutters to play up and down, and dress one or both sides of a boot form at a time, as herein set forth.

JOSEPH BURGESS.

No. 8247.—*Improvement in Feather-edging Gauges for Shoemakers.*

What I claim as my invention is the arrangement of the adjustable gauge rest, the pressure roller, and knife, or cutter, in the case, or handle, substantially as described, and so as to constitute a tool for feather-edging or reducing soles of shoes, as specified.

JACOB JENKINS.

No. 8248.—*Improvement in Bran Dusters.*

I do not claim exclusively the employment of intermediate vanes acting in connexion with the brushes on the reel for forming a blast, as such has already been used; but what I do claim as my invention, and desire to secure by letters patent, is the employment of adjustable vanes, which may be set in or out, and obliquely, in direction of their length, or be set either way only, as described and represented by the vanes, lettered f, g, in the drawing, such adjustable vanes acting in combination with the brushes on the reel, for the purposes and in the manner substantially as set forth.

S. W. KIRK.

No. 8249.—*Improvement in dyeing Door Mats.*

What I claim as my invention, and desire to secure by letters patent, is the coloring of borders and figures in a variety of colors and forms upon the wool of lamb-skins and skeep-skins for mats, and other similar purposes, by the use of pans, (which are to contain the dyes, being made and shapened in the form of the borders or figures designed to be colored,) in combination with the matching tin or form, fig. 2, or an equivalent device, for parting the wool, substantially in the manner and for the purpose herein set forth.

REUBEN SHALER.

No. 8250.—*Improved method of liberating Metal Tubes from forming Mandrel.*

Having now described the nature of my invention, and in what manner the same is to be performed, I wish it to be understood that I do not claim the exclusive use of the rolls for cross rolling, hereinbefore described and represented, except when the same are employed in the manufacture of pipes or tubes of copper, brass, or other alloys of metal, as herein described, to be used as the flues of steam boilers.

But what I do claim in the manufacture of pipes, or tubes, of brass, copper, and alloys of metal, for the use of the flues of steam boilers, by rolling hot on a mandrel, whether parallel or taper, is the enlarging of them by means of cross rolling, as above described, for the purpose of extracting the mandrel.

JOB CUTLER.

No. 8251.—*Improvement in Oil Cups for Journal Boxes.*

I do not confine myself to any form of valve or spring, but what I claim as my invention, and desire to secure by letters patent, is the employment, within the mouth of an oil cup, of a valve, B, operated upon by a spring, C, or its equivalent, in the manner and for the purpose substantially as herein described.

AARON RICHARDSON

No. 8252.—*Improvement in Fly Traps.*

What we claim as our inventions, and desire to secure by letters patent, are the tube, C, in combination with the glass, B, and the bottom, A, and rod, F, for the purpose above described, meaning to vary the construction while keeping the fixture substantially the same.

We also claim the ring, H, which is to close the apertures in the bottom, at E, for the purpose which it is applied, or anything similar in ts application.

HARVEY SNOW,
LUTHER T. SMART.

No. 8253.—*Improved Cut-off Gear.*

The arrangement of the lifting rods, and the method of operating them by the disk plate, as represented in the accompanying drawings, is peculiarly suited to this method of effecting the disengagement of the valves from the mechanism by which they are opened, for the disk plate imparts a transverse motion to the connecting rods, which causes them to rock upon the stops, and thus slide off their respective toes on the rock-shaft arms. But while I prefer this arrangement of eccentric gear, I wish it to be understood that I do not restrict myself to its employment, as my improvement may be applied to many other systems of mechanism by which valves are opened. As such systems may not possess the peculiar rocking motion I have mentioned, it will be necessary, in some cases, to disengage the lifting rods by a positive movement, which may, at the proper moment, be imparted to the lifting rods by some moving member of the engine, through the combination of any convenient and suitable mechanical device.

In combination with the reciprocating motions communicated to the lifting rods by the eccentric gear, I claim imparting a lateral movement to the free extremities of said lifting rods, to disconnect them from the valves and permit the latter to close, to cut off the steam or other expansive fluid by which the engine may be driven; whereby these rods are made to perform their usual duty of opening the valves, and, in addition, that of catches or latches in alternately connecting the valves with, and disconnecting them from, the mechanism by which they are opened, thus greatly simplifying the construction of the valve gear, rendering the same more durable and less liable to get out of order.

GEORGE H. CORLISS.

No. 8254.—*Improvements in Flexible Fences.*

Having thus fully set forth and described the nature of my invention, and its practical operation, I do not claim any particular form or construction of a post in connexion herewith, the same not being essential, nor whether the same be of wood or any other substance, (I having heretofore invented a metal post, being a convenient device to use in connexion herewith.)

But what I do claim as my invention, and desire to secure by letters patent, is the form and construction of the two concave plates, with pins near their open ends, forming one coupling-cap, or clasp, for the purpose of uniting together the upper bars of fence, or railing, whether the same be of wood or metal, and also of securing the same by the use of a pin, with a screw thereon, or other device, on the top of a post, in the manner and for the purpose as herein described.

And, in connexion therewith, I claim perforating the bars, or rails, with conical, tapering holes, mortises, or orifices, for the insertion of pickets, or banisters, in the manner and all for the purpose as is herein substantially set forth and described.

MATTHIAS P. COONS.

No. 8255.—*Improvement in Cast-iron Car Wheels.*

What I claim as my invention, and desire to secure by letters patent, is—

First. A cast-iron car wheel, made with a hollow, chilled rim and hollow spokes, in the manner and form herein set forth.

Second. The method of forming wheels for railroad cars, by casting the rim and spokes upon a grooved hub, which has been formed separately, as herein described.

THOMAS J. EDDY.

No. 8256.—*Spring expanding Swage for Boiler Tubes, &c.*

What I claim as my invention, and desire to secure by letters patent, is an expanding swage, constructed as herein set forth, and consisting essentially of radiating sections, which are connected with each other, and to a common centre, by spring shanks, as herein described.

JAMES McCARTY.

No. 8257.—*Improved Powder-proof Bank Lock.*

Having thus described my improvements in locks, I shall state my claim as follows:

What I claim as my invention, and desire to have secured to me by letters patent, is moving the key bit to the tumblers, by means of a follower sliding between the walls, as herein described, which follower acts in such a manner as to close the space into which powder might be introduced, where this is combined with a keyhole cover, sliding as described, by which combination I make a powder-proof lock, with tumblers, which cannot be reached by a pick, and whose slide cannot be blown off so as to secure access to the tumblers.

I also claim the combination with the plate, a', a', of the transverse, sliding, vertical slotted plate, c', c', which, jointly, cut off all communication with the tumblers in every position of the bolt.

WM. HALL.

No. 8258.—(Suspended.)

No. 8259.—*Improvement in Window Sashes.*

Having thus fully described my improved method of setting glass, what I claim therein as new, and for which I desire to secure letters patent, is fastening the bars of two parts, as herein described, by binding them together by a screw at the junction of their ends, their opposite ends being hooked into the frame of the sash, substantially in the manner and for the purpose set forth; and, in combination with this device, I claim the elastic bed for the glass to rest against, as above specified.

SEWELL SHORT.

No. 8260.—(Suspended.)

No. 8261.—*Improvement in Machines for grinding Flock.*

I do not limit myself to grinding or cutting flock, but any article to which the machine can be advantageously applied.

I claim a cylinder or drum, with knives or beaters attached, extending its length; said knives being set at an oblique angle, both with the radical lines and the axis of the drum, in combination with an outer cylinder, within which the drum revolves; the outer cylinder also revolving in an opposite direction, and having on its inner surface, at intervals, knives extending its length; the said knives being parallel with its axis, but oblique to its radius; said outer cylinder also having, in the intervals between its knives, panels, containing projecting ribs oblique to its axis, and so arranged that the action of the revolving knives, upon any material lying between the ribs, shall gradually carry it from the inner to the outer end of said cylinder; thus subjecting the material to repeated cuttings between the revolving knives, substantially as set forth in the above specification.

I claim the method of constructing the outer cylinder of alternate panels—the *one* set being permanent, and having on its inner surface oblique ribs; the *other* set being movable and adjustable (these panels are called cross-bars in above description,) by screws and springs, and having on its inner surface oblique knives; the fixed panels being connected with an outer and concentric ring of metal by chambers or passages, the same being in combination with another cylinder or ring of metal, within which it fits and revolves; which last ring has a hopper upon it to receive the material to be operated on, opening into the said chambers or passages, and by them into the cylinder containing the knives, substantially as set forth in the above specification.

I claim the combination of outer and inner rings, with the inner and outer revolving cylinders, and their knives and ribs, making a machine for grinding flock or any other material, substantially as set forth and described in the above specification.

JOHN C. FONDA.

No. 8262.—*Improvements in Knitting Machines.*

Having thus described my improvements, what I claim as new therein, and desire to secure by letters patent, is:

First. The sliding, independent yarn carriers, each governing an independent thread for each needle, substantially in the manner and for the purpose as described.

Second. I claim operating the yarn carriers simultaneously by means of the conical ring, (U',) working in the inclined slit in the carriers, substantially as set forth.

JOHN HENRY BARSANTEE.

No. 8263.—*Improvements in Stoves with Portable Ovens.*

Having thus described my improvements in the portable oven for cooking stoves, what I claim therein as new, and desire to secure by letters patent,

is in combination with a portable oven. I claim the permanent damper plate or shut off, M, which forces the heat and smoke, after striking against the bottom of the oven, to pass up the front flue and over the oven, and then down the back, passing down behind the permanent damper plate or shut-off, M, and out through the ordinary draught or top flue, B, of the stove, being so simple in its construction that it may be made by an ordinary tinman to suit any ordinary stove, as described and represented.

GEO. H. THATCHER.

No. 8264.—*Improvement in Seeding Apparatus of a Seed Planter.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the measuring seed roller with the distributing seed roller, the two being arranged and operated in the manner and for the purpose herein described.

DAVID HORNER.

No. 8265.—*Improvement in Machines for preparing Hubs for the reception of Boxes.*

What I claim as my invention, and desire to secure by letters patent, is the sliding shaft, with the slot, marked 4, passing longitudinally into the mandrel, together with the screw thread cut upon the mandrel to feed the knives, and the knives, which are so adjusted as to act at both ends at the same time, and also cross-stays, similar in construction (which may be formed of wood) to those marked 1 and 2, in the above description, which are intended for the purpose of fastening and truing the hub; all of which will appear by the above description, except the cross-stays, for the purpose of securing and truing the hub during the process of boring.

HENRY MOORE.

No. 8266.—*Improved Fittings for Boats, to facilitate the discharge of Cargo, &c.*

I am aware that vessels have heretofore been constructed with permanent cargo decks, placed at a distance from the bottom of the vessel, and provided with hatchways, through which cargo in bulk could be dropped into cars, arranged to run upon railways secured to the bottom of the vessel; but such decks are expensive in the first instance, are not so well adapted to the unlading of cargo in bulk, and are not susceptible of removal and replacement to fit the vessel, alternately, for carrying cargo in packages and cargo in bulk. These or other objections have proved to be so serious that this mode of fitting up vessels has not been adopted to any extent, and I make no claim to it, my invention being limited to a deck of narrow sections, and wholly removable; therefore,

What I claim as my invention, and desire to secure by letters patent, is the cargo-deck, formed of loose, narrow sections, so that it may be removed to adapt the vessel to carrying cargo in packages, or may be put in place to facilitate the unlading of cargo in bulk, in combination with the railway on the floor, for transporting the lading to the point whence it is removed from the hold.

WM. H. BRYAN.

No. 8267.—*Improvement in Machines for preparing Hubs for Boxes.*

Now, what I claim as new, is the combination of the movable cutters with the saws and small pins, arranged and operating substantially in the manner and for the purpose herein described.

I do not claim the cutters singly, or the arbor or disk, or the saw, such things having been used separately before.

WM. R. JONES.

No. 8268.—*Improvement in Tight Joint for Tuyers.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the combination of the inner and outer beads on the top plate, between which is placed clay or other plastic material, and the grooves in the edges of the sides of the tuyer, for the purpose of making an air-tight joint; the whole being secured by bolts, with a projection upon them, catching over a cam cast on flanges, on the under plate, as herein described and represented.

WM. GRAHAM.

No. 8269.—*Improvement in Brick Machines.*

Having thus described my improvements, what I claim as new therein, and desire to secure by letters patent, is, *first*, the arrangement of the apparatus for moving the moulds and the pressing apparatus, all constructed substantially as herein described, and worked by the revolving shaft, in the manner and for the purposes set forth.

LUTHER BROWN.

No. 8270.—*Improvement in Grain Winnowers and Separators.*

I claim the elevator, constructed substantially as herein set forth, with oblique plates or blocks, to support the straw and facilitate the separation of the grain.

I also claim the arched grating, in connexion with a blast, to effect the separation of the lighter impurities from the grain.

I likewise claim the arrangement, substantially as herein described, of the air-chamber between the fans, the suction-pipe, to supply the chamber with air, and the spout, to conduct the once winnowed grain from the screen into the lower extremity of the suction-pipe, to be winnowed a second time by the entering current of air; whereby the grain is subjected to the full force of two independent blasts, acting consecutively, which insures its effectual winnowing, as herein set forth.

A. B. CHILDS.

No. 8271.—*Improvement in Brick Machines.*

First. What we claim as our invention, and desire to secure by letters patent, is the arrangement of mechanism, substantially as herein described, viz: the toothed wheel, M, and the cams, *h*, and *i*, operated by the changing gear, or the equivalent thereof, connected with the mill, so as to be moved alternately back and forth, for the purpose of operating

the mould carriage and the pressing piston, P, substantially in the manner herein set forth.

Second. We also claim the adjustable rod, S, or its equivalent, connected with the piston-rod, R, for the purpose of acting upon the catch lever, K², or its equivalent, so as to disengage the weigh, C, or its equivalent, by which the operating machinery is thrown out of gear, for the purpose of arresting the pressing motion as soon as the piston has been depressed far enough to fill the moulds.

Third. Is the circular projection, V, or its equivalent, upon the wheel, L, to throw the wheel, L, out of gear, and stop the moulding apparatus while the grinding proceeds.

JAMES DANE,
DARIUS HEALY,
GARY CUMINGS.

No. 8272.—*Improvements in dressing Mill-Stones.*

Having thus fully, clearly, and exactly described the nature, construction, and operation of my invention—being an improvement in dressing mill-stones—what I claim therein as new, and desire to secure by letters patent, is the dress given to mill stones, according to the definite and fixed rule described in the foregoing specification, and illustrated in the drawing by the furrows (*a*) (*b*) (*c*) of each quarter.

I also claim diminishing the draught of the runner and increasing the number of the quarters, in comparison with that given the bedstone, for the purpose of giving the furrows of each stone, as determined by the rule laid down in the specifications, a shears-motion upon each other.

MORE HOLDIN.

No. 8273.—*Improved Water-Level Indicator for Steam Boilers.*

What I claim as my invention, and desire to secure by letters patent, is the connecting the ordinary float, placed within a steam boiler, with an index placed on the outside of the same, through the medium of the valve of a gauge-cock, by which I am enabled to remove any impurities which may at any time hinder the effective action of the float, substantially as herein set forth.

ALBERT H. JUDD.

No. 8274.—*Improvement in Shutters for Shop Fronts.*

Having thus fully described my improved shutter, what I claim therein, is, in combination with the sliding shutter, substantially as above described, the door by which it is fastened, and which permits it to slide back.

JAMES ROOT.

No. 8275.—*Improvements in Metallic Alloy Paints.*

Having thus described my invention, what I claim as new, and desire to secure by letters patent, is making paints out of metallic antimony, whether prepared separately or combined with other metals, to form alloys suitable for making paints, substantially as herein set forth.

I also claim combining antimonial alloys with oxide of copper, to constitute, with the painting vehicles herein specified, the exterior coatings for ships' bottoms, for the purpose of more effectually defending them against the adhesion of shells and weeds, substantially as herein set forth.

CHARLES WETTERSTEDT.

No. 8276.—*Improvement in Hot Air Furnaces.*

What I claim as my invention, and desire to secure by letters patent, is the employment of a flue or chamber, J, having a valve, *b*, and apertures, *a*, *a*, *a*, in combination with an internal flue, K, constructed and operating substantially as shown and described, for the purposes set forth.

JOSEPH C. TREAT.

No. 8277.—*Improvement in quadrant-hinged Grates.*

Having thus described my improvement in the quadrant-turning grate, I wish it to be understood that I do not claim a grate turning upon pivots, projecting from its upper front corners in such a manner that, when it is desired to discharge its contents, the lower rear portion will be made to recede from the back wall, while the front portion of the grate will project frontward beyond the breast of the chimney, and the contents discharged therefrom upon the hearth; but what I do claim as new, and of my own invention, and desire to secure by letters patent, is suspending the quadrant grate by pivots, B, projecting from the ends thereof, near the centre of the circle of the grate, in such a manner that, when it shall be desired to discharge the contents from the grate, its rear and lower portion will be made to recede from the back wall, C, and rise in the throat of the chimney; and thus the contents will be discharged into the rear portion of the fire-place, and the dust carried directly up the chimney; and the grate moving outward having to drag through the accumulated coal ashes, &c., in the fire-place, as described.

I also claim the combination of the guard plate, G, with the quadrant grate; said guard plate projecting from the back of the fire-place horizontally above the lower rear edge of the grate, and vertically within the ends of the same, for the double purpose of forming a support for the fire brick, or back of the grate, and protecting the inner edges of the bottom and ends of the grate, and preventing it from being opened by the lumps of coal that would otherwise fall between its edges and back wall, and force the grate open as described.

GEORGE H. THATCHER.

No. 8278.—*Improvement in Shuttle Motion of Looms.*

What I claim as my invention, and desire to secure by letters patent, is operating the picker-staff, or staves, H, by a cam or cams, M, upon a shaft, K, hung in bearings, L, attached to the lay, and carrying a ratchet

wheel, N, which receives motion at suitable intervals through an arm, Q, worked by the same motion which operates the lay, substantially in the manner herein described.

GEORGE J. WARDWELL.

No. 8279.—*Improvement in Machines for taking Ayes and Noes.*

Having thus fully described my improvements, what I claim as new therein, and which I desire to secure by letters patent, is the peculiar form and action of the springs, which carry the pencil by which a draw mark is made, without risk of breaking the point.

G. WM. YERBY.

No. 8280.—*Improvement in working clay for Pottery and other Ware.*

It will be seen that my process of heating clay while working is equally applicable to making bricks, pottery, clay retorts, and every article of clay goods; and, consequently, no machinery or heating apparatus can be described or shown, as it must be varied according to the particular manufacture; and I do not mean to limit myself in this particular, but to use such means as may be best adapted to heating and working the clay for the particular purpose; nor do I mean to limit myself to the precise temperature of the clay, as that must be regulated by the kind of clay, and the condition of the atmosphere, but to work the same at or about the boiling point of water; neither do I mean to limit myself to any peculiar clay, compounds of clay, or mixtures of clay and other substances.

Therefore, what I claim as my invention, and desire to secure by letters patent of the United States, is the application of heat to clay during the process of mixing, working, or tempering the clay; so that it is raised to a heat at or about the boiling point of water at the time of moulding or forming the same, substantially as described and shown.

JOHN AKRILL.

No. 8281.—*Improvement in Looms for weaving Pile Fabrics.*

Having thus set forth the principle of my invention, and the manner of constructing and using the same, I wish it to be understood that I do not limit myself to the special construction and arrangement of parts herein specified, as these may be varied without changing the principle or mode of operation.

What I claim as my invention, and desire to secure by letters patent, is the employment, on one or both sides of the loom, of two carriers, to which the figuring wires are secured, and two guides, substantially as described, and operated alternately; the said carriers having a motion towards and from the selvage of the cloth, to draw out and insert the wires, and, together with the guides, a motion towards and from the lay, to carry the wires from the woven pile to the open shed, and back, as described.

And I also claim, in combination, giving to the guides a vertical movement, after the wire has been drawn out, to admit of their passing each other, substantially as specified.

JOHN JOHNSON.

No. 8282.—*Improvements in Sewing Machines.*

Having thus fully described our invention, what we claim therein as new, and desire to secure by letters patent, is—

First. The combination and arrangement of the pitman, driving-bar, shuttle, and adjustable set screw, for the purpose of allowing the pitman a continuous motion, whilst the shuttle-bar and shuttle is momentarily stopped, to allow the needle to draw up the stitch, as herein described and represented.

Second. We claim bringing up the needle with a sudden jerk, after the stitch is formed, for the purpose of tightening up the stitch, after the manner of hand-sewing, and adjusting the same to any thickness of material to be sewn.

WILLIAM H. AKINS,
J. D. FELTHOUSEN.

No. 8283.—*Improvements in Looms for weaving Cut Pile Fabrics.*

Having thus described my invention, I do not mean to limit myself to this particular method and construction described, but to the characteristics or principles of the operation—for instance, in proper construction of a loom, there would be necessary a pair of fingers, or shields, on each side of the cloth, and it might be found advisable to make a movement of the fingers, or shields, only when a shuttle was thrown from the respective side. This could be done by connecting the movement of the shield to the cam-shaft.

What I claim as my invention, and desire to secure by letters patent, is—

First. The use in looms of a finger or shield, which shall be introduced between the warps, for the purpose of bringing the warp threads at the edge of the cloth in such a position that the filling yarn will be drawn in to form a smooth selvage, substantially as described.

Second. The use of hooks formed on the intersecting plates, or their equivalents, which shall hold the filling thread from returning towards the reel, substantially as described.

M. C. BRYANT.

No. 8284.—*Improvement in Brick Machines.*

What I claim as my invention, and desire to secure by letters patent, is the placing the auxiliary pressure roller, *p*, or its equivalent, between the main roller, B, and the knife, *n*, for the purpose of subjecting the surplus clay, after it is elevated above the tops of the moulds, to the action of pressure before moving the same by the said knife, substantially as herein set forth.

I also claim the subjecting the upper surface of the clay in each mould to a rubbing pressure by means of a plate, *m*, or its equivalent, placed above the tops of the moulds, in combination with some mechanical device for forcing up the movable bottoms of the said moulds whilst passing under the said plate, substantially in the manner and for the purpose herein set forth.

ISAAC GREGG.

No. 8285.—*Improvement in Printing Presses.*

What I claim as my invention, and desire to secure by letters patent, is—

First. Giving to the platen a rotating reciprocating motion, which enables it to assume the two positions of receiving the sheet and the impression alternately, when operated by the cam, sectional arm, and its own segment, geared with the segment of the sectional arm, by giving to it the movement described of an arc of the circle when traversing from one of these positions to the other.

Second. I claim affixing the vibrating bed on its own axis, so that it may recede into the proper position for receiving the inking rollers for inking the form, and become perpendicular and directly face to face with the platen, when the toggle is straight, for the purpose of giving the impression.

Third. I claim the arrangement of two side arms so combined as to form a frame to hold and carry the inking rollers, and giving to them the motion, both forward and backward, over the form for each impression during the rest of the other parts, whether the same be done in this precise manner, or equivalents, to produce a like result.

Fourth. I claim the grooved cam shaped arms or guides, or their equivalent, for the purpose of carrying the frisket in the right direction, and holding it in the desired positions during the intervals of rest given to the platen—that is, opening it to relieve the printed sheet, and holding it open to lay the succeeding sheet, and closing it firmly against the platen to grip the sheet, and holding it closed until the bed has moved forward, given the impression, and receded to its original position.

Fifth. I claim the combination of the bed vibrating on its own axis with the roller frame, composed of two arms, substantially as herein described and set forth.

GEO. P. GORDON.

No. 8286.—*Improved Spring Bolt.*

What I claim as my improvement is the combination of the lever with the spring bolt, and its case, so as to operate therewith, substantially in the manner as specified.

OLIVER H. BUSH.

No. 8287.—*Improvement in Machines for cleansing Wool.*

I do not claim either of the parts of the apparatus, as such, as my invention; but what I claim as my invention, and desire to secure by letters patent, is the combination of the tub, C, with the shaft, E, and tube, F, when these are combined with the vat, A, (with its trough, *a*, and *a'*,) and the whole is constructed, arranged, combined, and operated substantially as herein described, for the purpose of cleansing or for coloring wool and other analogous substances, as herein described.

L. W. BOYNTON.

No. 8288.—*Improvements in Machines for Jointing Staves.*

What I claim as my invention, and desire to secure by letters patent, is combining with the adjacent ends of any two plates of the chain the hinged pieces provided with self-acting toes, for clamping the stave while it is being jointed, and then releasing it, substantially in the manner and for the purpose described.

LEWIS S. CHICHESTER.

No. 8289.—*Improvements in Spike Machines.*

Having thus fully described my invention, I do not claim the header, N, or the holding die, Q, irrespective of their arrangement and operation; but what I do claim as new, and desire to secure by letters patent, is the arrangement of the carrier, H, within the hollow table, B, substantially in the manner described, and also the combination of a carrier, so arranged with a single griping die, Q, arranged with respect to it in the manner substantially as shown; the die and the carrier assisting each other in holding the spike while being headed.

MARK M. ISON.

No. 8290.—*Improved Water Gauge for Steam Boilers.*

I claim the combination of the glass tube and reservoir of fluid below it, heavier than that contained in its upper part, with the legs of a syphon, so that they become a part of that syphon, substantially as described, by which means I am enabled to protect the glass tube from the heat of the steam and impurities of the water, and also to show at any point above the boiler the height of the water in the boiler.

I also claim the combination with the gauge of the sediment depositor, constructed and arranged substantially as described, for the purpose of preventing the impurities of the water from entering the tube leading to the gauge.

A. S. LYMAN.

No. 8291.—*Improvement in machines for numbering the pages of Account Books.*

Having thus described my new machine, I shall state my claims, as follow:

What I claim as my invention, and desire to have secured to me by letters patent, is—

First. The use of type chains in a machine for printing the pages of account books; and,

Second. A machine for paging account books, having the essential elements hereinabove described, viz: the imprinting cylinders and rollers, against which they bear, together with the type chains, arranged together substantially in the manner hereinabove described.

JOHN McADAMS.

No. 8292.—*Improvement in the manufacture of Pigments.*

I am aware that a mixed chloride and oxide of lead has been long known, under the name of "Turner's Yellow," which is made by mixing oxides of lead and common salt.

I therefore do not claim this composition of matter; but what I do claim as my invention is the new manufacture of either a white or colored pigment, by the addition of one half of an equivalent of lime, or other earthy or alkaline base, with one equivalent of chloride of lead, or chloride of lead diffused in water, or however the solution may be obtained; the whole being substantially as hereinbefore specified.

H. L. PATTINSON.

No. 8293.—*Improvement in method of forming Teeth upon Cast Iron Grinders.*

I do not claim the casting of ribs or floats; but what I do claim as my invention, and desire to secure by letters patent, is the mode, herein substantially described, of making or forming teeth or grinders upon surfaces of cast iron, by nicking, craking, or chipping out parts of ribs or floats cast thereon, so as to leave the teeth or grinders projecting, as above set forth.

EZRA RIPLEY.

No. 8294.—*Improvement in Sewing Machines.*

What I claim as my invention, and desire to secure by letters patent, is giving to the shuttle an additional forward motion after it has been stopped, to close the loop, as described, for the purpose of drawing the stitch tight, when such additional motion is given at and in combination with the feed motion of the cloth in the reverse direction, and the final upward motion of the needle, as described, so that the two threads shall be drawn tight at the same time, as described.

I also claim controlling the thread during the downward motion of the needle by the combination of a friction pad, to prevent the slack above the cloth, with the eye on the needle carrier, for drawing back the thread, for the purposes and in the manner substantially as described.

I also claim placing the bobbin from which the needle is supplied with thread on an adjustable arm attached to the frame, substantially as described, when this is combined with the carrying of the said thread through an eye or guide attached to, and moving with, the needle carrier, as described, whereby any desired length of thread can be given for the formation of the loop without varying the range of motion of the needle, as described.

ISAAC M. SINGER.

No. 8295.—*Improvement in construction of Roofs.*

What I claim as my invention is the above-described peculiar arrangement of the arched trusses or framing of my improved roof, in combination with the suspending of both inclined sides of the roof from the ridge timber, so that each inclined side shall be made to counterbalance the other inclined side, and by so doing operate to prevent lateral and horizontal thrust upon the side walls, all essentially as specified.

FRANCIS WILBAR.

No. 8296.—*Improvements in Sewing Machines.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The combination of the rotating hook, to extend the loop on one thread, with a reciprocating bobbin, to carry the other thread through the loop so extended, for the purpose of interlacing the two threads together, whether the parts be severally arranged and operated as herein set forth, or in any other way substantially the same.

Second. The hollow mandrel, constructed substantially as herein set forth, with a groove on its periphery, to give a reciprocating motion to the bobbin, a segmental screw thread, to feed the cloth forward as the sewing progresses, and a hook and groove on its extremity, to form loops on the needle thread, in combination with a reciprocating bobbin; the whole arranged and operating substantially as herein set forth.

ALLEN B. WILSON.

No. 8297.—*Improvement in Shoulder Braces, combined with Abdominal Supporters.*

Having thus fully described the nature of my improvements, what I claim therein as new, and desire to secure by letters patent, are—

Firstly. The bars (*a*) having a common point of junction to a centre bar at the back, passing thence under the armpits, and thence forward, upward, and backward, until their padded extremities bear upon the clavicle; the bar being so formed as to fit snugly without direct pressure upon the body, except at the points at front and back, as herein explained, giving the desired support to the shoulders without unnecessary confinement of the person or obstruction of its various functions, and at the same time affording, through the medium of the bar, (*d, e,*) a firm point of attachment and support for a uterine or abdominal supporter.

Secondly. The jointed bar, (*d, e,*) having pads (*c, c, i, i*) located on each side of the spine, at the junction of the said bar with the braces, (*a,*) (*g,*) the said bar being jointed midways, so as to admit of easy flexion sideways, without compromising the rigidity which is necessary in other directions, and affording, by the limited extent of its pressing surfaces, free scope to the circulation, perspiration, muscular action, and other bodily functions.

JOHN S. DARE.

No. 8298.—*Improvement in ventilating and excluding Dust from Railroad Cars.*

What I claim as my invention, and which I desire to secure by letters patent, is the combination of the blower, bellows, or forcer, with the pipes or tubes for conveying the pure air along the train of cars, the pipes or apertures for the admission of air into the cars, the valves or inverted mufflers for controlling such admission of air, together with the valves and apertures for regulating the atmospheric pressure within the cars, and its escape from them, all as hereinbefore set forth.

RANSOM COOK.

No. 8299.—*Improvement in the manufacture of Brushes.*

What I claim as my invention is the above-described improvement in the manufacture of brushes, the same consisting in laying two or more brush blocks or plates together, or upon one another, and either boring them before or afterwards, and each with the same number of holes, and so that each hole in each block shall be in range with a hole in each of the other blocks, and passing or inserting bunches of bristles through all the blocks, and fastening the ends of said bristles in the last block, through which they are made to enter, and separating the said blocks asunder, and cutting the bristles between the blocks, all substantially as hereinbefore set forth.

ABB'T R. DAVIS.

No. 8300.—*Improvement in Cooking Stoves.*

Having thus fully, clearly, and exactly described my improvements in double oven cooking stoves, what I claim therein as new, and desire to secure by letters patent, are the closed chambers (*l*) and (*m,*) and opening, (*i,*) in connexion with the space between the hearth plate, (*c,*) fire back, (*d,*) and boiler flue plate, (*e,*) and the upper portion of the ovens at their plates, (*f,*) (*g,*) and (*h,*) the whole being arranged substantially in the manner, and for the purposes described.

HOSEA H. HUNTLEY.

No. 8301.—*Improvement in Brick Machines.*

What I claim as new in my invention, and desire to secure by letter patent, is—

First. The mode of controlling the operation of the mould bed carriage, and driving it in either direction by the combination, substantially as described, of the toothed wheel, G, on the mud mill shaft, the rack bars, *k, k'*, and their racks, *l, l*, and arms or ears, *m, m*, attached to the carriage, and the slides, *o*, on the stationary framing.

Second. The mode of operating the cut-off plate, L, L, for the purpose of opening and closing the apertures communicating between the mud mill and the moulds, by means of the levers, N, N', attached to them, and to the framing, in combination with the wheels, *o, o', o'', o'''*, on the mould bed carriage, substantially as herein shown.

RICHARD LONG.

No. 8302.—*Improvement in Cooking Ranges.*

First. I do not claim to be the inventor of brick oven; but what I do claim as my invention, and desire to secure by letters patent, is the attachment of a brick oven to cooking range, to be heated from the same fire with which the cooking is done, as herein described.

Second. I also claim the hot air-chamber, I, at the sides of perpendicular plates, *i*, *h*, and extending as high as horizontal plate, *i*, and all over curved plate, *i*, *i*, and extending all around inclined pipe, F, and perpendicular pipe, *i*, F, and communicating with pipes, J, in the manner and for the purpose herein set forth.

NICHOLAS MASON.

No. 8303.—*Improvement in Chemical Processes for fulling Vegetable and other Textures.*

I may, in conclusion, remark, that the description of the apparatus or machinery and the strength and temperature of the soda or potash, sulphuric acid, or chloride of zinc solution, may be varied to a considerable extent, and will produce proportionate effects without at all deviating from my invention; for instance, caustic, potash, or soda, may be used even as low as twenty degrees, Twaddle's hydrometer, and still give improved properties to cotton, &c., in receiving colors in printing and dyeing, particularly if the heat be low; for the lower the temperature, the more effectively the soda or potash acts on the fibrous material above described: I therefore do not confine myself to any particular strength or temperature of the substances I employ, but the particular strength, heat, and process here described, are what I have found the best, and which I prefer.

And I claim, as of my invention, the process of fulling cotton, linen, and other vegetable fibrous material, either in the fibre or any stage of its manufacture, or either alone or mixed with silk, woollen, or other animal fibrous material, by means of astringent or styptic materials, as set forth.

JOHN MERCER.

No. 8304.—*Improvement in Registers for Omnibus Drivers.*

What we claim as our invention, and desire to secure by letters patent, is the arrangement of a series of doors, with the attachment to the axes or hinges thereof of levers or other mechanism, in such a manner and in such connexion, by means of a rod or rods, and springs, or other suitable contrivance or device, with a dial, or some like mechanism, that each door, upon being opened, will act upon such dial or other mechanism in such manner as to indicate thereon and thereby the number indicated by such door, the several doors indicating different numbers respectively; also the arrangement of a strip of metal or other suitable substance, vertically or in some other position, in connexion with such dial, so that by means of a wedge upon the dial and pins upon the said strip, or *vice versa*, under which, or over which, the wedge successively passes, the said strip will rise or be forced outward from the circumference of the dial a given distance at each revolution of the dial, and indicate, by the figures on the surface of such strip, near the outward or upward end of the same, successively coming in sight above or beyond the circumference of the dial, the number of such revolutions of the dial, using for the construction of the same any metal or metals or other substance of a suitable and durable description.

IRA. B. PERSON,
JOEL L. BROCKETT.

No. 8305.—*Improvement in Boot Crimps.*

What I claim as my invention, and desire to secure by letters patent, is the lever, C, the knob, F, the bolt, G, and the two circular rods, E, E, in combination with each other, and with the other parts of the machine, as described, for the purpose of drawing the corners of the front to their proper place at the same time the brake is passing down over it by turning the screw I; and I make no further claim.

HARTWELL STANLEY.

No. 8306.—*Improvement in Pulp Screens.*

I prefer to have the screen plates, *e*, constructed of brass; the other parts described may be of wood, with the exception of the bellows; but I do not confine myself to any particular material.

Having thus described the nature and operation of my invention, what I claim as new, and desire to secure by letters patent, is the application of the vibrating bottom or bellows, C, to the box, A, A; said box being constructed as described, with the partition, B, and the screen, D, upon its upper surface; by which arrangement the pulp is forced by atmospheric pressure between the plates of the screen upon the partition, B, and off the partition into a receiving box, E, substantially as described.

GEORGE WEST.

No. 8307.—*Improvement in Ships' Model Measurer.*

What I claim as new in my invention, and desire to secure by letters patent, is the employment, for the purpose of taking the dimensions of models of ships and all other vessels, of a pillar or post, A, having a graduated scale, B, on one side, and an adjustable rest, D, sliding on it, and having also a rule, *o*, with any number of graduated scales on its face, and a leg, G, connected with it, both the rule and leg being capable of adjustment in lines at right angles to the face of the pillar or post; the whole being constructed, arranged, and operated in the manner substantially as set forth.

ABIJAH S. HOSLEY.

No. 8308.—*Improvement in process of reducing Ores by Zinc Compounds.*

What I claim as my invention, and desire to secure by letters patent, is the use, in combination, of the several processes described, for the manufacture of zinc white, as a specific means of treating ores containing any number of metals, and separating the metals from each other by virtue of the chemical affinity of zinc, or its oxide for sulphuric acid, as described; and this I claim, with or without the aid of other chemical agents or affinities, substantially as described.

E. LOUIS SEYMOUR.

No. 8309.—*Improvement in Washing Machines.*

Having thus fully, clearly, and exactly described the nature, construction, and operation of my improvements in washing machines, what I claim therein as new, and desire to secure by letters patent, is the chamber or tub, (*d*,) with its narrowed neck, and otherwise constructed substantially as described, in combination with the plunger, (*c*,) which latter, with the clothes wrapped round it, passes through the narrowed neck of the chamber, and. pressing forcibly on the water confined within the body of the chamber, drives it violently in the direction of the arrows and through the body of the clothes, carrying the dirt with it.

DAVID ALLAN.

No. 8310.—*Improvement in Cabbage Cutters.*

Having thus described my improvement on the machine for mincing cabbage, what I claim therein as new, and desire to secure by letters patent, is the two vertical bars, L, L, confined to the sides of the feeding box, E, so as to rise and fall with the movement of the feeder, R; said vertical bars, L, L, having handles, M, by which the operator actuates the feeding box, and, by the same exertion of his arms, renders the material self-feeding simultaneously with the reciprocating motion of the box, E.

HIRAM CARVER.

No. 8311.—*Improvement in Self-acting Cheese Presses.*

What we claim as our invention, and desire to secure by letters patent, the combination of the falling frame with the toggle-joint, and levers, and the fixed eccentric wedge, acting together and making the upward movement and pressure, substantially as herein set forth and described.

BETHUEL GILLETT,
LYMAN ALLIS.

No. 8312.—*Improvement in Dental Hydraulic Cups.*

What I claim as my invention is the construction of said machine, of two or more plates, with vacancies between the same, and with pipes annexed thereto.

And also I claim as my invention the application of water, or any suitable liquid, to the space or vacancy between the plates, for the purpose of hardening and rendering more firm the contents of the cup while on the jaw. I claim nothing for the outward form of the said plates, nor for the application of the same to the mouth merely to take impressions. And also I claim as my invention the method of using the gate as described.

JAMES HARRISON.

No. 8313.—*Improvement in Rotary Harrows.*

Having now described my invention, and the operation of the same, I will proceed to state what I claim, and desire to secure by letters patent of the United States. What I claim, therefore, is the use of the combination of the spur-wheel, H, and cog-wheel, D, with the hollow axis, G, for the purposes and in mode of construction substantially as herein set

forth, and their combination with the circular frame, B, having the face cog-wheel, C, and arms, A, attached, for the purpose of producing a rotating harrow, substantially in principle of construction as herein set forth.

JONATHAN F. OSTRANDER.

No. 8314.—*Improved Pad-Lock.*

Having thus fully, clearly, and exactly described the nature, construction, and operation of our improved mail-bag, spring, and safety padlock, what we claim therein as new, and desire to secure by letters patent, is the combination of the bolt (*p*) and cavity (*y*) on the rotating end of the hasp, with the tumblers, (*a*) and (*g*) having the characteristics described, or their equivalents; the tumblers, hasp, and bolt constituting a system of fastenings within and without the casing of the lock; the whole being arranged and operated substantially in the manner and for the purpose described.

GEORGE McGREGOR,
ROBERT LEE,
THOS. G. CLINTON.

No. 8315.—*Improved Adjustable Tool-Haft.*

I do not confine myself to the formation of the eccentric on the gripe, for the effect will be the same if the groove be made on the inside of the revolving tube, C, and the pin, *d*, be fastened to the gripe, A. I do not claim the gripe as any novelty; but what I do claim as my invention, and desire to secure by letters patent, is the mechanism by which its jaws are closed, the same consisting of the eccentric groove, the pin, and the revolving tube, as described in the above specification, and shown in the accompanying drawings.

PETER H. NILES.

No. 8316.—*Improvements in Insulators for Lightning Rods.*

What I claim as my invention is the insulated support and point for lightning rods, consisting of the insulated point, and opening in its shank; the insulating cylinder of glass, with its lip, or flange; and the wooden collar, for securing the whole to the building; all as described.

GEORGE W. OTIS.

No. 8317.—*Improvements in Breech-loading Fire Arms.*

What I claim as my invention, and desire to secure by letters patent, is operating the breech pin directly by the finger lever, as herein described, in combination with the breech pin and abutting lever, formed and operating substantially as herein described, and for the purpose specified.

I also claim elevating the charge lifter, by the direct contact of the breech-pin carrier with an arm of the lifter lever, and depressing it by the direct contact of the finger lever with the other arm of the said lifter lever, as described.

HORACE SMITH.

No. 8318.—*Pad Lock.*

What I claim as my invention is the combination of the turning hasp, or contrivance, C, the tumbler, E, and the slide, G, and its projection, *l*, or any mechanical equivalents; the whole being made to operate together substantially as described.

DAVID TILTON.

No. 8319.—*Improvement in Lime Kilns.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is—

First. So forming the fire space in lime kilns which are fired at both ends as to rise gradually from the centre of the kiln to points above the eyes in each end thereof, substantially as herein described, for the purpose of so distributing the draught and heat as to secure the even burning of the stone.

Second. I claim dividing the fire space, by a partition wall in the centre, into two chambers, for the purpose of shifting and regulating the heat required in either end of the kiln, substantially as herein described, for the more evenly burning of the stone.

Third. I claim, in combination with the fire chambers and partition wall, the ash pits at each end of the kiln, connected by a narrow flue, so that when the eye at either end may be closed for shifting the heat, sufficient draft will be kept up from the opposite end of the flue to allow the fire to burn moderately, without being entirely extinguished, as herein fully set forth.

SAMUEL BROWN.

No. 8320.—*Improvement in Horizontal Square Piano Fortes.*

What we claim as our invention, or improvement, and desire to secure by letters patent, is connecting and combining in the horizontal square piano forte, in one piece of cast iron, or other metal or metals, the bridge, A, the brackets, C, the upper bearing by the flanges, F, the reverse bearing on the buttons, G, the application to the long bridge of the horizontal square piano forte of the method of firmly securing the whole to the rest plank by means of the screws, I, and the application of the diagonal position of the face of the flange, so as to make both strings of each note of equal length to metal bridges on horizontal square piano fortes, as seen at H, in the manner and for the purpose intended, described in this specification, and seen in the model and drawings by which it is accompanied.

GEORGE BACON,
RICHARD RAVEN.

No. 8321.—*Improvement in means for obviating difficulties arising from defective insulation of Telegraphs.*

Having thus fully described my improvements in the working of telegraphs, what I claim as new therein, and desire to secure by letters patent, is reversing the connexion of the main wire with the poles of the battery, so that the battery acts in opposition to the battery at the other end of the line, in the intervals between the contacts made by the key in writing, (in place of merely breaking the circuit,) by means of the apparatus and arrangement of wires, batteries, &c., substantially as above described, for the purpose of counteracting the effects of imperfect insulation, as set forth.

CHARLES S. BULKLEY.

No. 8322.—*Improved Nut and Washer Machine.*

We claim the two punches, moved at the same time, with different velocities, and in the same direction, in combination with a die box, within which the nut is formed, substantially as herein set forth.

HENRY CARTER,
JAMES REES.

No. 8323.—*Improvement in Machinery for Cutting Glass.*

What I claim as my invention, and desire to secure by letters patent of the United States, is—

First. The combination and arrangement of the several parts for giving the reciprocating and circular movements herein described—that is to say, the combination of the bed plate, H, and revolving plate, I, with the carriage, consisting of the pieces, K, L, M.

Second. The method of guiding the movements, and adjusting the several parts of the machine, for the purpose of directing the course of the object to be shaped, or figured, in passing the edge of the cutting wheel, by means of movable lettered or named stops and gauges, prepared for particular patterns, and applied to the machine, as required; the whole being constructed and operating substantially as herein set forth.

J. P. COLNE.

No. 8324.—*Improvement in Self-acting Blow-pipe Lamps.*

Having now described the mode of construction and operation of my improved lamp, I will proceed to state what I claim, and desire to secure by letters patent of the United States:

What I claim, therefore, is the use of the safety valve and escape pipe and stop cock, in combination with the blow-pipe of a self-acting blow-pipe lamp, substantially as hereinbefore set forth.

D. W. C. McCLOSKEY.

No. 8325.—*Improvements in Machinery for forming points of Elliptical Springs.*

I claim the combination of the hollow die with the lower die, and have circular shears, actuated in the manner substantially as herein described, and for the purpose herein set forth.

W. T. RICHARDS.

No. 8326.—*Improvement in Cut Nail Machines.*

What I claim as my invention, and desire to secure by letters patent, is—

First. In combination with knives, or the equivalent thereof, for cutting blanks sidewise from nail plate, I claim a travelling, griping, and heading tongs or jaws, opening and closing in a direction perpendicular to the face of the nail plate, and constructed and actuated substantially as herein set forth, to gripe the blank on its flat sides without the necessity of turning it upon edge, as is customary with nail machines heretofore constructed, to draw it from beneath the knives, and hold it while being headed.

Second. I claim the direct acting knife stock, with knives secured to its opposite sides, in such positions with respect to the stationary knives or to each other that the knife upon one side cuts after the knife upon the opposite side, in combination with a double graded cam, or other equivalent actuating mechanism, which shall cause the cutter bar to descend with two impulses, at each of which one knife acts to cut a nail blank.

Third. I claim the relative arrangement of the travelling griping jaws and heading tool, the latter being actuated within the former, and travelling with it.

Fourth. In combination with two sets of knives acting, alternately to sever nail plates, I claim a reciprocating griping and heading carriage, which, travelling to and fro between the two sets of knives, gripes heads and delivers a nail at each single stroke in alternate succession at its opposite extremities, whereby much time and labor are saved, and the machinery to cut a given number of nails is condensed into a less space.

JOHN P. SHERWOOD.

No. 8327.—(Suspended.)

No. 8328.—*Improvements in Spike Machinery.*

Having thus fully described the nature of my invention, what I claim therein as new, and desire to secure by letters patent, is the method of delivering the spike from the die by means of the tilting rod, O, and the movable nippers, 3, 3, so as to allow the nippers to draw in the succeeding blank underneath the spike, and tip or tilt it out of the die, which prevents the possibility of a spike and blank being in the die at the same time, and the consequent breaking up of the machine.

JAMES H. SWETT.

No. 8329.—*Improvement in Rules for Calculating Interest.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of parallel slides, substantially in the manner and for the purposes herein set forth, one slider being for units, another for tens, another for hundreds, &c., and each slider being so graduated and numbered as to show through the vertical opening, *n*, *y*, *f*, *o*, the sum denoting the interest or tax on the numeral figure that appears on the same slider at the side of the bar, *m*, *n*, *o*, *p*, as herein described.

S. S. YOUNG.

No. 8330.—*Improved Saw Filing Machine.*

Having thus described the nature and operation of my invention, what I claim as new, and desire to secure by letters patent, is the swinging frame, constructed as described, and for the purpose specified, viz: by having the arms, J, J, J, firmly attached to a rod, I, the ends of the said rod working freely in holes or bearings in the ends of the arms, H, H, which are attached to the horizontal rod, C, by which arrangements the swinging frame has an up-and-down motion, owing to the rod, C, turning in its bearings; also a horizontal reciprocating motion, the same as the rod, C, and a forward and backward motion, by which, with the aid of the file turning on its axis in the frame, the file may be so adjusted as to operate both upon the front and back of the saw teeth, substantially as set forth.

THOMAS M. CHAPMAN.

No. 8331.—*Improvement in method of securing Wheels to Axles.*

We do not claim the securing of a hub to an axle by means of a groove around the inner end of the hub, or a bead on the axle; but what we do claim as new, and of our own invention, and desire to secure by letters patent of the United States, is the application of the cylinder, 5, and flanch, *f*, on the axle, in combination with the cylinder, *e*, flanch, 3, coupling, 7, keys, 12, and coupling box, *g*, to retain the plate, *d*, of the hub, and allow its rotation between the flanches, 3 and *f*, without any tendency to uncouple the hub from the axle, substantially as described and shown.

JUNIUS FOSTER,
DAVID MARSH.

No. 8332.—*Improvement in Double Oven Stoves.*

Therefore, having thus fully, clearly, and exactly described our joint invention and improvements in double oven stoves, wherein the front oven extends under the fire-place, or fire-place and hearth, as may be desired, what we claim therein as new, and desire to secure by letters patent, is the damper, (*a*,) constructed and arranged as described, so that one or both ovens may be used at pleasure.

We also claim the flue (K) between the ovens, substantially as constructed and arranged. to communicate directly with the exit flue, (*l*.)

We also claim projecting the cold air chamber into the flue under the fire-place, and there discharging the received air, so as to protect the oven from being over-heated at that point.

CONRAD HARRIS,
PAUL WILLIAM ZOINER.

No. 8333.—*Improvement in moulding and casting Stereotype Plates.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The moulding, in plaster, of one or more forms of type, wood cuts, medals, &c., at one operation, in air tight vessels, by means of exhaustion.

Second. I claim the making of the plaster moulds with two faces.

Third. I also claim the casting, from one or more moulds, in a box sufficiently tight to hold fluid metal, and bringing the face perfect, by means of the weight of fluid metal confined above them in column or otherwise.

Fourth. I also claim the grooved wedges, for retaining the moulds in their places while casting from them.

Fifth. I also claim the non admission of fluid metal to the moulds until the orifice through which it enters is sunk beneath the surface of the fluid metal, thus preventing the dirt and dross from entering with it.

CHARLES HOBBS.

No. 8334.—*Improvement in drying and oxidizing Colored Goods.*

What I claim as my invention is the application of atmospheric pressure, or the mechanical pressure of air, in the coloring of cotton, wool, or other substances, for removing the excess of liquor absorbed from the vat, and for oxidizing or fixing the color by its forced passage through the mass, and by the use of apparatus, substantially such as herein described.

JAS. C. KEMPTON.

No. 8335.—*Improvement in Mercury Baths for Photographic purposes.*

What I claim as my invention, and desire to secure by letters patent, is my moving and movable lever, cup, or its equivalent, and bath, for photographic and Daguerreotype purposes.

I claim the agitation of the mercury upon a cooler surface, immediately previous to its use, in the heated cup, (or part of it,) for the development of photographic impressions, by means of my movable lever cup, or its equivalent.

I claim the lever cup, or elongated cup, movable perpendicularly, on an axis or centre of motion, which centre of motion need not be confined to a particular part of the cup, but it may be varied and placed in any manner, giving and admitting the movement of the cup, but must be so arranged as that the mercury, or other substance, may flow from the heated surface of the cup to the cooler surface of the tube, or elongated cup, and *vice versa*, by elevating or depressing the exterior end of said cup.

I claim the balancing of said lever cup, or its equivalent, on the centre of motion, wherever placed, so that it will remain stationary, when the weight of the mercury, or other substance, is let on to either end of it, that end containing the mercury, or other substance used, being held down.

JOHN MOULSON.

No. 8336.—*Improvements in method of raising Sunken Vessels.*

I claim the combination of the inflatable air receiver, purchase, roller, and wedge, or their equivalents, as herein described, for the purpose of raising and supporting vessels.

WM. IRWIN.

No. 8337.—*Improvement in the construction of Bridges.*

What I claim as my invention, and desire to secure by letters patent, is the method, above described and shown, of making the thrust arches of bridges—that is to say, I claim the arch constructed partly of wood and partly of iron, when arranged in the manner herein specifically set forth; the iron parts of the arch being constructed in such a manner as to afford a firm bearing for the braces and uprights, with a projecting flanch of sufficient width to shelter the wooden part of the arch, as herein set forth, and the wood being bolted upon the sides, under cover of the flanches of the iron, in such a manner that the wood upon one side can be removed and be replaced without disturbing that on the other. The whole being constructed and put together substantially in the manner and for the purposes herein set forth.

EDWIN STANLEY.

No. 8338.—*Improvement in the construction of Violins, &c.*

Having thus described the construction and effect of my improvements of the violin, &c., what I claim as my invention, and desire to secure by letters patent, is the introduction into the body of the instrument of the brace bar or supporter, C, constructed of any suitable material, and of any requisite form between the upper and lower extremities thereof, inserted either into blocks of wood, A and B, or, instead of A, into an elongation of the neck, to answer the same purpose, by which means I am enabled to give strength to the instrument to resist the strain of the strings, and disconnect the sound board, E, E, and the table or back, from the blocks, A and B, said brace or supporter, C, sustaining the tension of the strings, preserving in tune, and also materially improving the tone, in quality, volume, and melody of instruments to which this improvement is applicable.

I also claim the manner of increasing the vibration of the sound board, E, E, and the table or back, by the cutting away or removing the before-described portions of blocks, A and B, in the manner and for the purpose set forth in the foregoing specification and accompanying drawings.

WM. B. TILTON.

No. 8339.—*Improvements in Cider Mills.*

What I claim as my invention, and desire to secure by letters patent, is the cast-iron grinders, arranged and constructed as described, viz: so as to force the apples, while being crushed, from the centre towards the periphery of the plates, and at the same time to force a portion of the pummace through the holes in the lower plate of the grinders.

I also claim the method of removing the cheese of pummace from the press-crib, viz: by detaching the platform from the press-crib, and using the same for a sled, to draw the cheese from the mill, substantially as described.

NATHAN CHAPIN.

No. 8340.—*Improvement in Circuit Changers for Electro-Magntic Telegraphs.*

Having thus fully described my improvements, what I claim as new therein, and which I desire to secure by letters patent, is the "circuit changer," substantially as above described, in combination with the arrangement of wires, magnets, &c., as set forth, for the purpose of enabling the operator at either one of two distant stations to arrange the connexions at the intermediate stations, so that he can write through to the other end-station at pleasure.

CHAS. S. BULKLEY.

No. 8341.—*Improvement in Machine for making Sod Fence.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the combination of the cutters and mould-boards, for cutting and turning the sod on edge, with the inclined adjustable spring rollers, for raising, packing, and forming the sods into a fence, as herein described and represented.

H. L. F. GAVETT.

No. 8342.—*Improved Hook-heading motion for Spike Machines.*

Having thus described my improvements on the machine for making hook-headed spikes, what I claim as new, and of my own invention, and desire to secure by letters patent, is the employment of a header, made to have a descending, and afterwards a horizontal frontward movement, for the purpose of first bending the end of the piece of iron downward, and then forcing it horizontally against the end of the die, C', and thus form a hook-head, as described and represented.

MOORE HARDAWAY.

No. 8343.—*Improved method of making Sails.*

What I claim as my invention, and desire to secure by letters pa ent, is the bringing straight cloths upon the leeches, and making all the head cloths parallel therewith, and uniting the goring cloths in the bunt of the sail, as described above.

ELI F. SOUTHWARD.

No. 8344.—*Gold Amalgamator.*

What I claim, therefore, as my invention, is as fellows: I claim the combination of the partition, S, (dipping below the surface of the water,) with the lower distributor, provided at the centre with a discharge aperture for the water and light particles, and at the periphery with apertures for the discharge of the water and heavier particles, for the purpose of preventing the escape of gold over the central or waste-pipe.

I also claim the arrangement of the sliding-tube, ferrule, or waste-gate directly upon the hollow axle of the lower distributor, T, the same being for the purpose of regulating the head of water within the said distributor. I am aware that it is not unusual in gold washers to use a succession of baths; therefore I do not claim such arrangement in general. But I also claim arranging the secondary mercury bath concentric with and below the primary one, in such a manner that the currents of water, &c., return towards the centre of the apparatus, thereby saving room, and causing the said currents to pass more slowly.

WM. BALL.

No. 8345.—*Improvements in Equalizing, or Power Regulators.*

I will proceed distinctly to state that I do not claim the mere employment as an "equalizer" or regulator of a piston operated by and acting against pressure, alternately, each stroke, the said piston having two strokes for one of the engine, or other mover it works in connexion with, as such has already been done; nor do I claim separately exposing the equalizer piston to the vacuum of the condenser. But what I do claim as my invention, and desire to secure by letters patent, is the use of steam or other gas to operate upon the piston of the power regulator, or "equalizer," the said steam or gas being derived from the same reservoir that supplies the engine.

ALFRED GREGORY.

No. 8346.—*Improvement in Sword Canes.*

What I claim as my invention, and desire to secure by letters patent, is a sword-cane, constructed substantially as herein set forth, viz: consisting of the rod, with blade attached, passing through the entire shaft, and giving point beyond it, whether the said rod be, or be not, connected with a spiral spring to draw the blade back into the handle.

I do not claim the application of the spiral spring as an adjusting power, nor do I claim the screw applied as a stop; neither of which being substantially new.

SAMUEL ADAMS HUDSON.

No. 8347.—*Improvement in Washing Machines.*

What I claim as my invention, and desire to secure by letters patent, is the combination, substantially as described, of the levers, link bar, and rubbing board, for the purposes herein specified.

ERASTUS LAWRENCE.

No. 8348.—*Improvement in Axles of Wheeled Cultivating Ploughs.*

What I claim as my invention, and desire to secure by letters patent, is hanging one or both of the axles of the wheels to the carriages of cultivator, gangs of ploughs, seed drills, &c., to the frame of the carriage, so as to vibrate the axle or axles, or suffer them to vibrate and keep them at right angles to the motion of the ploughs when moving in a direct line, and, when turning the ploughs, to keep the axle or axles in the direction of the radius of the circle, or nearly parallel with the radius of the circle, formed by the track of the wheel turning upon said axle when the ploughs constituting the gang are placed diagonally, one behind the other in succession, and the whee's to the carriage of the same are also placed diagonally, one behind the other.

G. W. C. GILLESPIE.

No. 8349.—*Improvement in Type-casting Machines.*

Having now described my invention, and the operation of the same, I will proceed to set forth what I claim, and desire to secure by letters patent. What I claim, is—

First. The employment of the lever, P, having an adjusting slot, adjuster, R, matrix spring-holder, O, and their combination with the horizontal slide, D, slide ways, H, H², and matrix spring, N, substantially in form and manner and for the purposes herein set forth.

I claim also the employment of the adjusting supporting piece, L, and the combination therewith of the horizontal slide, and levers, K, J, and M, substantially in form and manner and for the purposes herein described.

And I also claim the combination and arrangement of the horizontal slide ways, and levers operated thereby, for the purpose of obtaining a horizontal and oblique action of the machine.

JOHN J. STURGIS.

No. 8350.—*Improvement in Piano Forte Actions.*

What I claim as my invention, and desire to secure by letters patent, is the repeating check or tongue, connected with a lever, hinged to the hammer rail, and resting on the key, the under side of the hammer being provided with an arm, which rests against the upper end of the face of the repeating checks, substantially as and for the purpose specified.

RANDOLPH KRETER.

No. 8351.—*Improvement in Dental Forceps.*

What I claim as my invention, and desire to secure by letters patent, is the "compound lever forceps" above described, or the compound lever and the movable fulcrum applied to forceps, by means of which the roots of decayed or broken teeth may be readily and easily reached and extracted.

J. C. BURCH.

No. 8352.—*Improvement in Piano Forte Action.*

What I claim as my invention, and desire to secure by letters patent, is in having the shoulder under which the hopper plays attached to the hammer but by a centre pin, forming an independent oscillating shoulder to the hammer but, said shoulder being usually detached from the hammer but, or composing a part of it.

I also claim the extension of the back part of the shoulder down, so as to connect with a spring.

JAMES A. GRAY.

No. 8353.—*Improvement in Piano Forte Action.*

What I claim as my invention, and desire to secure by letters patent, is the jack, consisting of a crooked lever, and a straight, or nearly straight lifter, or pusher, acting conjointly on the general principle above illustrated.

And I also claim, and desire to secure, the peculiar application of the spring to govern the alternate bending and straightening of the jack, by acting one prong or tooth, between two other prongs or teeth, with due allowance of play, or shake, according to the desired degree of drop of the hammer from the string, known as the scrape.

R. M. KERRISON.

No. 8354.—*Improvement in fastening Hooks and Eyes to Paper Cards.*

I claim nothing for the machinery with which the work is done, nor for the mortise-like holes which belong to Atwood's patent; but what I do claim as my invention, and desire to secure by letters patent, is the confining of the eye by means of the longitudinal cut or slit, or cuts or slits, (whether one or more is used,) in the card, parallel with the rows of holes, admitting through it or them a portion of the eye, as herein described and applied, or in any manner substantially the same.

CHESTER J. CARRINGTON.

No. 8355.—*Improvement in Gauges used in Turning.*

What I claim as my invention, and desire to secure by letters patent, is the gauge, (*c*,) with its graduated slide, (*c*,) capable of being set to any given diameter, the whole being suspended upon a horizontal wire, operating as herein set forth.

C. R. HURLBUT.

No. 8356.—*Improvement in the manufacture of Paints.*

What I claim as my invention, and desire to secure by letters patent, is the manufacture, by the processes substantially as herein described, of new colors fit for painting, whether with oil, varnish, spirits of turpentine, or water, by means of the deoxidation of the soluble metallic sulphates of zinc, copper, iron, and other metals, and by the precipitation of their basis, either by alkaline hydro sulphurets whose sulphates are soluble, such as those of soda, potash, and ammonia, to obtain colors with a single metallic base, or to obtain colors with a double base, partly metal and partly alkaline sulphate, by using the alkaline hydro sulphurets whose sulphates are insoluble, such as those of baryta, strontian, and of lime, and even by the hydrated sulphurets and poly-sulphurets of lime prepared directly, substantially as herein set forth.

G. F. DE DOUHET.

No. 8357.—*Improvement in the manufacture of Iron.*

Having thus fully described the nature of my invention, what I claim as new therein, and desire to secure by letters patent, is the application of franklinite to the improvement of iron in the processes of reduction from its ores, and in the finery or puddling of crude or pig iron, according to the methods, as above described.

S. T. JONES.

No. 8358.—*Improvement in Bedsteads.*

What I claim as my improvement is the suspension spring or strip, *d*, the thrust spring, *a*, and the spring, *e*, between them, as combined or applied together, and to the bedstead and slats imposed upon them, substantially as hereinbefore specified.

IRA RUSSEL.

No. 8359.—*Improvement in Railroad Car Coupling.*

What I claim as my invention, and desire to secure by letters patent, is the shape and construction of the improved car platform, in combination with the jointed self-acting pin, stationary pin, and grooved half coupling, all as herein described, for the purpose of coupling and disconnecting cars.

GEORGE WINTERS.

No. 8360.—*Improvement in Machines for breaking Hemp and Flax, and reducing the length of the fibres.*

Having thus fully described our invention, what we claim therein, and desire to secure by letters patent, is the art or method of separating the fibres of flax, hemp, &c., from the boon, and reducing them to suitable length of staple to be used on cotton, woollen, and other machinery by the use of combined sets of grooved and graduated rollers, or their equivalents, operating in the manner and for the purpose herein fully set forth and represented.

JAMES S. TREAT,
STEPHEN RANDALL.

No. 8361.—*Gauge for indicating Pressure of Steam, &c.*

What I claim as my invention, and desire to secure by letters patent, is combining with the steam tube the disk and spring, so arranged that the force of the current of steam impinging upon said disk can be ascertained by the extent to which the spring is expanded, and this can be known by the comparative pressure in the boiler or other vessel necessary to give the required velocity to the current to produce different degrees of expansion of the springs, substantially as herein set forth.

GEORGE FABER.

No. 8362.—*Improvement in Apparatus for Draining Sugar.*

What I claim as my invention, and desire to secure by letters patent, is combining two or more straining pans with molasses or receiving vessels, below each, substantially as described, the said pans being provided with a discharge pipe or tube, substantially as described, so at the current of air shall pass from the lower part of the first to the upper part of the next through the series, and so arranged as to retain the molasses or other liquid parts; and this combination I claim, whether the said succession of pans be used in one or more series, as described.

SMITH GARDNER.

No. 8363.—*Improvement in Stone Drilling Machines.*

Having thus described my new drilling machine, I shall state my claim as follows: What I claim as my invention, and desire to have secured to me by letters patent, is—

First. A power drilling machine, in which the drill is driven by a vibrating hammer, operated substantially as hereinabove described.

Second. I claim stopping the "feeding forward" of the sliding frame and drill, when the latter does not penetrate the rock sufficiently, or to the usual depth at each blow, by keeping the pawl out of the feeding ratchet, excepting when the drill goes in the requisite length, by means of the combination of the forked vertical lever, c', d', connected with the drill shaft, the horizontal lever, d', a', a', and the spiral spring, h', h', operating substantially as hereinabove set forth.

I also claim drawing the edge of the drill away from the bottom of the hole, when the tool is being turned, by means of the inclined claw or fork, l', operating with a collar, n', on said drill, substantially as hereinabove described.

HENRY GOULDING.

No. 8364.—*Improvement in Machines for dressing Mill Stones.*

We claim, in combination with the feed lever, (e',) operated by the cam, (d',) to work the feed bands, the employment of a weighted stop lever, or the equivalent thereof, acting in the notch, (m',) of the lever, (e',) substantially as described, which said stop shall be self-acting, to stop the feed motion, that the cuts may continue in the same place until the feed motion is restarted and thus insure the cutting of the stone to the required depth, whatever may be the texture thereof, as described.

ERASTUS W. HAZARD,
CHARLES H. JENNER.

No. 8365.—*Improvement in processes of making Bronze Powder.*

What I claim as my invention is making metallic bronze powder of copper, tin, spelter, or their alloys, by running them through iron or steel rollers, substantially as described; also the application, and manner of application, of soap, to make the bronze bright, and brilliant, and durable.

L. BRANDEIS.

No. 8366.—*Improvement in Stoves.*

Having thus described my improvements, I shall state my claims as follow: What I claim as my invention, and desire to have secured to me by letters patent, is forming the tapering radiator, produced by extending the fire chamber, as above set forth, in branches arranged with their centre lines, parallel to each other, or nearly so, and connected by arches, substantially in the manner above set forth.

GARDNER CHILSON.

No. 8367.—*Improved Bench Vise.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the latch pin, the ratch bar, acted upon by a spring that constantly tends to disengage it from the latch pin, and the foot lever, with the movable jaw of a vise; these several parts being constructed, arranged, and operating as herein set forth.

N. F. CONE.

No. 8368.—*Improvement in Weavers' Temples.*

What I claim as my invention, and desire to secure by letters patent, is connecting the movable jaw to its point of suspension by an arm, or equivalent, in such a manner that the point of suspension will be nearer the middle of the cloth than its other extremity, which extends out towards or beyond the selvage at such an angle that the jaws of the temple will be released by the cloth as it is spread by the action of the reed upon the warp, when it strikes up a thread of weft, and closed by the contraction of the cloth, caused by its own elasticity, as the reed leaves it, so that the cloth, by its own action, is released, when the reed advances, and is griped and held as it recedes, thereby dispensing with the strong spring wedge and other devices heretofore used for operating the jaws of temples.

ARNOLD JILLSON.

No. 8369.—*Improvement in Leather-Splitting Machines.*

Having thus described my improved leather-splitting machine, I shall state my claims as follow: What I claim as my invention, and desire to have secured to me by letters patent, is—

First. Making the gauge-roller of a leather-splitting machine, with the sectional tubes or friction rollers, to be placed on each end thereof, substantially as herein above set forth, and for the purpose specified.

Second. I claim combining with the ordinary cast-iron spring plate of a leather-splitting machine a cast steel spring plate, forming a double lip spring plate, and fitted thereon so as to be adjustable horizontally, as herein above set forth; and so that the front edge of the lower or cast iron plate may project under the edge of the knife, and hold up the split, as hereinabove set forth.

ALPHA RICHARDSON.

No. 8370.—*Improvement in Fastenings for Last Blocks.*

Having thus described my improvement, I shall state my claim as follows: What I claim as my invention, and desire to have secured to me by letters patent, is fastening the block to a boot or shoe last by a hasp on said block, in combination with a spring attached to the last, as hereinabove described, or in any other manner substantially the same.

LEVI R. ROCKWOOD.

No. 8371.—*Improvement in Waste Pickers.*

Having thus described our improved machine, we shall state our claim, as follows: What we claim as our invention, and desire to have secured to us by letters patent, is the use of a blast of steam or air passing into and out of the hollow shell, as hereinabove specified, so as to blow the ends or fibres of the material out, in order to enable the teeth of the picking cylinder to engage with them.

CHAS. G. SARGENT,
ROBERT THOMPSON.

No. 8372.—*Improvement in Machines for printing House Papers.*

Having thus described my improvements in house paper printing machinery, I shall state my claims as follow: What I claim as my invention, and desire to have secured to me by letters patent, is the use of two sets of spur clamps—one set being sliding and feeding clamps, and the other set being stationary and holding clamps, and the two sets having a connected operation, so that one set shall be open when the other set is closed; all as hereinabove set forth.

I also claim the mode, hereinabove described, for supplying the coloring fluid to the patterns—that is, by means of a cloth band, alternately drawn forward from the vat over an elastic bed, on which the platen descends, and then back again through the color in the said vat; all as hereinabove set forth.

I also claim giving the second or double application of the color to the patterns, for each impression, by suddenly lowering the elastic bed after the first touch of the patterns on the cloth band, and then raising it again for the second touch, substantially in the manner hereinabove set forth.

MILTON D. WHIPPLE.

No. 8373.—*Improvement in Churns.*

Having thus described my invention, I will now state what I claim, and desire to secure by letters patent:

First. I claim the employment of a revolving vessel, A, containing the cream or milk, with or without cleats, *d*, *d*, *d*, *d*, constructed either plain or with pins, *e*, *e*, *e*, *e*, or having any other suitable internal projections, and operating in combination with a toothed or plain stationary cross-bar, F, removably or permanently secured to the fixed axles, B, B, and situated in the space forming the upper half of the vessel, A, at any desired distance from the centre thereof.

Second. I likewise claim the employment of a tempering cylinder, K, and tubes, L^1, L^2, in combination with the revolving vessel, A, and cross-bar, F, for cooling or warming and agitating the milk, by its precipitation thereon, as caused by the circular motion conveyed to the milk, and interruption or arresting effect produced, substantially as shown and described.

GEO. B. CLARKE.

No. 8374.—*Improvements in Machines for scutching and hackling Hemp and Flax.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the method herein described, or any other means essentially the same, of throwing the teeth in and out of the cylinder or drum at pleasure, whilst in motion, so as to present a greater or less length of teeth to the hemp, or of drawing them entirely within the cylinder in case the hemp should become entangled and likely to break up the machine.

Second. I claim, in combination with the bar holding the teeth, the spiral spring for allowing said bar to yield to knots, or other obstructions, and for drawing back into proper position the said bar after it is released from said obstruction.

Third. I claim, in combination with the bar and teeth, arranged as herein described, the adjustable guides, S, for setting the teeth at such angle as will give them more or less hold upon the hemp, as herein fully described and represented.

OWEN W. GRIMES.

No. 8375.—*Improvement in Machines for stripping Seed from Broom Corn.*

Having thus described the nature and operation of my invention, what I claim as new, and desire to secure by letters patent, is the endless bearded belt, D, D, constructed of any proper material, and having "lugs" or spikes, G, G, as described, in combination with the comb-rollers, B, B, set diagonally upon the frame, A, A, A, in the manner and for the purposes substantially as set forth.

L. D. GROSVENOR.

No. 8376.—*Improvements in Lath Machines.*

Having thus fully described my invention for sawing laths, I desire it to be understood that I do not claim mounting a rotary cutter, C, on the same spindle of the rotary saw, as herein described; nor do I claim the returning table, consisting of a series of rollers, G, G, G, arranged and operated in the manner described; but what I do claim, and desire to secure by letters patent, is the director, J, and carrying belt, in combination with the apparatus for registering, substantially such as described, for delivering bundles ready counted.

I also claim the rounded surface of the receiving table, in conjunction with the bent form of the strip, J, as represented in figure 2, at (*k*,) which effects, in the simplest manner, the delivery on the returning rollers, G, G, G, of the unsawed slab to the attendant, for another cut.

WILLIAM MERRILL.

No. 8377.—*Improvement in Easy Chairs for Invalids, &c.*

Having described the construction and uses of my adjustable combination chair, what I claim therein as new, and desire to secure by letters patent, is the manner of combining the jointed chair with the jointed ottomans, whereby the whole is made to subserve the several purposes hereinbefore described, and illustrated in the drawings.

I also claim furnishing the back of the chair with an additional joint, F^{2}, whereby the back of the chair is rendered susceptible of such adjustment as to form a support to the spine of the occupant of the chair, as described and shown in the drawings.

I likewise claim the employment of the triple-jointed hinges, K, K, in combination with the spiral springs, L, L, for securing the flexible bolster, J, by which it is steadied and retained in its proper position when expanded or contracted, as set forth.

PATRICK O. NEIL.

No. 8378.—*Improvement in Ventilating Ships.*

We do not claim to have invented either the caboose water back, ventiducts, or valves, although we do not know of the several parts referred to having been used for the purpose described. But what we do claim as our joint invention is the combination and application of the caboose water back, ventiducts, and valves, in connexion with our water surface and the cowl and vane, for the introduction of pure air, and the expelling of impure air, as described, and for the purpose hereinbefore mentioned.

AMOS J. SEXTON,
WILLIAM ENNIS.

No. 8379.—*Improvement in Machinery for threading Wood Screws, and Feed Apparatus therefor.*

Having thus described the principle, or mode of operation, of my said improvements, and the manner of constructing and working the same, together with old parts, so far as it was necessary to describe these latter, what I claim as my invention, and desire to secure by letters patent, is the employment of two cams in combination, substantially as described, for the purpose of operating the fingers which supply and present the blanks to the griping jaws, as described.

I also claim the employment of one cutter, to form the thread on the conical point, when combined and operating simultaneously with a second cutter, for forming the thread on the main part of the shank, substantially as described, and for the end specified, provided the motion of one of the cutters is extended into the track of the other, to insure the making of the thread on the conical point a continuation of the thread on the main part of the shank.

THOS. J. SLOAN.

No. 8380.—*Engine in which Compressed Air, or other Gas, heated and expanded by admixture therewith of a heated fluid, is used as the Motive Agent.*

Having thus fully described the nature of my invention, what I claim, and desire to secure by letters patent of the United States, is actuating an engine, such as are now usually driven by steam, or of any convenient form, by means of a measured or detailed quantity of air, previously compressed, and having had its tension, due to such compression, highly increased and augmented by the jetting, or flashing into, or commixture with it of a measured or detailed quantity of a "medium," or, in other words, of a heated liquid, as water, or a vapor, (simple or "superheated,") as steam, said jetting of the steam into the air, (or *vice versa*, the air into the steam, which I claim as equivalent,) and their commixture being effected in a vessel or vessels disconnected, previous to and during that process, or at least prior to its final consummation, from the reservoir, or main source of compressed air, and from that of the steam, &c., and each separate and distinct charge, or detailed quantity of compressed air, heated by its corresponding charge, or detailed quantity of steam, being allowed to act upon the piston, or its equivalent, prior to the admission or introduction of another charge of air and steam into the vessel or vessels in which their commixture is effected; the whole operation being carried out by means of mechanism, in substance such as here represented, or any more fitting mechanism that shall effect the same in the manner here claimed.

WM. MT. STORM.

No. 8381.—*Improvement in Shoe Latchets.*

What I claim as my invention, and desire to secure by letters patent, is the confining a shoe to the foot by means of a flexible latch, B, secured to one portion of the said shoe, acting in conjunction with a socket, or eyelet, *d*, and a catch, or hook, *c*, secured to other parts of the shoe, and operating substantially in the manner herein set forth.

ISAAC BANISTER.

No. 8382.—*Improvement in the Churn and Butter Worker.*

I am aware that, in some respects, it resembles some other machines or engines for such purpose, but still such parts as constitute such resemblances form no portion of my invention or improvements, and what I claim, which are as follow:

That is to say, I claim the combination of one or more fluted rollers, R, S, with one or more floats, *i*, *k*, to operate so as not only to aid in the process of separating the butter from the cream, but afterwards, and when the motion of the dasher is reversed, to throw into ridges the butter spread on the bottom of the floats.

And I claim the improvement of giving a longitudinal hollow or curve to the external surface of each float, *i*, *k*, for the purpose of gathering the spread butter towards its middle, and preventing the butter from adhering to the ends of the reservoir, as specified.

ASA WILLARD.

No. 8383.—*Improvement in Piano Fortes.*

Having thus described my improvements, I shall state my claim as follows:

What I claim as my invention, and desire to have secured to me by letters patent, is—

First. Arranging the sounding board in a springing form, and supporting its back on a straining lever, made to bear with more or less force against it, in the manner and for the purpose hereinabove specified.

Second. I claim the combination of the short subsidiary iron frame, having a rectangular socket on its front rail, with the long main iron frame, having a wooden block on the under side of its front rail, which fits and is glued into the aforesaid socket, as hereinbefore set forth.

Third. I claim casting the bridge of the long iron frame with curved brackets, so as to have it raised above the level of the bottom of the front rail of said frame, and permit the strings to be strained or strung under the same, as hereinabove explained.

Fourth. I claim easing the escapement of the fly of the jack from under the centre block of the hammer by means of a spring, combined with said block and the stem of the hammer, as hereinabove stated.

Fifth. I claim arranging the back catch on a lever, having a fulcrum in the jack, and arranged so as to cause the catch to follow the hammer in a stroke of the same, and cause it to repeat the stroke or note, if desired, when the fly of the jack fails to operate, so as to effect said second stroke.

Sixth. I claim using a piece of gutta percha on the top of the hammer head, in lieu of some of the layers of leather, in the manner and for the purpose specified.

LOUIS H. BROWNE.

No. 8384.—*Improvement in Letter Stamps.*

I do not claim punching out types from a cavity by a follower; but what I do claim as my invention, and desire to secure by letters patent, is so making and operating the detruding rods or followers of a letter stamp so as to act wholly within the body of the stamp block, whereby I avoid cutting away the handle, and the weakening which would be caused thereby.

I also claim making the detruding rod, R, wing, N, and thumb slide, O, in a single piece, whereby I greatly economize the labor of making this part of the stamp, as herein set forth.

B. CHAMBERS.

No. 8385.—*Improvement in Mowing Machines and Harvesters.*

What I claim as my invention, and desire to secure by letters patent, is hanging the cutter bar of a reaping machine to the side of a triangular frame in such manner that neither extremity of the cutter shall be liable to sag below the other extremity, as herein set forth.

JOHN H. MANNY.

No. 8386.—*Improvement in Printing Presses.*

It must also be understood that I do not claim individually or separately any of the parts of the apparatus or machinery; but what I do claim as my invention, and what I desire to secure by letters patent, is—

First. In combination with the ink troughs, E, and printing cylinders, A, the arrangement of the cam cylinders, D, reciprocating cylinders, K, (operated by the levers, J,) and L, (operated by the levers, M,) and cylinders, G and N, for receiving, carrying, and distributing the ink from the said trough to the said cylinder.

Second. I claim, in combination with the printing cylinders, the cylinders, O, P, provided with a spring knife or saw, Q, operated by cams, R, and also with alternate ribs or projections and grooves, for the purpose of nearly severing the filaments of the paper as it passes through between said rollers, and for the purpose also of creasing the paper for the more easily folding of it.

Third. I claim, in combination with the partially cutting and creasing cylinders, O, P, the different-sized cylinders, C, D, geared together for the purpose of tearing apart the partially cut paper, the cylinders, C, holding, and the increased motion of the cylinders, D, at their periphery (they being the larger) drawing the paper sufficiently to separate it.

Fourth. I claim, in combination with the separating cylinders, C, D, the tunnel, G, for guiding, and the wheel, E, divided into a suitable number of compartments, for receiving the sheets as they are delivered from the machine; the whole being constructed substantially as herein described, and for the purposes fully set forth.

JACO WORMB.

No. 8387.—*Blind or Shutter Fasteners.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the fast and free hooks with the inner plate, the same being arranged, as herein set forth, in such manner that the fast hook forms the pivot for the free one, and the two are connected to the inner plate in such manner that the movement, breakage, or removal of the free hook does not affect the security of the fastening, while, at the same time, the two hooks are secured to the inner plate by the fastening of the latter to the shutter.

WASHBURN RACE.

No. 8388.—*Improvement in Hand Stamps.*

Having thus fully described the nature of my invention, what I claim therein as new, and desire to secure by letters patent, is securing the plate of a hand-stamp to the shank or handle, by means of a universal ball and socket, or other joint, so as to allow the stamp to make a fair impression at whatever angle it may strike the material to be stamped, as herein fully set forth and explained.

STEPHEN P. RUGGLES.

No. 8389.—*Improvement in Piano Fortes.*

What I claim as my invention is the combination of the return screw, S, and button, T, or equivalent contrivance or contrivances, with the hammer and fly, and its retractive spring, so as to operate in manner, and in connexion with the same and other parts, substantially as herein described.

TIMOTHY GILBERT.

No. 8390.—*Improvement in Weavers' Shuttles.*

What I claim as my invention, and desire to secure by letters patent, is making the spindle and spring both in one piece, by extending the spindle behind the hole, for the pin that fastens it into the shuttle, and reducing it to a proper thickness, and bending it to form the spring required to hold the spindle in its proper positions in the shuttle, either with or without the catch on the end of the spring, in combination with the pin, D, or its equivalent, against which the spring acts to hold the spindles in the different positions required, substantially as described, thereby avoiding the inconvenience arising from the loosening of the screw which holds the spring in other shuttles, and saving the additional labor required to fit it in when the spring is made separate from the spindle.

LAROY LITCHFIELD.

No. 8391.—*Improvement in Weighing Carts.*

Having thus fully, clearly, and exactly described the nature, construction, and operation of my improved weighing car, what I claim therein as new, and desire to secure by letters patent, is the construction and arrangement, substantially as described, by which a weighing apparatus is capacitated for easy removal from place to place, by the adaptation to each other of the containing and weighing apparatus and of the running gear—that is to say, by making the fulcra (*i*) for the lever or weighing beam (*h*, *h'*) upon the axle near the wheel, the arm with its sliding weight lying upon the pole or tongue, (*l*,) and the axle affording, by its bent form, free egress to the contents of the box when discharged by means of the valve.

N. B. LIVINGSTON.

No. 8392.—*Improvement in Self-acting Presses.*

Having thus described the construction of my press, I desire it to be understood that I do not claim either the cams or the temple-joint, when used singly; but what I claim as new, and desire to secure by letters patent, is the combination of the eccentric cams, rolling on each other, so as to avoid friction in connexion with the braces or temple-joint, as above described, for the purpose and substantially in the manner aforesaid.

WM. MOORE.

No. 8393.—*Improvement in Saws for sawing and smoothing Boards.*

I claim, for the purposes above set forth, forming and arranging teeth of saws, substantially as herein described.

GEORGE F. WOOLSTEN.

No. 8394.—*Improvement in Instruments for the cure of Stammering.*

Having thus fully described my instruments for the cure of stammering, and their application and method of use, what I claim as my invention, and desire to secure by letters patent, is—

First. The employment of a tube in the mouth, which will admit of speaking, and of the passage of air, when either the tongue or lips would prevent the passage of air, substantially as hereinabove set forth.

Second. The employment of the adjustable springpad, substantially as hereinabove set forth.

Third. The joint employment of the mouth tube and the adjustable spring pad, at the same time curing the guttural, lingual, and labial disease of stammering, substantially as hereinabove set forth.

ROBERT BATES.

No. 8395.—*Machine for making Wheel Tires.*

What I desire to claim, and secure by letters patent, is the combination of the upper and lower dies with the welders, receiving motion from wedges attached to the upper and falling die, the whole acting to shape a tire on all parts of its surface at the same time, substantially as described in the within specification.

MARIA VAUGHN.

No. 8396.—*Improved Maze Lock.*

What I claim as my invention, and desire to secure by letters patent, is the disk, D, with its concentric and radial passages, or their equivalents, in combination with the bolt end, *o*, operated substantially in the manner and for the purposes herein described.

THOMAS NICHOLSON.

No. 8397.—*Machine for arranging Screw Blanks and articles of a similar character.*

Having thus described the principle, or mode of operation, of my said invention, and the manner of constructing and using the same, I wish it to be distinctly understood that I do not limit myself to the precise mode of construction and arrangement specified, as these may be varied without changing the character of my invention.

What I claim as new, and desire to secure by letters patent, is the combination of the inclined ways, substantially such as herein described, with a trough, substantially such as described, and provided with a pin or pins, or their equivalent, as described, so that, by the motion of the trough towards the ways, or *vice versa*, the screws or other articles will be forced up the inclined ways, hanging by their heads, as described.

THOS. J. SLOAN.

No. 8398.—*Improvement in Plotting Scales.*

What I claim to be my invention, and desire to secure by letters patent, is not the division into equal parts, with or without subdivisions of one or more of those parts, of the continuous edge of a scale or rule, nor the use of a vernier for measuring or describing right lines, nor the manner of attaching the vernier-slide to the main plate of the instrument, nor the use of a lever or slow motion screw, for adjusting the motions of the vernier-slide; but the combined application in one and the same instrument of the graduation upon the edge, (to obviate the imperfection and inconvenience attending the use of dividers or compasses,) and the slide carrying with it the several primary divisions of the unit, and those divisions carrying with them, respectively, by means of the vernier, the several secondary divisions into hundredths, or otherwise, so as to enable the operator to distinguish and apply hundredths, or half-hundredths of the smallest unit, with a great rapidity, precision, and ease, as tenths of the same unit, with the scale graduated on the edge, without a slide; and so, likewise, that whatever parts of a unit are required, or whatever the whole length of line to be measured, the whole amount of motion required in lengthening or shortening the instrument is only equal to the number of additional or intermediate hundredths, or other subdivisions, never exceeding one-tenth of the unit of measure.

LEMUEL H. PARSONS.

No. 8399.—*Improvement in Fountain Pens.*

What I claim as my invention is the improvement of the hollow flexible, and long extension of the reservoir or tube, as seen at *g*, to extend up and be secured to the arm of the writer, substantially in manner and for the purpose as specified.

NEWELL A. PRINCE.

No. 8400.—*Improvements in Machines for sawing Volutes.*

I do not claim the carriage, D, for carriages have been, and are now, applied to saw mills; but what I do claim as new, and desire to secure by letters patent, is—

First. The manner in which I produce the two motions necessary to be given to the block, in order that it may be sawed in the required form, viz: the screw rod, F, with its right and left screws cut upon it, mashing into the pinions, *t*, *t'*, by which motion is communicated to the horizontal rods, G, G', the toothed wheels, pinions, or spurs, *u*, *u*, grasping the edge of the block, and causing it to rotate, in combination with the bevel pinions, *l*, *m*, screw rods, *k*, and arm, *o*, by which a rectilinear motion towards the saw is given, the carriage and block producing the result described.

ELIJAH WHITEN.

No. 8401.—*Improvement in Mitre Boxes.*

What I claim is one or two rotary saw-guides, A, B, with sliding gauge rests, N, N, &c., and mechanism for rotating the guides, and fixing them in any desirable position, or positions, as specified, in combination with the improvement of making or applying the uprights, *c*, *d*, *e*, *f*, &c., or vertical supports of the saw to the bars, *a*, *b*, so as to be capable of being turned down to an angle with the horizon, for the purpose as described.

MATTHEW SPEAR.

No. 8402.—*Improvement in Shields for Valves.*

What I claim, and desire letters patent for, is surrounding the valve by a shield, constructed substantially in the manner as herein described and set forth, and fitting closely enough to regulate the ingress and egress of the water or steam, to such a degree as to prevent the slamming of the valve in opening and closing.

ALEXANDER JIMASON.

No. 8403.—*Improvement in the manufacture of Clay Pipes.*

Having thus described my improvements in apparatus for moulding clay pipes, I shall state my claim as follows: What I claim as my invention, and desire to have secured to me by letters patent, is the use of the wire gauge frame, constructed substantially as above described, in moulding clay or earthen pipes, in the manner and for the purpose above specified.

I also claim the improvement above specified in the sack in which said pipes are suspended to be dried, said improvement consisting in confining said sack to two rails, kept parallel by means of cross bars, forming with them a rectangular frame, as hereinabove described.

JOSEPH PUTNAM.

No. 8404.—*Improvement in Machines for opening and cleaning Flocks.*

Having thus described the nature of my invention, what I claim as new, and desire to secure by letters patent, is the arrangement and combination of the conical revolving grater within the close grater case, combined with the blowers, in the manner and for the purpose substantially the same as described and represented.

EPHRAIM C. BRETT.

No. 8405.—*Improvements in apparatus for Applying flocks to Cloth.*

Having thus described the nature and operation of our invention, what we claim as new, and desire to secure by letters patent, is the revolving screen, D, having a beater within it on a shaft, E, as described, in combination with the corrugated rollers, B, B, B′, constructed and operating in the manner and for the purpose substantially as set forth.

DANIEL PRATT,
RANSOM PRATT.

No. 8406.—*Improvement in Tanning.*

What I claim as my invention or discovery, as a new and useful improvement, and desire to secure by letters patent, is the use of arsenic or arseneous acid, substantially in the manner and for the purposes herein set forth; the peculiar properties of arsenic, by which it tends to suspend the natural tendency of the animal fibre to decomposition upon the extinction of animal life, are well known, and of course they are not patentable; but their application to the processes of tanning, and otherwise preparing skins and hides for useful purposes, by which they are rendered stronger and more durable, is believed not to have been heretofore known and used.

I do not, therefore, intend to limit my claim to any particular mode or period of using the article; but I shall apply it in such form, or in such

strength of solution, as the nature of the case may require, to effect the objects named. Workmen should guard against the absorption of the poisonous qualities of the arsenic, while immersing or handling the skins in the liquor, by using tools or wearing India rubber gloves. After the skins are taken out of the liquor and rinsed thoroughly, the danger ceases.

N. C. TOWLE.

No. 8407.—*Improvements in the Endless Chain Propeller.*

Having thus fully described my improvements in horizontal operating or endless chain propellers, I do not mean to claim the invention of the endless chain propeller, or the application of the endless chains to communicate power from one wheel to another; but what I do claim as new, and which I desire to secure by letters patent, is suspending the endless chain propeller, which is to be put in motion by an endless chain running on the side wheel on the principal drum under water, in a rigid frame inside of the water tight chamber, the frame being capable of an upward and downward motion, parallel to itself, by means of the four racks and pinions, or their equivalents, acted upon by gearing connected each to each, said frame being connected with an indicator, by which the situation of the propeller may be ascertained; the whole constructed substantially in the manner and for the purposes herein described.

Second. I claim the sliding lid to the aperture in the bottom of the vessel, through which the propeller projects when lowered for operation; but when the propeller is raised inside of the vessel, the lid closes the aperture, so that the speed of the vessel may not be impeded, when under sail alone, by the action of the water on the aperture in the bottom, said sliding lid being worked by a screw, or its equivalent, in connexion with an indicator, by which the position of the lid can be seen, substantially as herein described.

CHARLES F. FISHER.

No. 8408.—*Improvement in devices for sowing, in a Seed Planter.*

Having thus described the construction and operation of my drill, what I claim therein as new, and desire to secure by letters patent, is the novel manner of discharging the seed by the natural motion of the horse or animal, while in the act of walking and propelling the drill, without the aid of wheels, with the arrangement of levers, arms, &c., for discharging the seed, or their equivalents, operating in the manner and for the purpose herein fully set forth and represented.

W. P. CLEMENTS.

No. 8409.—*Improvement in Escapements for Time Pieces.*

What I claim, and that for which I respectfully pray a patent may be granted, is the combination of the pallets and lever or levers here set forth with the above-described mode of communicating impulse to the balance in time pieces which keep time by means of a balance.

JAMES FULTON.

No. 8410.—*Improvement in Running Gear of Locomotives.*

What I claim as my invention, and desire to secure by letters patent, is the manner of employing the unflanged driving wheels, A, connected and arranged as described, with the flanged truck wheels, D, at the forward end of the engine, in combination with the flanged driving wheels, B, for the purpose of increasing the traction or adhesion of the driving wheels to the rails for overcoming steep grades without increasing the weight of the engine.

JAMES H. MURRILL.

No. 8411.—*Improvements in Revolving Boilers.*

Having thus fully described the nature of my improvements in steam boilers, what I claim therein as new, and desire to secure by letters patent, is the combination of the small cylinders, (*c, d*,) provided with apertures and rims as described, with the distributing chambers, (*f, f'*;) the whole revolving around a common axis, and operating substantially as described.

WILLIAM SCOTT.

No. 8412.—*Improvement in Revolving Breech Pistols.*

I do not claim to make the latch hook alone revolve on the barrel, but I claim the improvement of so connecting or combining the latch hook, the slide bearing of the rammer, and the lever with the barrel, by means of the swivel tube, or any analogous contrivance, as to enable them to be all simultaneously turned laterally, or revolve around the axis of the barrel, and thereby remove any obstruction to the elevation or upward movement of the barrel, such as may be necessary in order to effect the removal of the cylinder of charging chambers from the arbor on which it is supported.

JOSHUA STEVENS.

No. 8413.—*Improvement in Apparatus for warming Air and Water for Dwellings.*

What I claim as my invention, and desire to secure by letters patent, is the construction of a fire-proof apartment in houses, extending from the lowest extremity of the house to the roof, with furnaces at the bottom, the smoke pipes of other fires entering it, and winding along its walls to a chimney at the top, and with openings to let the heat in the apartment into the house, or up the chimney; and also for the construction of cisterns within the fire proof apartments, with pipes as above described.

LE GRAND C. ST. JOHN.

No. 8414.—*Improvement in Machines for cutting Screws on Posts and Rails of Bedsteads.*

What I claim as my invention, and desire to secure by letters patent, is the trifurcated travellers, G, in combination with the right and left screw axle, B, B, the carriage, H, saddles, I, hollow axle, *t*, and cutters, *s* and *v*, whereby the threads of two beam tenons and two sockets are cut by one and the same operation; the several devices being constructed and arranged in the manner and for the purposes herein set forth.

ORION THORNLEY.

No. 8415.—*Improvement in Portable Elevated Ovens.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement, as herein described, of the inner and outer concentric tubes with respect to the oven and pot hole, as described, whereby the oven is equally heated by a small fire, and the heat is directed by the inner upright pipe against the bottom of the kettle or other vessel; thus enabling the user to conduct simultaneously the several operations of baking and boiling with a small fire, and with economy of fuel.

PATRICK KILLIN.

No. 8416.—*Improvement in Machines for cutting Screws on Rails of Bedsteads.*

Having thus fully described the construction and operation of my hand implement for cutting right and left-handed screws on tenons of bedstead rails, what I claim as my invention, and desire to secure by letters patent, is—

First. In combination with the central screw shaft, D, through which the rotation of the cylinder, A, is effected, the hollow screw shaft, E, provided with an inverse and male screw thread and cylindrical case, F, having an inverse screw thread matching with the male screw thread of the hollow shaft, E; the whole being arranged as above set forth, and operated by means of the bolts, C and *b*, and cam, H, on the cross head, in such a manner as to feed the cylinder, A, frontward simultaneously with a right or leftward rotation thereof, as fully described and shown in the drawings.

Second. I also claim the employment of the screw shanks, J, J, provided with toothed wheels, K, K, made to match with toothed or ribbed plates, L, L, forming one of the sides of each box; the outer ends of said screw shanks, J, J, being confined in inverse screws, formed in plates *d, d;* whilst their inner or pointed ends are supported by plates, *k, k*, having projections k^2, k^2, against which the shoulder of the rail acts, for the purpose of actuating said screw shanks rotarily for imparting thereto a lateral movement, in such a manner as to cause their pointed ends to enter the rail, and be locked thereto by the spring levers, M; said screw shanks, J, being detached from the rail, when unlocked, by simply withdrawing the implement therefrom, as fully described and shown in figs. 2 and 3.

Third. I further claim the employment of the semi-circular plate, O, of the cross head, *c*, in combination with the spring levers, M, M, for the purpose of actuating said spring levers, M, in locking and unlocking the plates, *k, k*, of the screw shanks, J, J, at the terminus of the receding movement of the cylinder, A, whether cutting the right or left screw, as described and represented.

Fonrth. I also claim confining each V-shaped cutter, P, to the reversible cylinder, A, by means of the segmental brace plate, R, notched at one end, so as to interlock with the end of the shank of the cutter, projecting through an opening, S[a], in the cylinder, whilst its opposite end is made to fit against the frontward portion of the cutter, at S[a], said segmental brace-plate, R, being secured by means of a screw bolt, *s*, passing through it and the cylinder, and pressing upon the shank of the cutter, P, in such a manner as to form a complete lock thereto; there being a binding pressure at four points upon the cutter, viz: at either extremity thereof, at the connexion of the brace-plate, R, with the frontward end of the cutter, and the centre, by the confining screw bolt S, thus rendering it impossible to move the cutter without fracturing the segmental brace-plate, R, and displacing the screw bolts, S, as described and represented.

S. LEWIS.

No. 8417.—*Improvements in Locomotives moved by the power of Animals.*

Having thus described my apparatus for applying the force exerted by animals to the purposes of locomotion, what I claim therein as new, and desire to secure by letters patent, is—

First. The combination with the endless platform of an adjusting apparatus, by means of which the inclination of the platform to the frame of the power carriage may be varied, to enable the horses to work to the least advantage, whether to accelerate or to retard the movement of the impulsoria in traversing ascending or descending grades.

Second. I also claim the method of connecting the frame of the impulsoria with the pilot by means of a longitudinal shaft, which is fitted with mechanism, by means of which the impulsoria can be adjusted, transversely, to keep the driving axle level, and to prevent the endless platform from sloping crosswise when traversing a road, one of whose sides is higher than the other.

And, lastly, I claim, in an apparatus adapted to propulsion by animals, substantially as herein described, the employment of a single driving wheel, arranged in such manner as to admit of being leaned toward the hill, in travelling across slopes, to prevent a transverse sloping of the endless platform, in which the animals walk when the wheel thus arranged is steadied by a pilot before and a follower behind, or their equivalent, substantially as herein set forth.

CLEMENT MASSERANO.

No. 8418.—*Improvement in Insulators for Telegraph Wires.*

What I claim, and desire to secure by letters patent, is the re entering angle, at or near the base of the cup, as described, for the purpose of giving the wind a direction downwards, thereby preventing the rain that is driven by the wind from entering the cavity of the cup.

I also claim the annular disk, or washer, supported upon the centre shank or rod, and so placed within or at the open or lower end of the inverted cup as to prevent the free access of wind and rain to the inside of the the cup.

I do not claim the mode of embedding the shank in glass cast around it; but I do claim the application of the enamel, or glazing of porcelain, glass, or other vitrified, non-conducting material, to a surface of metal, when the same is used for insulating the wires of the electric telegraph.

JOHN MONTGOMERY BATCHELDER.

No. 8419.—*Improvement in Insulators for Telegraph Wires.*

What I claim as my invention, and desire to secure by letters patent, is my improved insulating supporter for telegraphic wires, composed of the supporting and protecting cover, A, the winged tube, B, the wire holder, C, and the insulating segments, *d*, *d*, arranged and combined with each other substantially in the manner herein represented and described.

Z. C. ROBBINS.

No. 8420.—*Improvement in Imitating Marble.*

What I claim as my invention is the process, substantially as described, of preparing and applying colors to glass, or other suitable transparent medium, so as to imitate the varied or colored appearance of polished marble or other mineral.

HIRAM TUCKER.

No. 8421.—*Improvement in Shower Baths.*

What I claim as my invention, and desire to secure by letters patent, is the manner of hitching and unhitching the bath, for the purpose of suspending it when raised, and lowering it when desired, by means of the hooks, L, P, in combination with the looped strap, I, carrying a pulley, K, arranged and operating in connexion with another pulley, M, substantially as shown and described.

WM. H. BROWN.

No. 8122.—*Improvements in Machines for Cutting Corks.*

Having thus fully described my improved cork-cutting machine, what I claim therein as new, and for which I desire to secure letters patent, is the cylindrical crown cutters, substantially as herein described, formed of an adjustable, cylindrical, smooth knife, surrounded by a burr cutter, the relative positions being adjustable, and the two being separable for sharpening, as fully set forth in the above description.

GEORGE HAMMER.

No. 8423.—(Suspended.)

No. 8424.—*Improvement in Machines for twisting Fringes of Shawls, &c.*

But what we claim as our invention, and desire to secure by letters patent, is the method of selecting from the mass the threads which are to be twisted into separate strands, by means of a reciprocating or vibratory finger, or the equivalent thereof, substantially as described, in combination with the first shell and wheel, or their equivalents, substantially as described, for giving the twist to the strands, as described.

We also claim, in combination with the first twister, the employment of the finger or fingers, or the equivalent thereof, for selecting and drawing together the strands which are to be twisted together to form the fringe, as described; and in combination therewith, we also claim the second twisting wheel and shell, or their equivalent, substantially as described.

JOHN NESMITH,
WESLEY SAWYER.

No. 8425.—*Improvement in Grinding Mills.*

I do not claim the original invention of the crushing cylinders, nor of a conical cast iron mill for grinding substances. But what I do claim as my invention, and desire to secure by letters patent, is the mode and manner of feeding the material to be ground directly from the crushing cylinders, through the opening in the outer cone, C, into the cavity in cone B, through the four openings therein, as they pass in turn under the opening in C, aforesaid, and thence, through the same openings, out of said cavity, between the two grinding cylinders, B and C; and also the mode and manner of making the said openings by the introvenient points, *e, e, e, e*.

And I also claim the arrangement of the teeth of the outer cone, C, into two sets: the first section at the smaller end being large and coarse, and turned so as to cut against the edges of the corresponding teeth of cone B; while the other section of teeth, or those towards the larger end, are finer, and turned in the opposite direction, so that their backs, and not their edges, are cut and ground upon by the edges of the corresponding teeth of cone B.

WILLIAM NEWLOVE.

No. 8426.—*Improved Door Lock.*

What I claim as my invention, and desire to secure by letters patent, is the combination in the same lock of the bolts, provided with two sets of diagonal slats, or their equivalents, the slide, running at right angles thereto, having pins, or their equivalents, and two key notches, and the drops acting as described, by which I make a right and left-hand lock, which must be locked before the key can be withdrawn, and which forces the operator to turn the key in a certain but different direction, according as either edge of the lock is uppermost.

CHARLES H. BEATTY.

No. 8427.—*Improvements in Machines for making Nuts, Washers, &c.*

What I claim as my invention, and desire to secure by letters patent, is the compressing and discharging the nut, or washer, by means of the follower or hollow piston, the bracket, the cross-head, and the moving die box, constructed and operating substantially as described.

WILLIAM KENYON

No. 8428.—*Improvement in Axle Boxes for Railroad Cars.*

Having thus fully described my improved oil box, what I claim therein as new, and desire to secure by letters patent, is the sliding partition, (*e*,) operated upon by a screw, or its equivalent, in combination with the inclined bottom at the inner end of the packing space, condensing the packing more at the inner end of the packing space than at the partition, whereby the oil is prevented from escaping, as well as insuring a constant supply of oil to the journal, substantially as herein set forth.

ROBERT LEVINGTON.

No. 8429.—*Improvement in Water Wheels.*

What I claim as my improvement is the combination of the curved partition, *d*, and the air space or passage, *p*, with each two buckets, and for the purpose of causing the escape of air from the bucket into the next one in rear, all substantially as specified.

JAMES L. PARKER.

No. 8430.—*Improvement in Overshot Water Wheels.*

What I claim as my invention, and desire to secure by letters patent, is the self-acting gates attached to the buckets of an overshot water wheel, in the manner described, and for the purposes herein set forth.

EDMUND SHEETZ.

No. 8431.—*Improved Pad Lock.*

Having thus fully described my improved pad lock, and its mode of operation, what I claim therein as new, and desire to secure by letters patent, is the arrangement of the bolt, tumblers, and springs, as herein set forth, the tumblers and bolt being operated by the same springs, which also serve the purpose of throwing out the shackle, the tumblers projecting beyond the end of the bolt for that purpose; all substantially as herein described.

THOMAS SLAIGHT.

No. 8432.—*Improvement in Stoves.*

What I claim therein as new, and desire to secure by letters paten of the United States, is making, as described, a space between the fire place and the back oven, the terminus of all the flues, and causing the vertical flue between the ovens to be an ascending or decending flue. by means of the register damper, as described. And I furthermore claim the combination of the first with the second feature, for the purpose and in the manner described.

ELISHA VANCE.

No. 8433.—*Improvement in Lamps for burning Vapor of Benzole, &c.*

What I claim as my invention, and desire to secure by letters patent, is the generator and lamp herein described, consisting essentially of chambers long and narrow at their lower extremities, and fitted with pipes, or their equivalents, for the introduction of air, the said chambers communicating at their upper extremities with a common reservoir, or vapor space, or chest, in which the vapors from the chambers are mingled prior to burning, and the relative volumes of the inflammable vapors being regulated by the adjustment of the respective currents of air, whereby the regular, proportionate, and economical consumption of the fluids is insured, and an equable light of the requisite intensity and volume is maintained, substantially as herein set forth.

CHAPMAN WARNER.

No. 8434.—*Improved Furnace employed in welding Shanks to Tools.*

Having thus described my improvements, I shall state my claims, as follow:

What I claim as my invention, and desire to have secured to me by letters patent, is the combination of the groove formed in the brick work above the fire with the aperture, *h*, *h*, leading thereto, and the reverberatory channel and exit flue leading therefrom, arranged with reference to each other and the fire, substantially in the manner described, whereby the flames, gases, &c., are caused to act upon both sides of such portions of the blade and shank as are to be welded to each other, and the other portions of the blade are protected from the heat, substantially as described.

JONATHAN WHITE.

No. 8435.—*Improvement in Air-heating Stoves.*

What I claim as my invention is as follows—that is to say: I claim the air space, I, I, the curved chamber, H, the series of descending pipes, K, K, and the ascending pipe, N, in combination with the air space, X, the chamber of combustion, and ash pit or chamber; all essentially in manner as specified.

GORDIN WILLISTON.

No. 8436.—*Improvement in Solar Lamps for burning Lard or Oils.*

Having thus described my invention, I do not claim either the use or construction of the deflector, button, or any part of the lamp separately considered; but what I do claim as my invention, and desire to secure by letters patent, is the combination of the stationary or an adjustable button, E, with a deflector of metal, B, placed above the base of the flame, attached to any lamp constructed with an argand burner for consuming lard or crude oil, substantially arranged as set forth in the foregoing specification.

JOHN G. WEBB.

No. 8437.—*Improvement in Argand Gas Burners.*

I therefore claim the construction and use of an argand burner and button, with a cone to regulate a supply of air to the base of the flame, in combination with an outside draught between the cone and a suitable glass chimney, to complete the combustion and turn the flame over the button, such parts being applied to burning carburetted hydrogen, or similar gas, substantially as described and shown.

JOHN G. WEBB.

No. 8438.—*Improvement in Insulators for Telegraphs.*

What I claim as my invention, and desire to secure by letters patent, is casting the glass insulators of magnetic telegraph and other wires of a cylindrical form, with a flange at one end eccentric with the periphery of the same, its upper part being even with the top, and its lower part dropped slightly below the cylinder, and forming the bore of the cylinder, likewise eccentric with the periphery, so as to allow a greater body of glass to form at its lower part than its upper part, where it is slit from its outer to its inner periphery, to allow the insertion of the wire, and inserting the insulator so formed into a horizontal hole, into which the wire is previously introduced through a slit at its side, bored through the post, or through a bracket secured on its side, or to a tree, and corresponding with the form of the flange which fits therein in such a manner as to insulate the wire from contact with the post, and prevent the glass from slipping round, and consequently the escape of the wire from the glass, as herein described, or in any other form, substantially the same as the form and modifications above described.

JOHN YANDELL.

No. 8439.—*Improvement in Burglar Alarms.*

My claims in the above-described invention I shall confine to a group or train of barrels or firing chambers, in combination with the pierced fuse and vent holes, constructed, prepared, and operated essentially in the manner and for the purposes above set forth and described.

JOHN G. BOLEN.

No. 8440.—*Improvement in the Tops of Cans or Canisters.*

Having thus fully described my invention, and the advantages thereof, what I claim therein as new, and desire to secure by letters patent, is the swaging or striking up the collar to receive the cover on the conical frustum, in place of soldering a separate one on, as heretofore.

ALFRED BLISS.

No. 8441.—*Improvement in Air-heating Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the combination of a revolving cylinder or cylinders with a fire-grate, to form a heating apparatus, as above described.

CHARLES A. BOGERT.

No. 8442.—*Improvement in Ships' Winches.*

Having described my invention, its mode of construction and operation, I do not claim the rigging of a winch or windlass with counter falls, for the hoisting and lowering of burdens on the counterpoise principle, at whatever relative distance of hoisting and lowering it may be fixed, simply as such; but I claim the combination in a ship winch of the principle of adjustability with the principle of counterpoise, whereby I am enabled to vary the relative distances of the hoisting to that of the lowering motion, so as to adapt its action to various changes of the relative distances of the hoisting to that of the lowering, as required in the lading and unlading of vessels.

I claim also therewith the principle of using a hoisting in connexion with a lowering fall, so that the burden is hoisted by one fall and lowered by the other, instead of interchanging the falls so that each load or parcel is both raised and lowered by the same fall, as has been practised in other counterpoise machines, by which means my winch is more convenient to use than it would otherwise be when the hoisting and lowering distances are dissimilar.

Second. I claim a fall or chain and hook, suspended over the deck or scaffold, working as a suspension chain and medium of transfer from the hoisting to the lowering fall of a ship winch, whereby I am enabled, as described, to transfer packages or burdens in sling from the hoisting to the lowering fall without reslinging or otherwise resting them.

THOMAS G. BOONE.

No. 8443.—*Improved Ore Washer.*

What I claim as my invention, and desire to secure by letters patent, is the combining in the same separating cistern the spiral channel, having a discharge aperture at the centre, and the revolving dasher, whose arms are immediately above the channel, for the purpose of separating metals from the impurities with which they are mechanically mixed, by acting in the manner substantially as described.

And I claim this construction, irrespective of the use of quicksilver in the channel, which may in some cases be dispensed with.

ARNOLD BUFFUM.

No. 8444.—*Improvements in dressing Cotton Duck.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the process, herein described, of softening and stretching cotton duck, by subjecting it, whilst strained, to jets of steam, and passing it over, under, or around heated stationary friction rollers, and between and around rotary pressing calender rollers, for the purposes herein specially set forth and described.

HORATIO M. GAMBRILL

No. 8445.—*Improvement in Printing Presses.*

What we claim as our invention, and desire to secure by letters patent is arranging upon a horizontally reciprocating carriage a blanket frame, D, pressing cylinder, C, set of inking rollers, J, and sheet-flyer, N, in such a manner that the two ends of the pressing cylinder shall roll upon the side rails, B, thus constituting a pair of the carrying wheels of the carriage, and producing a rotary motion of the pressing cylinder as it

passes over the type-form, and whereby the requisite motion is given to the blanket; the several parts being constructed and arranged substantially in the manner and for the purposes herein set forth.

JOHN R. HATHAWAY,
JOHN P. STRIPPEL.

No. 8446.—*Improvement in Washing Apparatus.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is the application of boiler, (*h*,) with or without divisions, placed over the revolving boiler, resting on frame, (*i*,) the bottom of which boiler forms the upper half of the flue, (*m*,) by which both boilers are heated by the same fire, and from which the revolving boiler may be supplied with water, as herein fully described and represented.

JAMES T. KING.

No. 8447.—*Improvements in Apparatus for regulating the Speed of Engines.*

What I claim as my invention, and desire to secure by letters patent, is governing the throw of the variable cut off eccentric, C, for the purpose of operating the cut-off so as to regulate or equalize the speed and power of the engine, by means of the balance of or difference between the constant friction produced by the revolution of a pulley, Y, which is hung loosely upon the same shaft with the said eccentric, and driven at a speed which always bears the same proportion to, but is greater than the speed of the shaft, and the variable friction of a brake shaft, T, upon a wheel, D, which is also hung loosely upon the same shaft, and which receives or is acted upon by the aforesaid constant friction of the pulley, the tightness of the brake strap, and the friction produced by its being controlled by a common steam engine governor; the whole operating substantially as described, the said balance or difference of friction producing either a uniformity or difference between the speed of the shaft and of the wheel, D, and the said difference in speed causing motion to be given to any train of mechanism, substantially such as is described, in communication with the eccentric.

H. A. LUTTGENS.

No 8448.—*Improvement in Machinery for enamelling Mouldings, &c.*

What I claim as my own invention is the arrangement of the conveyor, constructed so as to form, in connexion with the moulding or the article to be enamelled, a reservoir to contain the composition, said moulding forming, as it were, a sliding bottom to the reservoir, by which means the composition is spread upon its surface, as set forth. I claim also the clamp for fastening and releasing the end of the article to be enamelled; the whole being constructed and operating substantially in the manner and for the purpose described therein.

ROB'T MARCHER

No. 8449.—*Improvement in the Mouth-Piece for Wind Instruments.*

What I claim as my invention, and desire to secure by letters patent, is a mouth-piece, with an artificial embouchure, or lips, attached to it, using for that purpose any elastic and water-proof material which will produce the intended effect.

CHARLES L. MEECH.

No. 8450.—*Improvement in Sugar Vacuum Pans.*

Having thus fully described my improved apparatus, and its purposes, I claim as my invention, and desire to secure by letters patent, firstly, the evaporating and condensing tubes, constructed and arranged in the manner and for the purpose set forth; they, being attached at one point only, through which the steam enters, have freedom to expand or contract without injury; and the evaporating tubes being combined at the centre of the series, as above especially set forth, with the boiler, the steam is conveyed from the boiler to the extremities of all the tubes in the most direct manner.

I also claim connecting the filters with the vacuum pan, in the manner and for the purpose set forth, so that the vacuum pan shall perform the double office of making the vacuum in the filter and boiling in vacuo.

I also claim the construction and arrangement of the condenser tubes, above specified, the ends of said tube being turned back inward nearly the whole length of the outer portion, as distinctly shown in the drawing.

J. M. MILLER.

No. 8451.—*Improvement in Running Gear of Railroad Cars.*

What I claim as my invention, and desire to secure by letters patent, is the employment of the bar, B, B, and ball and socket joint, D, E, attached to the end of B, B, with a hinge in combination with the pivot, C, on the truck-frame, for directing and turning said frames, (but not drawing the train by said ball and socket-joint, as I do not dispense with the ordinary traction or coupling bar, H,) and thus bring the axis of each truck coincident with the radii of the curve of the track, and lead the whole train over any point on the track previously passed by the locomotive, without requiring the action or aid of the flanges, or any of the wheels, except those on the locomotive; thus preventing the abrasion or wear of the rails and liability of the train being thrown off.

W. NEBINGER.

No. 8452.—*Improvement in Piano Forte Strings.*

I do not claim, as my invention, simply the application of silver to the strings of pianos, for the purpose stated, as that has before been done by wrapping the strings with silver wire; but, when wrapped with wire, are liable to rattle when struck by the hammers.

What I do claim as my invention, and desire to secure by letters patent, is coating the smaller strings of pianos with silver, or an alloy thereof, for the purpose of improving the tone and preventing the rusting of the strings, substantially as specified.

HENRY J. NEWTON.

No. 8453.—*Improvement in Excavating Machines.*

Having thus fully described the nature of my invention, what I claim therein as new, and desire to secure by letters patent, is the within-described arrangement of parts, by which the elevators can be raised or lowered to correspond with any irregularity or unevenness of ground.

And I also claim making the operation of dumping self-operating, by means of the friction roller acting on the periphery of a pulley permanently attached to the shaft, as herein fully described and represented, and for the purpose made known.

BENJAMIN W. REMY.

No. 8454.—*Improvement in Saddles.*

What I claim as my invention, and desire to secure by letters patent, is the combination of levers and spring as set forth in the specification and drawings.

JOHN C. FR. SALOMON.

No. 8455.—*Improvement in Cast Iron Car Wheels.*

What I claim as my invention, and desire to secure by letters patent, in the shape of cast-iron car wheels, is the forming of said wheels with corrugations in the direction of the radii, which corrugations are reversed in passing from the hub to the rim, so that the parts convex at the hub, in passing towards the rim, gradually lessen their convexity, and then become concave, and increase in their concavity till they reach the rim; and so that, on the other hand, the parts concave at the hub, in passing towards the rim, gradually lessen their concavity, and then become convex, and increase in their convexity till they reach the rim; the arches or central lines of the corrugations thus cutting obliquely and passing through, alternately, from one side and from the other, a plane supposed to be at right angles to the axis of the wheel, and to pass through the middle of the hub; and the said corrugations, in their radial direction, being either straight or curved; the whole constructed substantially in the manner and for the objects herein set forth.

BENJAMIN SEVERSON.

No. 8456.—*Improvements in Machinery for shaving, nicking, and re-shaving Wood Screws.*

Having thus described the principle or character of my invention, and the manner of constructing and using the same, I wish it to be distinctly understood that I do not limit myself to the precise construction and arrangement of the parts, as these may be variously modified without affecting the principle or mode of operation which I have invented and claim to be new.

What I do claim as my invention, and desire to secure by letters patent, is so combining the shifting mandrel that carries the blanks with a shaving and nicking apparatus, substantially as described, that the blank, after being shaved to give the required form to the head, and whilst held in the same mandrel, may be shifted to the nicking apparatus, and, after being nicked, reshifted back to the same shaving apparatus, to have the bars removed by the same cutter that performed the first shaving operation, as herein set forth.

I also claim the employment of two shifting mandrels, substantially as specified, in combination with the shaving and the nicking apparatus, substantially as herein described, so that the nicking operation can be performed on one blank whilst the first and second shaving operations are being performed on other blanks, as specified.

And I also claim giving to the mandrel, or mandrels, end-play in their boxes, in combination with the permanent rest at the back of the mandrel, and with the cutter, substantially as specified, by means of which the same position of the blank relatively to the cutter is obtained for the second shaving operation which it had for the first, as described.

THOS. J. SLOAN.

No. 8457.—*Improvement in Box Opener.*

What I claim as new, and desire to secure by letters patent, in an instrument for opening boxes, is the combination of the lever, A, with the brace, F, constructed and operating substantially as described, either with or without the heel, H.

GEO. C. TAFT.

No. 8458.—*Improvement in Machines for Dressing Stone.*

Having thus fully described the construction and operation of my machine, what I claim therein as new, and desire to secure by letters patent, is the manner of attaching the pick-head to a strong, but flexible steel spring, which falls on a box spring, whereby the desirable whip or spring blow is given to the pick, substantially as described.

I also claim the combination of the lever, F, and connecting lever, G, and crank screw, for graduating the action of the pick while cutting the furrow of mill stones, gradually decreasing the force of the blow as the pick approaches the feather edge of the furrow, substantially as described and represented.

JOSEPH Y. TILTON.

No. 8459.—*Improvement in the Seeding Apparatus of a Seed Planter.*

What I claim as my invention, which I desire secured to me by letters patent, is giving the seed-rollers an intermittent rotary motion, substantially in the manner and for the purposes set forth.

CORNELIUS C. VAN EVERY.

No 8460 —*Improvement in Machines for peeling and cutting Peaches.*

What I claim as my invention, and desire to secure by letters patent, is the application of a revolving rasping surface to the purpose of peeling peaches, or other like fruits; and also the method of cutting peaches by a knife revolving in a box, having an opening in the bottom, in such a manner that the stone of the peach is struck out and the pulp thereof cut into pieces proper for drying, in the manner above described. And

I claim and desire that such letters patent should secure to me the aforesaid methods of peeling peaches, and of cutting the same, as well separately as when combined together, in the manner hereinbefore particularly described.

JOSHUA O. WARD.

No. 8461.—*Improvement in Swinging Cradles.*

What I claim as my invention, and desire to secure by letters patent, is the self-adjusting pivot or connexion, produced by the ball or weight, M, suspended from the arc, o, o, by bent rods or hooks, P, P, said hooks having sufficient adhesion to communicate motion to the cradle from the motive-power before described; thus constituting a sliding instead of a fixed pivot upon the end of the cradle, making it a matter of indifference on which side of the cradle the child may be lying, without stopping the motion of the cradle, which, with the crank alone, would stop. The action of this cradle is so gentle, and works so steadily, as to be free from noise.

LUCIUS F. WHITAKER.

No. 8462.—*Improvement in Portable Water Closets.*

Having thus fully described the nature of my invention, and the manner in which it is constructed, what I claim as new, and desire to secure by letters patent, is the manner of construction as described, and for the purpose specified, viz: the vessel, B, resting upon the partition, *a*, in the interior of the case, A, and the circular rim, D, projecting a short distance over the edge of the cover, C, when on the vessel, B, and resting upon the top edge of the vessel, B, when the cover, C, is off of it, in order to form the seat; the whole arrangement being covered by the cover, E, of the case, A, substantially as set forth.

GEO. R. WILMOT.

No. 8463.—*Improvement in Seed Planters.*

Having thus described the nature and operation of my invention, I will now state what I claim as new, and desire to secure by letters patent.

I claim the employment of the indicator, I, having its ends bent as described, or in any other manner substantially the same, and secured on the main shaft in such a manner that it can be disengaged or thrown into connexion with the wheel as desired, for the purpose of indicating the place where the corn has been planted, in the manner and for the purposes substantially as set forth.

MYRON CORY.

No. 8464.—*Improved means for attaching Augers, &c., to their handles.*

Having thus described the nature of my invention, and the manner in which it is constructed, what I claim as new, and desire to secure by letters patent, is the method of securing augers, and other implements, to handles by means of a socket, D, and ferrule, or cylindrical slide, E, constructed as described, viz: the socket being placed underneath a mortise hole, C, in the handle, and perforated with an oblong slot, *(a,)* the edges of the slot being bevelled to correspond to notches *(c)* in the shank, B, of the implement, the upper surface of the socket being inclined, and the shank, B, moved along the slot *(a)* by means of the ferrule or cylindrical slide, by which the bevelled edges of the slot bind or wedge in the notches, and the taper form of the shank drawn firmly in the hole (*d*) through the ferrule or slide, substantially as described.

MERRITT S. BROOKS.

No. 8465.—*Improvement in Machines for pegging Boots and Shoes.*

Having thus described my improvement in the implement for pegging shoes, what I claim as new, and desire to secure by letters patent, is splitting the peg from the peg-wood, and driving it into the sole of the shoe, by a single blow of the plate, E, acting on the peg-wood, and forcing it upon the knife, I, substantially as herein described.

I also claim mounting the peg-wood or block in a vertically sliding carriage, or the equivalent thereof, in combination with the stop-plate, S', knife, I, and fingers, T', operated substantially as herein set forth.

A. C. GALLAHUE.

No. 8466.—*Improvement in Machines for drying Bagasse.*

Having thus fully described my improvements in apparatus for drying bagasse, &c., I wish it to be understood that I do not claim for such purposes a heated cylinder, revolving upon an inclined axis, such cylinders, in various forms, having been long in use; but what I claim herein as new and of my invention, and desire to secure by letters patent, is—

Firstly. The arrangement (substantially as herein described) of two cylinders, one so secured (by hollow bolts or rivets) concentrically within the other as to leave between them an annular steam space, crossed by ventilating apertures, and the whole made to revolve around an inclined axis, for the expeditious drying (free from the danger of accidental ignition) of bagasse, and other like substances.

Secondly. The steam and condensed water pipes, revolving together (one within the other) within a common journal bearing, and entering the steam space of the cylinder, in oppositely oblique directions, as described, for facilitating at the same time the discharge of the water and the omission of steam, during the revolution of the cylinder.

SAMUEL H. GILMAN.

No. 8467.—*Improvement in Boot Trees.*

What I claim as my invention, and desire to secure by letters patent is the set-screws, *m* and *n*, and plate, *x*, in combination with the screw, *g*, substantially in the manner and for the purpose herein described and set forth.

D. R. HENDRIX.

No. 8468.—*Improvement in Swinging Cradles.*

What I claim as my invention, and desire to secure by letters patent, is the combination of a cradle with pendulum rods and balls, or weights, attached thereto, and set in a frame so as to swing therein, in the manner and for the purpose above set forth.

SELDEN W. KNOWLES.

No. 8469.—*Improvement in Oil Presses.*

Having described my invention, what I claim as new, and wish to secure by letters patent, is as follows—

The combination of the heating plates with the steam chamber, substantially as herein set forth, the plates being moved parallel, and the steam tubes connecting them with the steam chamber sliding in stuffing boxes in a line with the motion of the plates above set forth, said steam chamber being placed in a proper relative position with the plates for that purpose.

D. L. LATOURETTE.

No. 8470.—*Improvement in Piano Fortes.*

What I claim as my invention, and desire to secure by letters patent, is, first, the manner, substantially as herein described, of placing or arranging the strings of a piano forte, to wit: the shorter string or strings of the higher octaves across the narrower portion of the instrument, and the longer strings, or those of the lower octaves, crossing them in the direction of the greatest length of the instrument, so as to include the greatest possible size of string within the instrument, for the purposes specified.

FR. MATHUSHEK.

No. 8471.—*Improvement in the method of moulding Kettles with Spouts.*

Having thus described my method of moulding tea kettles, I do not claim any peculiarity either in dividing the pattern or using a green-sand core; but what I do claim as my invention, and desire to secure by letters patent, is providing the pattern, B, with two projections or solid pieces—one, G, on the under side of the spout portion, D, to prevent sand entering the spout when forming the green core of the body, and the other, H, on the upper side of the spout, D, for forming a print in the sand to receive the projection, I, of a dry sand core, G', I, by the use of which, in connexion, the said dry sand spout core, G' I, can be inserted in the drag portion of the mould after the removal of B, but before the removal of A, and be held firmly in its required position, by which means the pattern, A, is made to adjust the spout core, and greater truth secured in setting the spout core, and fewer defective casts result; in the manner set forth substantially in this specification and accompanying drawings.

W. H. PEASE.

No. 8472.—*Improvement in Dairy Stoves.*

Having thus fully described the improved apparatus, and its mode of construction, what we claim therein, and desire to secure by letters patent, is, first, the arrangement of the flues and valves in combination with a water pan and fire-box, substantially in the manner and for the purpose set forth.

We also claim the combination of flues and valves as herein specifically mentioned, for the purposes described.

JOEL STEVENS,
H. J. RUGGLES.

No. 8473.—*Improvement in Machines for taking Yeas and Nays.*

What we claim as our invention, and desire to secure by letters patent, is the method of dividing the yea and nay votes, and showing the vote by weighing the yea and nay balls, or their equivalents, in the opposite pans of a scale beam, substantially as herein set forth.

We also claim the method of enumerating the votes upon a question by weighing the balls, or their equivalents, by spring balances, or their equivalents, whose indexes indicate the number of ballots in their respective scale pans, substantially as herein set forth.

We also claim the combination of the scale beam and spring balances, or the equivalent thereof, arranged substantially as herein described, for the purpose of showing simultaneously both the number of votes taken on each side of the question and the relative values of the two sets or classes of votes, as herein set forth.

We also claim the employment of mechanism for the purpose of recording the vote and showing whether it is yea or nay at a single operation, substantially as herein described.

We also claim the employment of mechanism for the purpose of recording the vote and showing the enumeration thereof at a single operation, substantially as herein described.

And, lastly, we claim the employment of mechanism for the purpose of recording and enumerating the vote, and showing whether it is yea or nay at a single operation, substantially as herein described.

THOS. B. STOUT,
JAMES F. MORELL.

No. 8474.—*Improvement in Cements for grinding Cylinders.*

Having thus fully described my improved composition, and the manner of applying it, what I claim therein as new, and for which I desire to secure letters patent, is the composition herein described, consisting of the whey of milk, vinegar, glue, spirits of wine, and ether, substantially in the manner and for the purpose set forth.

I also claim the combination thereof with emery to construct a grinding cylinder or other surface, in the manner described.

JACOB STEPHEN.

No. 8475.—*Improvement in Machines for printing in Colors.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is in combination with receiving, distributing, and inking rollers, arranged as herein described, the adjustable ink trough, provided with removable partitions, and perforated side, so as to give out the ink in lines or belts, corresponding with the lines or size of the type, in the form for the purpose herein described.

R. S. WEAVER.

No. 8476.—(Suspended.)

No. 8477.—*Improvement in the use of Steam to make Zinc White.*

Having thus fully described the nature of my invention, and some of the means by which the same may be put into practical use, what I claim therein as new, and desire to secure by letters patent, is mixing the vapor or gases of water or steam with the heated vapor of zinc, or of its ores, as set forth, for the purpose of manufacturing zinc white for commercial uses.

I also claim, in combination with the process for manufacturing zinc white, substantially as herein described, the making of hydrogen gas for light, heat, or motive power, as herein fully set forth.

HENRY W. ADAMS.

No. 8478.—*Improvement in Baby Jumpers.*

I do not claim the use of spring, or the means of giving motion for the purpose of exercise or amusement, as that has been before employed in a variety of ways; but I do claim the combining of springs with a frame and seat in the manner described, forming an apparatus for teaching children to stand and walk, and, at the same time, to prevent the child from bearing its whole weight upon its feet, as it sits upon the seat or saddle, and can at its option either stand upon its feet or sit down; and at the same time move itself in any direction with its feet and its body securely sustained in an upright position, after the upper top is locked around its waist, in the manner described; and it can at its option either move by a motion of its limbs, or use the machine as a jumper for amusement, as the accompanying description and drawing represent.

EUCLID RICE.

No. 8479.—*Improvement in Apparatus for watering Cattle.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is in combination with a pump, worked by an endless chain of elastic balls, and operated upon by the weight of cattle, the spiral spring, *(r,)* operating between a stationary collar and the movable cogged and threaded sleeve, (E,) for the purpose of more certainly running the sleeve into gear when the cattle step upon the platform, and for gradually stopping the platform as it rises, and the buckets as they run back into the stack or pipe, for the purpose of carrying back the water, as herein fully described and represented.

S. W. WOOD.

No. 8480.—*Improvement in Threshing and Separating Grain.*

First. What we claim as our invention, and desire to secure by letters patent, is the method, herein described, of constructing threshing cylinders with curved knives, or otherwise shaped in the end, for the purposes herein described.

Second. Also, the method, already described, of working the separator by means of the jumping wheels and concave tracked brackets, or by any modification of it whereby the action is substantially the same.

CYRUS ROBERTS,
JOHN COX.

No. 8481.—*Improvements in Air-Engines.*

What I claim as my invention, and desire to secure by letters patent, is the working cylinder and piston, and the supply cylinder and piston, of less piston surface, the two pistons being connected with each other, and working together, substantially as specified, in combination with the regenerator and heater, so that the air, or other circulating medium, shall pass from the supply cylinder to the working cylinder through the regenerator, substantially as specified, and give motion to the engine through the difference of area of the pistons; and this I claim, whether the air, or other circulating medium, be made to pass on the return stroke from the regenerator to the supply cylinder, or any other receiver, or into the atmosphere.

I also claim, in connexion with the working cylinder, the employment of two regenerators, substantially as specified, in combination with the valves, or their equivalents, for the purpose of causing the air, or other circulating medium, to pass, during a series of strokes, through one of the regenerators to the working cylinder, and back from the working cylinder through the other regenerators, and then reversing the action, as substantially specified.

I also claim interposing the heater between the regenerator and the working cylinder, substantially as specified, to heat the air, or other circulating medium, as it passes from the regenerator to the working cylinder, as specified, to supply the heat required.

And, finally, I claim communicating the power of the engine to the working beam or its equivalent, by the attachment thereof to one of the pistons, or piston-rods, between the open ends of the two cylinders, said pistons being connected or braced to each other, substantially as specified, whereby I am enabled to render the engine compact, and effectually to brace and connect the two pistons and avoid undue strain, as specified.

J. ERICKSON.

No. 8482.—*Improvement in Machines for forming Horse Collars.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the moving, tapering block with the adjustable stationary dies; the two being constructed and arranged substantially as herein set forth.

ISAAC DAVIS.

No. 8483.—*Improvement in Cultivators.*

What I claim, and desire to secure by letters patent, is the intermediate jointed ploughs, in combination with the main cultivating ploughs, as described, for enabling the ploughman to plough nearer to, or further from, the rows at will.

ISAAC CONSTANT.

No. 8484.—*Improvement in Seed Planter.*

Having thus described the nature and operation of our invention, what we claim as new, and desire to secure by letters patent, is in combination with the seed box, A′, and cap, *n*, arranging the rotating disk, *i*, vertically, and providing it with the projections, *j*, and the stationary vertical disk, *b*, provided with an opening, *h*, for receiving the grain and the flanches, *c*, *e*, between which the said projections rotate, and by which the grain is carried from the seed box to the cap, and thence to the seeding tube; the whole being arranged in the manner and for the purpose specially set forth and described.

NEWTON FOSTER,
GILBERT JESSUP,
HIRAM L. BROWN,
CALVIN P. BROWN.

No. 8485.—*Machine for measuring and cutting Iron.*

What I claim as my invention, and desire to secure by letters patent, is the measuring wheel, placed in any suitable position, in combination with the cutter, bed plate, and spring, or its equivalent; the whole being arranged and combined, substantially as described, for the purpose herein set forth.

LEVI B. GRIFFITH.

No. 8486.—*Improvement in Desks.*

Having thus fully described the construction and operation of my elevating desk, what I claim as new, and of my invention, and desire to secure by letters patent, is the raising of a horizontal surface at the back part of the desk or table when the front part is being raised, to form an inclined plane by means of the arrangement of the screw and lever, or any analogous device, the front part being hinged to the elevating frame, K; the same to be applied to standing or sitting desks or tables, substantially in the manner and for the purpose set forth.

JOHN T. HAMMITT.

No. 8487.—*Improvement in Radiating Surfaces.*

What I claim, and desire to secure by letters patent, is the application of the tapering form to radiating surfaces, constructed in the compact and available manner above described.

JOSHUA K. INGALLS.

No. 8488.—*Improvement in Tanners' Oil from Rosin.*

What I claim as my invention, and desire to secure by letters patent, is the new and original product or manufacture which I denominate Robbins's tanners' oil, or Robbins's curriers' oil, the process of producing which I have herein fully set forth.

I also claim every use and application of my said oil.

LEWIS S. ROBBINS.

No. 8489.—*Improvement in lubricating Oil from Rosin.*

What I claim as my invention, and desire to secure by letters patent, is the new and original product or manufacture which I denominate

Robbins's lubricating oil, the process of producing which I have herein fully set forth.

I also claim every use and application of the said oil.

LEWIS S. ROBBINS.

No. 8490.—*Improvement in distilling Acid and Naphtha from Rosin.*

Having thus fully described my new and improved process of distilling rosin, what I claim therein as my invention, and desire to secure by letters patent, is—

First. The process of separating the acid and water, arising from the decomposition of rosin, at the temperature of 325 degrees Fahrenheit, or thereabout, by means of fire heat, substantially in the manner herein set forth.

I also claim, in combination with the above, the process of separating the naphtha from the other component parts of the rosin by preserving the temperature of the liquid mass within the still at about the range of 325 degrees Fahrenheit, as above stated, and injecting steam into the same, by which I am enabled to throw off the naphtha at the same temperature employed for throwing off the acid.

I do not intend to limit my improved process of distillation, as hereinbefore described, to the production of oil from rosin, but shall employ it for redistilling the crude article known as rosin oil.

LEWIS S. ROBBINS.

No. 8491.—*Improvement in Paint Oil from Rosin.*

What I claim as my invention, and desire to secure by letters patent, is the new and original product or manufacture which I denominate Robbins's paint oil, the process of producing which I have herein fully set forth.

I also claim every use and application of my said oil.

LOUIS S. ROBBINS.

No. 8492.—*Improvement in the manufacture of Charcoal.*

What I claim as my invention, and desire to secure by letters patent, is the iron cylinder with a double bottom, the upper one being perforated, and these combined with several flues, covered at the top with dampers, and protected within with iron rings, the whole so constructed that the fire may be applied either on the top, under the bottom, or within the flues, or in all together, at pleasure; and the whole adapted, as herein described, to the uses and purposes specified, and these only.

WM. P. McCONNELL.

No. 8493.—*Improvement in Folding Doors of Stoves.*

Having thus fully described my improved doors for grates and stoves, what I claim therein as new, and for which I desire to secure letters patent, is the sliding and folding doors, in combination with pilasters, by which I prevent the heating of the doors and warping consequent thereon and admit a free radiation of heat from the side of the stove, substantially in the manner and for the purposes set forth.

JAMES ROOT.

No. 8494.—*Improvement in processes for Dyeing Blue.*

I claim as my invention the mode of producing a dark blue, or color to take the place of indigo, which color can be produced at a very great saving of expense, in comparison to that incurred by the employment of indigo in the usual way.

I do not mean to claim the use of a prussiate of potash dye alone; but do claim the employment of such dye, in combination with either one or more of the above-named woods, substantially in manner as specified.

EDWARD SWINEY.

No. 8495.—*Improvement in Compounds for Extinguishing Fires.*

What I claim is the application of a compound of sulphur and nitre, in a state of combustion, within a room or apartment on fire, for the purpose of extinguishing the fire tending to destroy the said room or building thereof.

JOSHUA UPHAM.

No. 8496.—*Improvement in Springs.*

Having described the nature of my said invention, and the manner of performing the same, I declare that I claim, as of my invention, the above specified mode of arranging or combining springs and inclined planes, or surfaces, curved or plane, so that the points, or arms, of the springs may be applied to or press against the inclines, or inclined planes, for the purpose of thereby obtaining the action of said springs, in manner hereinbefore described.

JAMES WEBSTER.

No. 8497.—*Improvements in Planing Machines.*

Having thus fully described the nature of my invention, what I claim therein as new, and desire to secure by letters patent, is the application of springs or weights to cutter stocks, both at their point, in line with the cutting-edge of the knife, and also to the heel, by which a double action is given to the stock, both at the heel and edge, allowing it to rise and oscillate to the inequalities of boards or plank, substantially as described and for the purposes herein set forth.

GEO. W. BEARDSLEE.

No. 8498.—*Improvement in Carriage Springs.*

My improvement, and, therefore, what I claim, consists in combining buttress blocks, C, D, with the wood bar, A, and the metallic strap bar, B, in such manner, substantially as specified, so that such blocks, when the spring is in use, shall act as levers, to compress the wood and counteract the tendency of the fibres to be elongated and ruptured by the downward strain.

LEVI BISSELL.

No. 8499.—*Improvement in Machines for Dressing Staves.*

What I claim as my invention, and desire to secure by letters patent is dressing staves by means of stationary knives, in combination with a pressure-roller, directly over the cut, when this is combined with the bed, constructed with a raised portion where the cutting is done, for the purpose of allowing a crooked or bent stave freedom of motion while being dressed, substantially as described.

LEWIS S. CHICHESTER.

No. 8500.—*Improvement in Bating and Tanning Hides.*

What I claim as my invention, and desire to secure by letters patent, is the method, herein described, of bating hides and other skins in the process of tanning, by subjecting them to a vapor bath, applied substantially in the manner herein described.

I also claim the combination of the rocking frame and the shaft above, the two being connected, as herein set forth, in such manner that the shaft may be used either to rock the frame or to raise it from the vat.

WM. B. MILLIGAN.

No. 8501.—*Improvement in Cheese, Butter, and Bread Cutters.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the circular revolving table (*e*) and knife, (*l*,) the said knife being attached to the sliding shaft, (*i*,) and operated by means of a treadle (*k*,) and weighted cord and pulley, or their equivalents, so that the cheese, or other article to be cut, may be placed upon the table and not removed until, by a single revolution of the wheel, and a few slight pressures of the foot upon the treadle, it is cut into as many parts as may be desired, without crumbling or waste.

B. F. ADAMS.

No. 8502.—*Improvement in the construction of Scythe Fastenings.*

What I claim as my invention, and desire to secure by letters patent, is the mode of adjusting the lever, D, by rotating the ring, C, around its own axis, by which the point of the scythe is thrown out or drawn in, as shown and described, the upper end of the lever, D, passing through an eye, *g*, attached to the ring, C, the fulcrum of the lever being near the end of the snath, as shown at *e*, and the scythe attached to the lower end of the lever, as set forth.

DAVID ANTHONY, SEN.

No. 8503.—*Improvement in Hand Planes.*

What I claim as my invention, and desire to secure by letters patent, is the application to carpenters' planes and moulding tools of a new method of confining the iron, by a metallic apparatus, acting upon the principles of the lever and cam, in combination with the set screw for adjusting the same, as herein described, using for the purpose the aforesaid contrivance or arrangement of parts, or any other substantially the same, and which will produce the same effects in like manner.

BENJAMIN F. BEE.

No. 8504.—*Improvement in Screens of Winnowing Machines.*

I do not claim any part or portion of the gear, fans, or forms of the hopper or shoe as an original invention, as I am aware that all these have been in common use.

But what I do claim as new, and desire to secure by letters patent, is the arrangement of guides, D, D, and side apertures on the upper movable screen, as seen in figure 3, and the lower screen, as seen in figure 4, attached to the shoe, and which screen may be attached to any common winnowing machine, in the manner and for the purposes before described.

JONATHAN BEAN.

No. 8505.—*Improvement in Stave Jointing Machines.*

What I claim as my invention, and desire to secure by letters patent, is the adjustable knife, in combination with the adjustable rest, as described, to adapt them to the jointing of staves for casks of different bilge.

DANIEL DRAWBAUGH.

No. 8506.—*Improvement in Shuttle motions of Looms.*

What I do claim, and desire to secure by letters patent, is hanging the picker staff or staves upon radius rods, D and E, having two distinct radial motions, substantially as herein set forth, for the purpose of causing the end which operates upon the shuttle to describe or make a rectilinear motion parallel with the raceway, and with less power than has heretofore been done.

GEORGE W. PERRY.

No. 8507.—*Improvement in Machines for cutting the Soles of Boots and Shoes.*

What I claim as my invention, and desire to have secured to me by letters patent, is the mode or means, hereinabove described, for insuring the unerring turning of the knife-frame for cutting both sides of the sole, said means consisting of the notched pawl lever and spring, *y*, *y*, operating on the journal plates of said frame, substantially as hereinabove described.

JOSEPH STEGER.

No. 8508.—*Improvement in Car Seats.*

Having thus described the nature of our invention, what we claim as new, and desire to secure by letters patent, is the arrangement of two levers in a cross position, so that any required height of back may be carried and reversed from and to either side of the seat, and secure it firmly in its position at any required angle, substantially the same as described and represented.

EZEKIEL BOOTH,
EZRA RIPLEY.

No. 8509.—*Improvement in Telescopes.*

What I claim as my invention, or improvement, consists in combining the glasses, or glasses and diaphragms, with a sliding or eye-piece tube, A, of a telescope, by means of a tube, or slide, B, perforated through its side or sides in such manner as to enable a person, when the said tube, B, is withdrawn from its enclosing tube, to obtain ready access through the openings, or perforations, to the glasses, or lenses; the whole being substantially in the manner and for the purpose as described.

ALVAN CLARK.

No. 8510.—*Improvement in Machines for cutting Hides.*

What I claim as my invention is the combination of mechanism for reducing dry hide to a strip, and mechanism for cutting or removing the hair from the under-side of the said strip, at one continued operation, substantially in the manner as described.

JACOB C. FLINT.

No. 8511.—*Improvement in bending Felloes.*

What I claim as new, and desire to secure by letters patent, is the curbs, C, D, in combination with the box, B, or its equivalent, said curbs being constructed in the manner and for the purpose substantially as described.

A. W. JOHNSTON.

No. 8512.—*Improvement in Card Grinders.*

What I claim, and desire to secure by letters patent, is an instrument for grinding or sharpening wool, cotton, or other cards, made with sectional card teeth, which are so bent at the heel as to make the sharp edge more prominent than its opposite and broad edge, together with its application to the card that is to be ground in such a direction as to cause the sharp edge of the teeth of the grinder to be first presented to and enter among the teeth of the card.

RICHARD KITSON.

No. 8513.—*Improvement in Daguerreotype Apparatus.*

Therefore, we claim—

First. The construction of a camera box, with a cross-opening, or mortise, to receive a sliding frame, that carries both an object glass and the Daguerreotype plate, as described.

Second. The construction and application of a sliding frame, *i*, with a division, to receive a frame carrying an oblong object glass, so formed as to be placed either vertically or horizontally, as described and shown.

Third. The construction of the slide, *i*, so as to receive in the other division a Daguerreotype plate in a frame, *n*, such frame, *n*, being pressed in place by springs, 16, and held in place by blocks, 17, taking notches in the frame, *n*, as described and shown.

WILLIAM LEWIS,
W. H. LEWIS,
HENRY J. LEWIS.

No. 8514.—*Improvement in coupling Railroad Cars.*

What I claim as my invention, and desire to secure by letters patent, is the combination of a stiff car coupling with the ends of a couple of cars, and with the trucks under the same, substantially in the manner herein set forth, by which the cars are made to guide the trucks under them, and keep them in their proper positions on the track—to wit, in such positions that a line drawn midway between and parallel with the truck axles will be at right angles to any straight track, and also at right angles to the tangent of any curved railroad track.

LORENZO D. LIVERMORE.

No. 8515.—*Improvement in Abdominal Supporters.*

What I claim as my invention, and desire to secure by letters patent, is the employment of a pubic brace of the peculiar form herein described, and as represented in figs. 2, 3, 4, 5, 6, and 7 of the drawings, so as to fit the ospubis, and press uniformly upon the inguinal region, while the upper edge of the brace is bent forward so as to effect no inconvenient pressure upon the abdomen of the wearer; said pubic brace being made of hammered leather, or other tenacious material, in the manner and for the purpose herein described.

A. J. LONSBURY.

No. 8516.—*Improvement in Bedsteads.*

Having thus described the nature of my invention, and the manner in which it is constructed, what I claim as new, and desire to secure by letters patent, is the manner of securing the lower bedstead to the upper one, so that it may slide underneath the upper one, or be drawn out from it, as described, viz: by having the clamps (*g*) attached to the upper part of the foot-posts, E, of the lower bedstead, said clamps fitting in the recesses (*a*) of the rails, A, of the upper bedstead, and the rails, D, of the lower bedstead, passing through the mortise holes (*b*) in the foot posts, C, of the upper bedstead, substantially as shown and set forth.

LEVI NEWCOMB, Jr.

No. 8517.—*Improvement in Horse Collars.*

What I claim as my invention, and desire to secure by letters patent, is connecting the sides of the breast plate, C, by a flat joint, A, in combination with the levers, D, attached to the sides of the breast plate, and rising over the neck without touching the shoulders of the animal, and connected at the top, by which means the breast plate is made adjustable to the size of the horse, substantially as herein set forth.

R. RICKEY.

No. 8518.—*Improvement in Grain Kilns.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the heating chamber, D, with the two drying beds, one above and the other below, as described.

ISAAC S. STOVER.

No. 8519.—*Improvement in Frosting Plates of Glass.*

What I claim as my invention, and desire to secure by letters patent, is the use of a rocker containing pebbles, sand, and water, for the purpose of frosting plates of glass, or embossed work, as above described.

ISAAC TAYLOR.

No. 8520.—*Improvements in Apparatus for sizing and dyeing Yarn.*

What I claim as my invention, and desire to have secured to me by letters patent, is—

First. The conducting of yarn or thread from section or warper beams directly into and through the size or coloring liquids to the pressure rollers, by a series of rollers, more or less in number, placed as nearly in contact with each other as the nature of the case will admit, the closer the better, sufficient space being allowed between the fixed rollers for the passage of the yarns or threads, thus enabling the said rollers to operate as guides to each and all the threads, to prevent them from matting or clinging together, and superseding the otherwise necessary use of reeds, raddles, or other separators.

Second. I claim the taking or making of a weaver's lease, or series of leases, at the commencement of the process of warping or beaming of yarn or thread on section or warper beams, and at proper intervals on the same, to correspond with required lengths of yarns or threads on weaving beams, and preserving the same throughout the sizing and drying, thus dispensing with the use of hacks or lease takers in the dresser, and the otherwise necessary stoppage of the dresser or sizer, for the purpose of tying or twisting together each separate thread.

ALONZO BASCOM.

No. 8521.—*Improvements in Printing Presses.*

Having thus fully described the nature, construction, and operation of my invention, I will proceed to state what I claim, and desire to secure by letters patent—

First. I claim hanging the type bed and platen upon cranks on rotating shafts, C, C', and D, D', arranged and operating in the manner substantially as herein described.

Second. I claim the spring presser, W, attached to the type bed or platen, for the purpose of pressing the band, *e*, communicating motion to the sheet, against the opposite surface of the platen or bed, and causing it to be moved at precisely the same speed as the bed and platen, substantially as described.

Third. I claim the arrangement for carrying and giving motion to the inking roller, consisting of the barrel, P, the bars, Q and *p*, the lever, R, springs, *r* and *t*, and band, *u*, combined together, and with the above type bed and platen, in the manner substantially as set forth.

THOMAS H. DODGE.

No. 8522.—*Improvement in Machines for cutting Combs.*

Having thus described the nature and operation of my invention, what I claim as new, and desire to secure by letters patent, is the wheel, B, with the cutters, *t*, placed on its periphery, as described; said wheel having a rotary motion, and also a vertical reciprocating motion, in a trans verse line with its axis, for the purpose of turning or cutting comb-teeth, substantially as described; said motions being given the wheel by means of the cams, H, I, levers, P, U, and pawls, *l*, *n*, or their equivalents, as set forth.

S. CURTIS.

No. 8523.—*Improvement in Stove Grate Bars.*

Having thus described my construction of fire-grate, what I claim as new, and desire to secure by letters patent, is the manner, described, of forming separate grate-bars for vibrating grates, rounded at their ends, secured and working in grooves of the frame, as described.

GEORGE. W. GARDNER.

No. 8524.—*Improvement in Ploughs.*

What I claim as my invention, and desire to secure by letters patent, is a cotton scraper, constructed as herein described, with a share and mould-board projecting from the side of the landside, opposite that to which the earth is thrown, the landside thus extending from the point of the scraper to that wing of the mould board opposite the one to which it usually extends; and the several parts being so arranged that the landside will run deep enough to hold the implement firmly to its work, the share will pare the ground and cut off the weeds near the roots of the plants, and the mould-board will conduct the same towards the middle of the space between the rows.

HENRY GOLDSEN.

No. 8525.—*Improvement in Propellers of Machinery to be used in Currents.*

What I claim as my invention, and desire to secure by letters patent, is the application, for the purpose specified, of one or more levers, A', A, with the floats or blades, B, B, at their lower ends, against which the current acts; said levers being attached, at about their centres, to an adjustable frame, D, by a universal joint, C, as described; the upper ends of the levers being attached to cranks, I, I, by which, through any suitable gearing, motion is communicated to the shaft, M, substantially as described.

JAMES HARDIE.

No. 8526.—*Improvement in Railroad Car Wheels.*

What I claim as my invention, and desire to secure by letters patent, is connecting the tread or rim of a car-wheel to the hub or central part thereof by means of India rubber, or other analogous elastic material, such elastic material being connected with the outer periphery of the central part of the wheel by a groove on the latter, or its equivalent, and to the inner periphery of the rim, also, by a groove thereon, or its equivalent; the India rubber holding itself in both grooves by its elasticity, and giving to the wheel lateral as well as radial elasticity, as herein described.

I also claim the grooved segments, constructed substantially as herein described, and interposed between the India rubber and the rim, for the purpose of facilitating the insertion of the India rubber into the space between the rim and central part of the wheel, and its removal therefrom, as herein set forth.

NEHEMIAH HODGE.

No. 8527.—*Improvements in Mill for Grinding and Bolting.*

Having thus fully described the nature of my invention, what I claim therein as new, and desire to secure by letters patent, is—

First. The grinding of grain, or other material, by means of a revolving stone, or metallic roller, and one, two, or more separately adjustable concaves, whereby "high and low" grinding may be performed simultaneously, and bolting the same the instant that any particles are ground fine enough, in combination with the returning on to the roller again all particles too coarse to be bolted through the bolting concave, so that they may be ground over again and again, until they are fine enough to be discharged; and this I claim, whether it is done by means of the revolving beaters and brushes, which throw it up and through the pipe, or by any other means essentially the same.

Second. I claim the guides or partitions in the pipe, as herein described, to prevent meal from scattering endwise in its transit from the bolting concave to the roller, in combination with the adjustable aprons, A, on which it falls, and which distribute and govern it in its passage to the discharging end, as herein described and set forth.

JEHU HOLLINGSWORTH.

No. 8528.—*Improvement in Cannon for throwing Chain Shot.*

Having thus fully described the nature and operation of my invention, what I claim as new, and desire to secure by letters patent, is in combination with the revolving head, S, and the bores, B, B, diverging as described, the rack, C, attached to the gun, and the worm-wheel, D, hung on the shaft, E, by which the gun is made to revolve or turn to the desired position, so that the chain-shot may be thrown either in a horizontal or vertical line.

ADAM LEMMER.

No. 8529.—*Improved Screw Propeller.*

And having now described the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim as my invention, and desire to secure by letters patent, is arranging two or more series of narrow blades, such as above described, each series on a separate shaft, and the shafts one within the other, and provided with keys, or other equivalent means of securing them to each other, substantially as specified, so that the two or more shafts may be turned on each other, and resecured, to place the series of vanes directly behind each other for sailing purposes, and at different points of the circle for propelling.

G. MALO.

No. 8530.—*Improvement in Desks.*

What we claim as our invention, and desire to secure by letters patent, is—

First. Forming the desk top in boxes, parts, or pieces, D, E, each of which may be separately raised or lowered, as required, through appropriate mechanical devices, substantially in the manner and for the purposes shown and set forth.

Second. The employment of hinged double leaves, F, G, in the front of the desk, the same, when extended, forming a rest for the hand, and being made capable of closing down or in, essentially as described.

ISAAC H. NORRIS,
DAVID FLANDERS.

No. 8531.—*Improvements in Railroad Switch.*

Having thus described my invention and improvements in the self-adjusting and locking switch for railroads, I wish it to be understood that I am aware that the relative position of the switch with the main track, or turn-out, or sideling track, has been changed by the action of mechanism attached to the cars, as well as by devices attached to the locomotive, in various ways; and therefore I do not claim changing the switch by apparatus or devices actuated by the cars or locomotive; nor do I claim constructing and operating a switch composed of a single movable section of the main rail; but what I do claim as my invention and improvement, and desire to secure by letters patent, is the employment of the additional movable sections, D, D, in combination with the sections, C, C′, forming the switch, whereby the lateral movement of each is halved or divided, in opposite directions, and a more regular curve is produced than that resulting from the use of the single movable section or switch, and thereby insuring safety, the weight of the train of cars on one section of the switch forming a lock to the other section, as one section cannot move without the other, till the train of cars shall have passed therefrom, as herein fully set forth.

I also claim the combination of the double central lever bars, A, B, A. B, with the central connecting rock-shaft, E, having two cranks, *f*, projecting in opposite directions, to which are attached the cross bars, g, g^2, for uniting the double sections, D, C, C′, whereby the switch is adjusted, as fully set forth and shown in the accompanying drawings.

D. F. PHILLIPS.

No. 8532.—*Improvement in Seed Planters.*

Having thus fully described my invention, what I claim as new, and desire to secure by letters patent, is the combination of the slides, *f*, *g*, with the grooves, *a*, (which "drill in" the grain,) and the cells, *c*, *e*, so that by moving the slats, *f*, towards the centre of the hopper to close the communication with the grooves, and open it with the cells, *c*, for planting in "check rows," or by moving both the slats, *f*, *g*, towards the centre of the hopper, to close the communication between said hopper and the grooves, *a*, and cells, *c*, and open it with the cells, *e*, for planting in "step rows;" the whole being arranged in the manner and for the purpose herein set forth and fully shown.

WILLIAM REDICK.

No. 8533.—*Improvement in inserting Porcelain Teeth.*

What I claim as my invention, and desire to secure by letters patent, is the mode of inserting teeth by forming the concave base, and of inserting the platina pins into the base of the platina surface of the teeth, in an oblique direction, and attaching them to the gum plates without stays.

W. WILLSHIRE RILEY.

No. 8534.—*Improvement in Stoves.*

What I claim as my invention, and desire to secure by letters patent, is placing the damper, F, between the fire and hot air flues, B and E, so as to control the amount of opening in each respectively, and governing the same by the expansion of the rod, *d*, substantially as herein described, for the purpose of regulating the heat of the oven.

I do not claim the expanding rod, *d*, irrespective of its connexion with the damper, placed as described.

H. R. ROSE.

No. 8535.—*Improvement in Stove Grates.*

Having thus fully described my new and improved fire chamber for stoves, &c., what I claim therein as new, and for which I desire to secure letters patent, is the inclined elevator, E, for raising the back grate, and coupling it with the front grate, and in combination the connecting the front and back grates with hooks or catches, constructed and arranged substantially as above specified.

H. J. RUGGLES.

No. 8536.—*Improvement in Spring Saddles.*

What I claim as my invention, and desire to secure by letters patent, is the movable pommel, the spiral spring, or springs, connecting the pommel and cantle, and the raw hide seat, all combined, substantially in the manner herein set forth, making a spring-seat saddle tree.

JOHN C. Fr. SALOMON.

No. 8537.—*Improvement in Gongs.*

What I claim as my invention, and desire to secure by letters patent, is making gongs of sheet or plate iron, or steel, with a rim, B, all round, strengthened by a ring or band, C, the whole being coated, and having the crevices, interstices, and all unsound parts filled with an alloy of copper and tin, or any alloy of a similar nature, or composed of similar metals to what is usually called "bell metal, substantially as herein set forth.

VINE B. STAR.

No. 8538.—*Improvement in finishing and balancing Mill Stones.*

What I claim as my invention, and desire to secure by letters patent, is the inserting the balance rine in the eye of a mill-stone in the early

stage of its construction, and then making use of the said balance-rine, in conjunction with a chuck, combined with the spindle, in completing the stone, substantially as herein set forth.

GEORGE TODD.

No. 8539.—*Improvement in Wires for making pile in Woven Fabrics.*

What I claim as my invention, and desire to secure by letters patent, is combining with the flat pile or figuring wire employed in weaving looped or piled fabrics, and attached to, or near one end thereof, a weight, for the purpose and in the manner substantially as described.

E. B. BIGELOW.

No. 8540.—*Improvement in Fastenings for Garments.*

Having thus described my improved mode of fastening garments, &c., I shall state my claim as follows: What I claim as my invention, and desire to have secured to me by letters patent, is the opening, closing, and fastening together the two sides of a garment, or other article, by means of the clasps and ribs, operating in combination, substantially in the manner hereinabove described.

I also claim the method of connecting the clasps one to the other, in pairs, and in the series of pairs, by the links, cord, and beads, substantially in the manner hereinabove set forth.

ELIAS HOWE, Jr.

No. 8541.—*Improvement in Cooking Stoves.*

Having thus fully, clearly, and exactly described and represented my improvements in stoves, what I claim therein as new, and desire to secure by letters patent, are the diving flues (*i*) opening from the floor, as described, and, in combination with this, the chamber (*g*,) for the purpose described.

HOSEA H. HUNTLEY.

No. 8542.—*Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the employment of the three movable plates, C, D, E, constructed and arranged as described, viz: the plate, E, being hollow and affording a passage or flue, when not cut off by the damper, through which the heat passes, warming the ovens formed by the plates, the plates being capable of being withdrawn from the stove, or varied in a vertical position, by which arrangement the stove can be converted into an air-tight, or draught wood, or coal cooking stove, cooking range, or a wood, or coal, draught, or air tight radiating stove, or into a Franklin stove, substantially as set forth.

GEO. W. CARLETON.

No. 8543.—*Improved Safety Apparatus for Steam Boilers.*

First. We claim as our invention, and desire to secure by letters patent, the bent tube, formed and arranged substantially as described.

to contain mercury, in combination with the lever of the safety valve, or its equivalent, and connected with the steam boiler by means of a swivel and a pillar connexion, or its equivalent, whereby the varying pressure of steam varies the actual weight upon the valve.

Second. We also claim the combination of the connecting rod, Q, and the lever, O, I, and the shaft, R, for connecting the mercurial gauge, T, T, and U, with the catch box, N, and projecture, O, on the catch box, whereby the mercury in the gauge, T, T, being the weight, holds down the safety valve, or sets it at liberty, by the pressure of steam from the pillar, E, and swivel, S, S, said pillar being supplied with steam from the boiler or boilers, as described in the specifications.

Third. We also claim the combination of the rod, M, with the spiral spring upon it, and small pulley at the top of it, with the notched pulley, L, for holding the catch box together so long as the full part of the pulley, L, is on the small pulley, or setting it at liberty when that part of the pulley that is cut out comes opposite the small pulley, and thereby allowing it to ascend, as described in the specifications.

JONATHAN COLLINS,
JOHN J. G. COLLINS.

No. 8544.—*Improvement in Ploughs.*

What I claim as my invention, and desire to secure by letters patent—

First. Is the cutter, C^4, or its equivalent, to separate the sward for the first furrow at a proper distance from the coulter, acted upon by the prop, a^3, and lever, C^4, or their equivalents.

Second. Is the piece, D^3, fastened to the heel of the mould-board in combination with the cutter, C^4, to turn wide furrows.

Third. Is the mode of connecting the tongue and plough, respectively, to the axle, by means of the links and the loose tenon on the tongue, substantially as described, so as to allow the team to walk entirely aside from the furrow, or direct course of the plough, in ploughing prairie, marsh, or other land with soft under strata, and make the plough run smoothly and work well, and so as also to enable the ploughman to take an extraordinarily wide furrow, with one member of the team walking in the furrow with a common yoke, thus dispensing with the long yoke now commonly used for that purpose.

Fourth. Is the rope, D, and lever, D′, or their equivalents, in combination with the mode of connecting the tongue and plough to the axle, substantially as described, for the purposes set forth in the within specification.

ELIJAH GOLDTHAIT.

No. 8545.—*Improvement in Centrifugal Sugar Drainers.*

I would now state that what I claim, and desire to secure by letters patent, is centrifugal machines for separating fluid from other matter, constructed and operating as herein set forth, with detachable vessels containing the substance to be operated upon, irrespective of the exact mode of attachment, their number of vessels used, or the form.

DANIEL KING.

No. 8546.—*Improved Method of Operating Rudders.*

Having thus fully described our invention, we will proceed to state what we claim as new, and desire by letters patent: We claim controlling the operation of the rudders in such a manner as to bring either into operation while the other is stationary, by means of the pins or studs, *h*, *h′*, on their tillers, in combination with the grooves or slots, *g*, *g′*, in a wheel or disk, G, receiving motion upon an axis, *f*, or by the equivalents of the same, substantially as therein described.

THOMAS H. MORTIMER,
JAMES M. GARDNER.

No. 8547.—*Improvement in the manufacture of Door Knobs.*

I claim the combination and arrangement of the arms, sliding-plate springs, and lever, substantially as described, operating in the manner or in any analogous way, for the purpose set forth.

ORRIN NEWTON.

No. 8548.—*Improvements in Drop Presses.*

What I do claim as my invention, and desire to secure by letters patent, is the general arrangement and combination of the crank and shaft with its sweeps, moving always in the same direction with the moving gear, or pulley, and the ratchet wheel, joined together and running loose upon the shaft, constantly in the same direction, substantially as I combine them, for the purposes herein described.

I also claim the lock, in combination with its sweep and springs, and with the crank, to stop its motion not too abruptly, and to hold it until it is unlocked by the hand or foot of the workman, substantially as described.

MILO PECK.

No. 8549.—*Improvement in Cider Mills.*

Having thus described the portable cider mill, I wish it to be understood that I make no claim to originality of invention to any part of the mill, separately considered; nor do I claim as new any part of the arrangement of the press grinding cylinder or hopper. But what I do claim as new is—

First. The arrangement of the parallel slicing knives, D, in combination with the reciprocating follower, G, made as described, with channels and ribs on its inclined face, when used with a grinding cylinder, Y, and concave, T, made and arranged as described and represented, for first slicing the apples, and then delivering the slices successively to the grinding cylinder, Y, to be reduced to pummace in the manner herein described.

D. F. PHILLIPS.

No. 8550.—*Improvement in Shingle Machines.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The peculiar form and mode of adjusting of the riving plate E, the same being self-adjusting, by means of the spring, F, upon which it rests, and the end of the plate contiguous to the riving knife, being bent upward, (to accommodate irregularities in the grain of the shingle timber,) as herein specified.

Second. The employment (in combination with a shingle shaving machine) of the rolls, T, levers, X, Z, hanging rods, X, spring, *k*, and bent lever, *p*, or their equivalents, the whole being arranged and operated in the manner and for the purpose herein described: the levers, rod, and spring acting upon the rolls, and pressing them uniformly towards each other, for the purpose of unwinding or straightening the rived shingle, in the first instance, and the bent lever (being operated by the motion of the connecting rod, R, and acting upon the spring, *k*,) having the effect of increasing the force or pressure of the rolls upon the shingle, (as the latter passes between them,) for the purpose of preventing the splitting of the shingle in advance of the cutters as they approach the thin end of the shingle, as herein set forth.

FRANKLIN SKINNER.

No. 8551.—*Improved Valve for Oscillating Engines.*

I do not claim the circular valve, nor the manner of reversing the engine by turning the valve; but what I claim as my invention, and desire to secure by letters patent, is the arrangement of the piston valve with a ground face in a cylindrical steam chest, as described above, by which the necessity of packing about the trunnion and plummer block is avoided, consequently saving much friction in the trunnion.

WM. M. SMITH.

No. 8552.—*Improvement in Railroad Car Brakes.*

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the levers, link rods, and shoes, or rubbers, substantially as herein described, whereby each wheel of both trucks of a car is retarded with a uniform force when the brake is put into operation.

F. A. STEVENS.

No. 8553.—*Improvements in Looms for weaving Bags.*

What I claim as my invention, and desire to secure by letters patent, is—

First. Placing the cams upon one or more shafts in such manner that they can be moved so as to change their relative position in regard to each other with or around the shaft, if upon separate shafts; or around the shaft, if upon the same shaft, in combination with the devices, substantially such as are herein described, or their equivalents, for releasing, changing, and holding said cams, as may be required, for the purposes set forth in the foregoing specification.

Second. Is the pin, *r*, on the spring, f^1, in combination with the pawl, *m*, or their equivalents, to force back the rod, d^2, and propel the wheel, I, by the pin, d^2, acting against the inclined sides of the notches, h^2, h^2, so that the pin, d^2, will fall back on the groove, d^1, and allow the wheel, I, to be propelled by the pin, C^4.

CYRUS BALDWIN.

No. 8554.—*Improved Hand Drill.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the helical spring, F, with the screw, *j*, upon the drill shaft and the opening and closing nut, or screw-nippers, H, H, the whole being applied in the manner substantially as described, and operating for the purpose of controlling all the required movements of the drill in the line of the axis of its revolution, in giving it the pressure upon its work, controlling the said pressure, and withdrawing it from its work, as herein fully set forth.

WILLIAM BUSHNELL.

No. 8555.—*Improvements in Hurdle Fences.*

Having thus fully described my improved fence, what I claim therein, and desire to secure by letters patent, is the method of locking and supporting the same by means of the notched sills and lock braces, as herein described.

CYRUS C. COLE.

No. 8556.—*Improvement in Machines for crimping package papers for Soda Powders, &c.*

What I claim as my invention is the combination and arrangement of the surfaces, *t*, *u*, *v*, *w*, *s*, *p*, *b*, *a*, *c*, *d*, in the manner substantially as represented in the drawings, and for the purpose of folding the paper in a trough like shape, and in other respects convenient for being filled with powder and folded together.

CARLOS A. COOK.

No. 8557.—*Improvement in Railroad Switches.*

Having thus described my invention and improvement, and pointed out the difference between the same and other railroad switches, what I claim therein as new, and desire to secure by letters patent, is—

First. The combination of the stationary single casting, *c*, with the single casting or switch, *g*, each having a guard on the inside thereof, whereby the said permanent single stationary casting, *c*, is made to subserve the purpose of the ordinary frog and auxiliary switch in connexion with the turn-out side of the main track as described.

Second. I also claim providing the movable casting, *g*, on the inside thereof with a guard, *m*, for the purpose of guiding the train of cars over the switch in a straight line when running in the direction of the arrow, y^2, and thus prevent the cars from passing on to the turn-out rails when the switch is in the position shown in fig. 2, the projection or frog, *f*, being of sufficient length, in connexion with guard, *m*, to guide the train on to the main rail, *a*, as described.

WM. N. RAINES.

No. 8558.—*Apparatus for Propelling and Steering.*

I do not claim the peculiar wheel here used as a water wheel and propeller; but what I claim as my invention, and desire to secure by letters patent, is the combination of the water ways in the rudder with a water wheel and submerged propeller, to be operated by hydraulic pressure, for propelling and steering vessels, substantially as herein set forth.

JOHN C. FR. SALOMON.

No. 8559.—*Improved Lock for Safes, &c.*

I do not claim the knobs, D, D, and collars, E, E, with the numbers on them, for the purpose of serving as indexes, as they have been previously used; neither do I claim a series of tumblers as those described, for these have also been previously used; but what I do claim as new, and desire to secure by letters patent, is the "tallon," N, with the stud, *q*, attached to it, in combination with a series of tumblers, O, having curved slots, *o*, in them; said tallon and tumblers operating as described, viz: the tallon being thrown up by the key during its second revolution, and the stud, *q*, in consequence, placed on the outer side of the tumblers, the tallon being held up by the catch, P, the catch, *y*, on the tallon bearing against the stump, *z*, and preventing the bolt from being moved back or withdrawn; the tallon, N, requiring to be let down, when the bolt is to be withdrawn, so that the stud, *q*, may work or slide in the curved slot, O, in the tumblers, and the catch, *y*, be free from the stump, *z*; the bit of the key, in turning, acting upon the end of the tallon, and shooting back the bolt, substantially as described.

F. C. GOFFIN.

No. 8560.—*Improvements in Railroad Car Trucks.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is hanging the frame of a six-wheeled truck immediately on the centres of the front and rear axles by a shank or socket, and to the centre axle by guides, in combination with horizontal, diagonal, or other bracing, connecting and operating said wheels so that they may adjust themselves to any lateral curvature in the track, and at the same time allow either of the sets of wheels to pass over any obstruction without raising the other sets from the track, and for the purpose, also, of allowing the set from which the weight is removed to still retain its position on the track for guiding the others, as herein fully set forth and described.

BENJ. HINKLEY.

No. 8561.—*Improvement in Steam Carriages for Railways.*

Now, we wish it distinctly understood that we do not claim the combination of a steam engine with the axles or body of a carriage; nor do we claim any arrangement of it by which it is directly applied to a "fixed" axle, or one so connected directly with the carriage body that, other than a rotary motion, it can have no horizontal and rocking movements, independently of the same; but what we do claim as our invention or improvement is the arrangement or arranging steam engine directly on a movable truck-frame of "a long car," or carriage, in combination with arranging the boiler, or steam generator, on or in the carriage body or frame, and connecting the engine and steam generator by a flexible pipe, or pipe having a ball and socket, or other equivalent connexion or joint, such as will allow of all the necessary rotary and rocking movements of the truck frame and carriage body; the whole being substantially as hereinbefore described.

JOS. H. MOORE,
WM. P. PARROTT.

No. 8562.—*Improvement in Expanding Mandrels.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The use of an expanding nut or shell, D, formed in segments whose interior faces have portions of a screw thread cut thereon, which fit within, and correspond with, the thread of a taper screw, *e*, of the mandrel.

Second. The manner of holding together, or retaining in their places, the several segments, *c*, *c c*, of the expanding shell or nut, by means of a coiled spring, or springs, *g*, *g*, encircling the segments, and made of sufficient length to admit of the nut expanding without destroying the confinement or hold of the segments, as described.

WALTER SHERROD.

No. 8563.—*Improvements in Machines for Stretching and Drying Cloth.*

What I claim as my invention is the combination of the two winding and lengthwise stretching contrivances, or stretchers, the two widthwise rotary stretchers, C, D, and the three or any other suitable number of drying cylinders, E, F, G, substantially as described, so as to enable a person to cause a piece of cloth to pass in one direction over and around the drying cylinders, and next in the opposite direction, as many times as may be desirable, in order to stretch, dry, and finish the same to the extent that may be required.

THOMAS BARROWS.

No. 8564.—*Improvement in the mode of papering Pins.*

I do not claim the crimps that the pins are inserted through; neither do I claim rolling up the paper of pins from both ends to the centre, that being old and well known. But what I do claim as my invention, and desire to secure by letters patent, is the *new* mode of papering pins, substantially as herein described.

I claim the new manufacture of "book pins," formed by folding the paper in parallel folds at regular distances from each other, producing fan-like or zig-zag folds, which allows the paper of pins to be closed into compact form, without rolling or winding, for the purposes herein set forth.

C. O. CROSBY.

No. 8565.—*Improvement in Machines for Working Clay.*

What we claim as our invention is—

First. The fixed double eccentric cams, I, I, in combination with the pitmans, J, J', attached to the slides, K, K', and by means of L, L', giving motion to the pawls, M, M′, and through them to the rack, Q, and the wheel, E, for the purposes herein set forth and described.

Second. We claim the particular arrangement and combination of machinery set forth and described in figs. 2, 3, and 4, in combination with the tempering wheel, E, fig. 1, especially the double eccentric, I. I, and the pitmans or connecting rods, J and J′, the slides, K and K′, with the pawls, M, M′, the connecting bar, O, the shifting rod, P, and the rack, Q, as applied to tempering clay for making brick, or any other purpose, or any equivalent device or arrangement of machinery for accomplishing the same purpose substantially in the same manner.

DANIEL DUCHEMIN,
GEORGE DUCHEMIN.

No. 8566.—*Improvement in Tailors' Measures.*

What I claim as my invention, and desire to secure by letters patent, is the gauge designated by the letters A and S in the drawings. This gauge has two arms slit through the centre, from the cross bar down, as illustrated by fig. 1 in the drawings; the front arm extends up and forms a semi-circle over and around the top of the inner arm. This semi-circle is slit through the centre, and forms a way for the two shoulder straps, which are attached by a pivot to the top of the inner arm to turn on, with screws to set them to the desired place; the semi-circle is designated by the letter D in the drawings. This gauge moves horizontally on strap E, from the front backward, or *vice versa*, until it strikes the front of the arm-hole and locates the same, and is set by screws to the desired place. Again, this gauge can be drawn perpendicularly, so as to increase the length of the shoulders for a very full breasted man, or contracted, so as to fit a hollow breasted man.

JAMES MAGINNIS.

No. 8567.—*Improvement in winding Watches.*

What I claim as my invention, and desire to secure by letters patent, is the application to watches of the machine keys, substantially as herein described and illustrated by the accompanying drawings, which keys and their boxes are enclosed by the watch case, and form a part of the watch, rendering the use of ordinary watch key unnecessary, without the expense and great friction of the complicated machinery heretofore used for the same object.

THEODORE NOEL.

No. 8568.—*Improvement in Carriage Perches.*

What I claim as my invention, and desire to secure by letters patent, is constructing the front extremity of the perch so as to form a spindle, which passes through a tube on the turning plate, to connect it with the front axletree, and at the same time to form a hinge on which the front axletree can rock, the latter being a new duty additional to that which the forward extremity of the perch has heretofore performed, thus increasing the efficiency without increasing the complexity or cost of the coupling.

LEWIS E. STILWILL.

No. 8569.—*Improvements in Machines for boring holes in Posts*

Having thus described my improvements on the machine for boring holes in posts for fencing, what I claim therein as new, and desire to secure by letters patent, is combining the pivoted bar, R, provided with a catch and inclined plate, S, T, and long arm, V, and stop or pin, *p*, with the gauge bar, U, provided with rows of pins, *q*, and mounted in bearings in the inclined carriage, G, whereby the movement of the latter is regulated in moving the timber laterally in boring a series of holes, as described in the specification.

I also claim the combination of the pivoted beam, P, inclined plane, *b*, inverse half nut screw, *f*, and propelling screw shaft, M, whereby the carriages are made to advance toward the boring tool, and is disengaged for the purpose and in the manner described and represented.

I do not, however, intend to confine my claim to the precise construction described in the foregoing specification, but to use such a form of construction as may be the best adapted to accomplish the desired object by means substantially the same; neither do I claim any portion of the machine above described that has been practised successfully by others prior to its being invented by myself.

THOMAS T. STRODE.

No. 8570.—*Improved Foundry Apparatus.*

Having thus described my improvements in the art of founding, what I claim therein as new, and desire to secure by letters patent, is—

First. The method of making moulds for castings by impressing the pattern into a measured quantity of sand, contained in a flask constructed with steps, or protuberances, and depressions, substantially as herein described, so that the mould, when finished, may be surrounded by sand, varying in thickness in proportion to the different degrees of compression which it receives by the impression of the pattern, in order that the density or hardness of the face of the mould may be rendered more uniform, substantially as herein set forth.

Second. I claim the method of charging the half flask with the requisite quantity of sand to form a half mould by surmounting said flask with a hopper, and passing the two to and fro beneath a sand-box, substantially as herein described.

Third. I claim the method of detaching the hopper from the flask after the mould is formed, and of applying it thereto before the sand is introduced, substantially as herein described.

Fourth. I claim the method of applying facing sand to the flask prior to the formation of the mould, by means of apparatus operating substantially as herein described.

Fifth. I claim the method of tempering, distributing, and sifting moulding sand by means of machinery, operating substantially as herein described.

Sixth. I claim the core spindle, constructed substantially as herein described.

Seventh. I claim the method of filling a series of flasks with melted metal by a single sprue by means of a sprue case, with which the flasks are connected, substantially as herein set forth.

Eighth. I claim the combination of apparatus for tempering the moulding sand, apparatus for distributing the tempered sand and sifting it into the sand reservoir, and apparatus for supplying to the flask a measured quantity of sand from the reservoir, with a flask and pressing apparatus, whereby the sand is worked and the mould produced by machinery, operating substantially as herein set forth.

CHAPMAN WARNER.

No. 8571.—*Improvement in Running Gear of Locomotives.*

What I claim as my invention, and desire to secure by letters patent, is the use of steam springs for the support of the weight carried by the driving wheels of a locomotive engine, in combination with bearing or supporting wheels placed both before and behind the aforesaid driving wheels, which bearing wheels support a portion of the weight of the engine, through the medium of steel, air, India-rubber, or other springs possessing the properties herein described, as belonging to steel springs, as distinguished from steam springs, for the purpose set forth in the specification.

I also claim the employment of steam springs, or steam pressure, operating separately from the propelling cylinders, for the purpose of varying the pressure of the driving wheels of a locomotive engine upon the rails of the road, in combination with bearing or supporting wheels placed both before and behind the aforesaid driving wheels, which bearing wheels support a portion of the weight of the engine, through the medium of steel, air, India-rubber, or other springs possessing the properties herein described, belonging to steel springs, as distinguished from steam springs, for the purpose set forth in the specification.

ROSS WINANS.

No. 8572.—*Improvement in Apparatus for opening and closing Gates.*

Having thus described my improved gate, what I claim therein as my invention, and desire to secure by letters patent, is making a blank space on the lever, *o*, and vibrating it so far as to disengage the cogs upon it from the cogs upon the plate, *l*, so that the gate may be opened and closed by persons on foot without the aid and without operating the lever, *o*, in combination with the connecting of the bar, *r*, (or latch) to the lever, *o*, by the rope, *g*, so as to unlatch the gate when the lever, *o*, vibrates before the cogs on the lever, *o*, gear into the cogs upon the plate, *l*, to open the gate, substantially as described.

ENOCH WOOLMAN.

No. 8573.—*Improved Revolving Reverberatory Furnance.*

What I claim as my invention, and desire to secure by letters patent, is the rolling or revolving furnace, revolving on friction wheels, or rollers, or their equivalent, in combination with an ordinary fire, such as is used in reverberatory furnaces, the two being combined in such a manner that the products of combustion, heated gases, &c., from the grate shall pass into the interior of said rolling or revolving furnace, substantially as herein described, said rolling or revolving furnace being applicable to any purpose for which ordinary reverberatory or wind furnaces are employed.

AMBROSE S. BEADLESTON.

No. 8574.—*Improvement in Potato Diggers.*

What I claim as of my own invention, and desire to secure by letters patent of the United States, is the arrangement and combination of the cutting and digging cylinders with the riddles, in the manner herein set forth.

DANIEL D. BELL.

No. 8575.—*Improvement in construction of Sounding Boards for Musical Instruments.*

What I claim as my invention, and desire to secure by letters patent, is the above-described mode of constructing the sounding-boards of stringed instruments by combining or arranging together any suitable number of pieces of wood prepared as above, all in manner and for the purpose as herein set forth.

CORNELIUS BOGART.

No. 8576.—*Improvement in Running Gear of Railroad Cars.*

What I claim as new and original, and desire to secure by letters patent, is adapting to each side of railroad car trucks four or more wheels, attached to a frame-work, inflexible vertically, but with a horizontal motion, in such manner that in case of depressions in the rails at their joinings, or otherwise, they (the wheels) will alternately, by couplets, triplets, or the like, receive the weight of the load above, and relieve the wheel passing over the depression from the weight of the load and frame-work, so that no concussive blow is struck with that weight, or jar created, substantially as above described.

THOMAS A. DAVIES.

No. 8577.—*Improved Carbonic Acid Gas Engine.*

I do not claim the invention of carbonic acid gas in its liquified or æriform character as a motive power; neither do I claim the use of the hydrostatic press for liquifying the gas, as these principles have long been known and commented upon by Sir Hy. Davy, Faraday, Brunnel, and others. But what I claim as my invention, and desire to secure by letters patent, is—

First. A carbonic acid gas engine, in which said fluid passes from a reservoir, where it exists in a liquid state, through suitable valves, into a heated cylinder, thence into a refrigerator, where it is cooled, and thence through pumps, where it is condensed by hydrostatic pressure, and forced back again to the reservoir before named; the said engine being constructed substantially as herein described.

Second. The combination of crimped leather washers, a spiral spring, or springs, and oil, or any lubricant, for packing the piston-rods, or plungers, as described.

JOHN C. Fr. SALOMON.

No. 8578.—*Improvement in Gas Regulators.*

What I claim as my invention, and desire to secure by letters patent, is the closing of the valve, *d*, when the fluid becomes too low in the gas regulator for safety, by the movement of the float, *j*, and the lever, *i*, *h*, and their action upon the thimble, *l*, on the valve rod, *c*, substantially as herein set forth.

JONATHAN S. CONANT.

No. 8579.—*Improvements in Water Metres.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The uniform circular channel, *a*, *a*, in combination with the contracted channel, *b*.

Second. I claim the rotating paddle-wheel, having paddles projecting into and working in the said uniform and contracted channels.

Third. I claim the apertures, *m* and *n*, proportioned and formed as described.

Fourth. I claim the pipe, *q*, with its jet, *r*, for giving motion to the paddle-wheel before the fluid enters through the aperture, *m*.

Fifth. I claim the valve, *k*, by which any desirable power of jet may be obtained before any fluid enters through *m*.

J. ERICSSON.

No. 8580.—*Improvement in Chucks for Lathes.*

Having thus described my improved chuck, what I claim therein as new, and desire to secure by letters patent, is the mechanism, herein described, or the equivalent thereof, for connecting and disconnecting at will the whole or any part of the screws which operate the griping jaws, with the wheel which turns them, so that the screws and jaws may be moved either separately or in connexion, or in part separate and in part connected, whereby objects of either regular or irregular shape may be chucked, either eccentrically or concentrically with the axis of the mandrel, substantially as herein described.

I also claim the turning plate (I) of the chuck, constructed with a cog-wheel on its inner face, made in segments, part of which can be withdrawn out of gear with the pinions on the carrier screws, or held in gear therewith by means of set screws and springs, or the equivalent thereof, substantially as herein set forth.

JOSEPH HYDE.

No. 8581.—*Improvement in Feeding Logs in Saw Mills.*

Having thus fully described the nature of my invention, what I claim therein as new, and desire to secure by letters patent, is the combination of any number of adjustable rollers, F, which may be set at any angle with the feed rollers, Q, or with each other, for the purpose of feeding up the log, so that it may be cut with the curve or grain of the wood, substantially in the manner herein set forth and described.

CHARLES KETCHAM.

No. 8582.—*Improved arrangement of Pans for washing Ores, Minerals, &c.*

I do not claim the device of arranging a movable pan in a vibrating frame, and of operating the same, so as to give a double motion to the pan, since letters patent for this invention have been granted to Arnold Buffum and Philip Thorp.

What I claim as my invention, and desire to secure by letters patent, is the arranging and operating of a series of ore-washing pans, or sets of pans, in a vibrating frame, said pans, or sets of pans, having also an oscillating or rocking motion in the frame, in such a manner that, as the superficial portion of the contents passes freely from any one pan or set of the series into the next, the contents shall at the same time pass out of the latter less freely, or not at all, and *vice versa*, substantially as already described.

Second. I claim also the arranging in a vibrating frame of a series of pans, or sets of pans, one after the other, each pan, or set, being hung upon the frame by a separate axle, or equivalent attachment, and secured in its working position by a catch, or other equivalent means, in such a manner that each pan, or set, may be conveniently disconnected and tilted, so as to discharge its whole contents into a receptacle separate from those of the other pans.

Third. I claim also the arranging of a succession of groups of [pans by a constant duplication for the subdivision of the contents in such a manner that the contents issuing from each pan of any one group, the last excepted, shall pass, by an equal division, into two pans of the next succeeding group, substantially as described.

SAMUEL PORTER.

No. 8583.—*Improvement in Car Seats.*

Having thus described the nature of our invention, what we claim as new, and desire to secure by letters patent, is the arrangement of the reversing arms, A, A, pivoted midway the height of and to the back, so as that they shall descend and slide through the pivot rollers, so as that any required height of back may be reversed from one side of the seat to the other, in the manner and for the purpose substantially the same as described.

EZRA RIPLEY,
E. L. BRUNDAGE.

No. 8584.—*Improvements in Lath Machines.*

Having thus fully described the nature of my invention, what I claim therein as new, and desire to secure by letters patent, is so arranging the frame that carries the reciprocating or chopping knives and feeding apparatus as that, whilst cutting, it shall at all times rest by its own weight on the bolt or log, in advance of the portion thereof which is being cut, in combination with the mode, as herein described, of giving to the knives carried in said frame an alternating drawing movement towards and from the log, independent of the downward motion or position of the frame, by which means the block may be entirely reduced to laths while the whole weight of the knife frame is resting on it to keep it firm and solid.

I also claim, in combination with the cutter stock, the feeding plates for feeding up the log to the cutters, a "throw" being given to said stock for that purpose; and this I claim, whether the same is accomplished by the means herein specially set forth, or by any other means essentially the same.

G. W. TOLHURST.

No. 8585.—*Improvement in Chair Seats.*

What I claim as my invention, and desire to secure by letters patent, is the above combination of the frame and web, being the mode of securing the web to the frame, as herein set forth, by gluing or cementing the web into a groove in the frame.

JOHN W. DRUMMOND.

No. 8586.—*Improvement in Weavers' Temples.*

What we claim as our invention, and desire to secure by letters patent, is the roller temple, constructed as herein set forth; the roller working in a concave, so that the cloth is held at that line of the periphery of the roller which is nearest the reed, at which line the roller is enabled to perform its duty with the greatest efficiency.

ELIHU DUTCHER,
WARREN W. DUTCHER.

No. 8587.—*Improvement in combining Organs and Piano Fortes.*

I do not claim combining the organ and piano forte, irrespective of the manner in which the combination is formed; but what I claim as my invention, and desire to secure by letters patent, is—

First. The whole or any number of the tubes of an organ, with a distinct set of keys, in combination with a piano forte having its own proper set of keys, in such a manner that either the piano forte or organ can be played separately, or both at the same time, by the two sets of keys; or both coupled and played by one set of keys, by means of couplers, P or O, and eccentric bars, h, j, or other equivalent devices, substantially as herein described.

Second. Coupling either or both the organ and piano with a pedal action, R, n, Q, and uncoupling them from it by means of couplers, T, U, acting on the keys and eccentric bars, t, w, or their equivalents, so that either the organ and piano forte, or both, can be played upon by the pedals, substantially as herein set forth.

RICHARD M. FERRIS.

No. 8588.—*Improvement in Carriages.*

What I do claim as my invention, and desire to secure by letters patent, is—

First. The employment of segments, c, d, and fifth wheels, F, G, (or parts corresponding thereto,) attached as described; the one segment, d, and fifth wheel, F, working on pivots, f, n, secured at points between the front and hind axle, such parts acting in combination with arms, j, p, constructed substantially as shown and described, for coupling the movement of two axles, or their turning appurtenances, for the purposes set forth.

GUSTAVUS L. HAUSSKNECHT.

No. 8589.—*Machinery for making Kettles and articles of like character from disks of metal.*

I do not claim any of the gear wheels or pinions, nor their arrangement, except as hereafter set forth, some of these being common in ordinary lathes; but I do claim as new, and desire to secure by letters patent of the United States—

First. The application of a rotary metallic form, or mould, or successive forms or moulds, in combination with a proper tool or tools, roller or rollers, sustained, moved, and directed in a proper path by competent mechanical means, for the purpose of operating on a disk, blank, or plate of metal, so as to reduce it gradually from the centre to the edge, at the same time forming it with straight sides, by successive stages, into a complete kettle, or into any similar articles, to the forming of which this apparatus can be applied, substantially as described and shown.

Second. The construction of the mandrel, f, 3, part of which is cylindrical and part fitted with a short screw, 13, to take the screw of the hand-wheel, f, 2, so that great pressure may be made at the point desired, while at the same time the mandrel can be easily and quickly moved through a long distance, for the purposes and as described and shown.

HIRAM W. HAYDEN.

No. 8590.—*Improvement in Adjusting Lenses.*

We do not claim to be the inventors of any of the parts herein described and shown; neither do we mean to limit the application of these means to cameras, but to use the same to adjust the focal distance of lenses in optical instruments wherever the same may be made available. What we claim as new, and of our own invention, and desire to secure by letters patent of the United States, is the combination of the pin, 2, spring, f, and groove, 1, with the cylinders, a and b, for the purposes and as described and shown.

WILLIAM LEWIS,
W. H. LEWIS.

No. 8591.—*Improvement in Stethoscopes.*

What I claim as my invention, and desire to secure by letters patent, is the double branch, C, C, connected with the main trunk, a, so as to enable persons to use both ears simultaneously, substantially as herein set forth and described.

NATHAN B. MARSH, *M. D.*

No. 8592.—*Improvement in Mineral Composition resembling Jasper.*

What I claim as my invention, and desire to secure by letters patent, is the manufacture of a mineral composition, having the external characters above described, by the fusion of clay with alkali, soda, lime, and sulphate of copper, as above described, or their equivalents, and working the composition into articles of utility and ornament, in the manner above described.

JOHN PAIGE PEPPER.

No. 8593.—*Improvements in Rotating Tumbler Locks.*

We do not claim a combination of geared change wheels and notched circular plates, applied together on one common arbor, so that the said change wheels and circular plates shall lay side by side on the said arbor, by which arrangement of them they require to be removed from the arbor, in order to change the catch of any one wheel from any notch or hole of its circular plate into any other of the notches or holes of the said plate; but what we do claim as our invention is combining with the rotary tumblers and the change gears (arranged as set forth) the projection or tooth, *r*, or its mechanical equivalent, and the sliding frame, G, or its equivalent, for holding and guiding the tumblers during their rotations, and for moving them out of or into connexion with the change gears, all substantially as hereinbefore specified.

And we also claim the arrangement of the tooth or bit, *c*, and the stud, *q*, on a sliding and turning shaft, in combination with the arrangement of the arm, E, and the tumblers, so that when a person tries to move the tumblers, he cannot get end-play on the bolt, and *vice versa;* and in combination with the change gears and the arbor, *e*, we claim the friction spring, or springs, *a'*, and plat, *b'*, for the purpose above described.

DAVID H. RICKARDS,
JOSEPH F. FLANDERS.

No. 8594.—*Improvement in Candlesticks.*

I do not claim the employment of a movable detached cork, or other elastic substance, over which a sliding socket is allowed to move; nor do I claim the employment of a sliding socket; but what I claim as my invention, and desire to secure by letters patent, is the employment in the sliding socket candlestick of elastic packing, attached to the standard of the candlestick, substantially in the manner described, whereby I am enabled to support the sliding socket, prevent the leaking of the grease, and also am not obliged to use so long a sliding socket as where a cork is inserted loose in the socket.

FRANCIS A. ROCKWELL.

No. 8595.—*Improvement in Chimney Caps.*

I do not claim either the arch, B, or the end plates, *c*, *c*, or the end plates, *a*, *a*, and *b*, *b*, irrespective of the devices in connexion with them.

But what I claim as my invention, and desire to secure by letters patent, is—

First. The flanges, *c*, *c*, applied to the arch, B, in combination with the end plates, *c*, *c*, substantially in the manner and for the purpose herein set forth.

Second. The inclined plates, *a*, *a*, and *b*, *b*, applied to the arch, B substantially as and for the purposes specified.

CHARLES W. RUSSELL.

No. 8596.—*Improvement in Churns.*

Having thus described the nature of my invention and improvement, I wish it to be understood that I make no claim to originality of invention in any of the individual parts of the churn except the dasher, and this I claim only when it is constructed with inclined perforated paddles and tapered elbow tubes, L, combined, for directing the cream or milk upward, and also throwing it centrifugally against the ribs, B, and concave surface of the churn tub, A, during the operation of churning, in the peculiar manner herein set forth.

HENRY SKINNER.

No. 8597.—*Blind and Shutter Operator.*

Having thus fully described the nature of my improvements in window blind operators and fasteners, what I claim therein as new, and desire to secure by letters patent, is the combination of the extension handle (*k*) (provided with taper ends) with the lever (*h*) and the studs, (*j*, *j'*,) or their equivalents, by which the handle can, by extension, be made to possess the requisite leverage, and by which, when the lever arrives at that position of its sweep corresponding to the required position of the blind or shutter, it is firmly secured in its position, and the handle placed out of the way by the latter being thrust home against the studs; the whole being arranged substantially in the manner described.

N. W. SPEERS.

No. 8598.—*Improvement in Apparatus for pressing Garments.*

Having thus described my improvements, I shall state my claims as follow:

What I claim as my invention, and desire to have secured to me by letters patent, is suspending the goose in a tailor's pressing machine from a carriage travelling on rails on the end of a vertical spindle; also, arranging said spindle so that it may be moved vertically, and swivel or turn upon its axis, substantially as hereinabove set forth.

I also claim arranging said goose upon the rod, passing through the forked end of said spindle, so that it may slide forward and back upon said rod, as hereinabove set forth.

Furthermore, I claim the combination of a goose, arranged substantially as hereinabove described, so as to move in the several directions specified, with a platform box, susceptible of adjustment, as specified and heated, substantially as hereinabove set forth.

JOSEPH W. THORP.

No. 8599.—*Improvement in Processes for Smelting Copper Ores.*

That which I claim as my invention and discovery, and for which I ask letters patent, is the use, as a flux, for ores combined with an excess of silica, of the sub silicate of iron, obtained from the second smelting, or from iron furnaces; the grinding of the regulus or mat to a powder, (instead of merely breaking it into lumps or fragments,) so that a perfect oxidation can be obtained, and leaching with water, which aids the oxidation, and extracts the sulphuric acid when generated, as that acid greatly retards the refining process when combined with the metallic copper.

SAMUEL F. TRACY.

No. 8600.—*Improvement in Tailors' Measures.*

What I claim as my invention, and desire to secure by letters patent, is the mode of cutting coats and vests by making all the principal parts to depend in length on the length of the breast measure, substantially as herein described.

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EDWARD × VIRTUE.
mark.

No. 8601.—*Improvement in Grain Sieves.*

What I claim as my invention, and desire to secure by letters patent, is forming sieves for separating grain from straw, chaff, and all extraneous matter, and for other analogous purposes, of sheet metal, with apertures, B, B, cut or otherwise, made in it, and inclined leaves, A. A, under the said apertures, of corresponding form with the apertures themselves, substantially as herein set forth.

THOS. B. WHEELER.

No. 86 2.—*Improvement in Pumps for elevating Water mixed with Mineral Substances.*

I claim the improvement by which the waste, auriferous, or earthy water that leaks out of the shaft-hole of the case, A, is saved and returned into the body of the case, and the wear of the shaft hole of the chamber, *q*, prevented, the said improvement consisting in the chamber, *q*, the wheel, *r*, and the passage, *t*, as combined together, connected with the case, A, and the shaft of the fan-wheel, and made to operate substantially as specified.

WM. BALL.

No. 8603.—*Improvement in Chronometric Locks.*

Having thus described my improvements, I shall state my claim as follows—

What I claim as my invention, and desire to have secured to me by letters patent, is the manner of disengaging the drop lever from the notch of the bolt, from the outside of the partition, when the clock is stopped,

and preventing the same from being effected when the clock is in motion, by means of the lifting screw, in combination with the forked lever, swinging loop, and ratchet wheel, substantially in the manner above-described.

WM. L. BASS.

No. 8604.—*Improved Machine for making Leather Tubes.*

Having thus described the construction and operation of my machinery for forming flexible tubes, what I claim as my invention, and desire to secure by letters patent, is—

First. The method of forming tube blanks, or sheets of the proper size and form for tubes, from leather, or other suitable material, by means of the movable and stationary nippers and inclined knife, or the equivalents thereof, operating automatically, substantially as herein set forth.

Second. I claim the method of forming flexible tubes from prepared sheets or blanks, by means of fingers, clamps, and cement, or their equivalents, acting substantially as herein set forth, to bring the edges of the sheet into contact, and to unite the same.

Third. I claim combining, in a single machine, the operations of forming the leather, or other material, into blanks, bringing the edges of the same into contact, and uniting them, so as to form a tube at a single operation, substantially as herein set forth.

Fourth. I claim the clamp, by means of which the material is held, and upon which it is formed into a tube, constructed and operating in such manner that it shall, in addition to its movements towards the other clamp, also have a longitudinal movement to withdraw from the finished tube, substantially as described.

Fifth. I claim the combination of the reciprocating, diverging fingers with the reciprocating converging plates, or their equivalents, by whose action the fingers are made to seize the sheet of material, substantially as herein set forth.

Sixth. I claim the method of coating the edge of the sheet with cement, by means of a roller, or its equivalent, which receives the cement and applies it to the edge to be cemented, substantially in the manner and for the purpose herein set forth.

Seventh. In combination with a clamp, or its equivalent, for supporting the edges of the sheet of material to be united, I claim a reciprocating pressing iron, actuated substantially as herein set forth, to press the edges together and to set the cement.

NEWELL WYLLYS.

No. 8605.—*Rotary Swaging Machine.*

What I claim as my invention, discovery, and improvement, is the compressing, drawing, swaging, or working into shape, wrought iron car wheels, and other metallic disks, by means of two dies, or swedges, suitably shaped, one of which is forced towards the other, while it at the same time revolves on its own centre, its axis of revolution being the same as that of the disk which is acted upon; the other die being either stationary or having a revolving motion in an opposite direction to that of the first mentioned die, and with the same axis of revolution; the said two dies, or swedges, operating substantially as described, and being moved by any competent arrangement of machinery substantially as described.

P. G. GARDINER.

No. 8606.—*Improvement in Suspenders.*

What I claim as my invention, and desire to secure by letters patent, is the fastening of those different parts of a suspender to each other which require a permanent fastening, by a metallic clasp or clamp, substantially in the manner and for the purposes hereinbefore described.

JULIUS HOTCHKISS.

No. 8607.—*Improvement in Candle-making Apparatus.*

Having thus described the nature of my invention, I do not wish to be understood as claiming the drawing the candles and suspending them above the moulds, whereby the latter are wicked for the casting of the next series of candles, this having been before done; but what I do claim, and desire to secure by letters patent, is the employment of gripers, D, D, for griping the wicks, drawing and suspending the candles on the frame above the moulds, by means of spring bearings, by which the gripers are held firmly closed, and the candles are securely held and suspended until the next series of candles are moulded, when those suspended are cut from the wick and removed, in the manner and for the purpose described.

WILLIS HUMISTON.

No. 8608.—*Improvement in Æolian Attachments.*

What I claim as my invention, or improvement, is the combining with the valve stem, or rod, *a*, movable bar, *d*, or any equivalent mechanism, by which such valve stem, or the head thereof, whenever desirable, may be moved out of action with the key lever, for the purpose essentially as described.

GUSTAVUS W. INGALLS.

No. 8609.—*Improvement in Carriages.*

Having thus described the nature and operation of my invention, what I claim as new, and desire to secure by letters patent, is the employment or use of the chain, C, and pulley, B, in combination with the dogs, F, G, and slide bar, D, constructed and operating in the manner and for the purpose substantially as set forth; the lower ends of the dogs being raised or depressed by means of the levers, M, M, L, L, operated upon by the square or loop, K, or any other equivalent device, and the slide bar, D, attached to or detached from the pole, E, by means of the levers, N, and pawl, O, operated upon by the bent lever, *p*, or their equivalents.

LEWIS KING.

No. 8610.—*Improvement in Harness Saddles.*

Having thus fully described my improved harness saddle, and the advantages thereof, what I claim therein as new, and desire to secure by letters patent, is the sliding gauge hinge boxes attached to the pads, so as to adjust the width of the saddle by the screws, substantially as described.

I also claim the manner of attaching the sliding gauge hinge boxes to the pads by means of the housing between them and the top of the pad, and the set screws passing through the plate, *f*, and top of the pads, substantially as herein set forth.

JOHN McLAIN.

No. 8611.—*Improvement in method of hanging Window Sashes.*

I am aware that strips, acted upon by springs, have been placed in grooves in window sashes, and also in grooves in the casing for acting on the sashes, for the purpose of excluding air and for sustaining the sashes, when raised, in place of weights, and therefore I wish it to be understood that I do not claim the said arrangements as any part of my invention; but what I do claim as my invention, and desire to secure by letters patent, is the manner, herein described, of arranging and securing window sashes in their frames by means of grooves, *c*, *c*, in the sides (C) of the window frame (or casing) that receives the edges of the sashes, (or by projections from the sides of said frame, or casing, that fit it into grooves in the edges of the sashes,) and by making one or both sides of the window frame or casing movable and elastic by means of the springs, *a*, *a*, or their equivalents.

SAMUEL D. NIMS.

No. 8612.—*Improvements in Cutters for Planing Machines.*

We do not claim the formation of cutters by placing circular saws obliquely upon their arbors, as this has been done before; but what we do claim as our invention, and desire to secure by letters patent, is the constructing of a cutting instrument for operating upon lumber, of one or more elliptical shaped saw or saws, placed upon an arbor in positions so oblique to the direction of its axis as to bring every portion of the periphery of said saw or saws into the same perpendicular distance from the said axis of their arbor, by which the teeth of the said saw or saws are made to perform a combined rotary and laterally reciprocating cutting action in the same circle of rotation, substantially in the manner herein set forth.

JAS. M. PATTON,
WM. F. FERGUS.

No. 8613.—*Improvement in Apparatus for making Wrought Iron direct from the Ore.*

I do not wish to limit myself to the use of a puddling furnace for the final operation, nor to the use of mineral coal, as the same result in kind may be produced by a bloomery; what I claim as my invention, and desire to secure by letters patent, is the arrangement of a series of flat vertical tubes (or the equivalent thereof) in a vertical stack, substantially as described, when these are combined with a puddling or other furnace, substantially as described, by means of an interposed ore box, substantially as and for the purpose specified

I also claim combining with each of the deoxidizing tubes, as described, and at the middle and near the lower end thereof, a double inclined plane, substantially as described, to insure the equal descent of the charge of ore, as described.

And I also claim, in combination with the series of deoxidizing tubes and the ore box, substantially as described, the employment of a series of stationary and a series of adjustable inclined planes, substantially as described, to regulate and insure the equal discharge of the ore from each and from the whole series of tubes, as described.

JAS. RENTON.

No. 8614.—*Improvement in method of setting up Ten-Pins.*

Having thus described the nature and operation of my invention, what I claim as new, and desire to secure by letters patent, is attaching the pins, D, to a disk or plate, I, by means of cords, (*e*,) in combination with the adjusting screen, E, and guide screens, G, H, by which the pins are properly adjusted or set up on the alley, A, upon raising and lowering the disk or plate, I, as described; the disk or plate being operated by means of the cord, K, passing over the pulleys (*j*) (*k*) and around the wheel, O, power being communicated to the shaft, (*l*,) or by any other mechanical means.

THOS. E. SHULL.

No. 8615.—*Improvement in Machines for counting Screws and Pins.*

What I claim as my invention, and desire to secure by letters patent, is the cylinder or wheel, formed with recesses in its periphery, for the reception of the screws, or other articles, to be counted, and provided with a groove for the reception of, and in combination with, the detector, to indicate, mark, and register the number of screws, or other articles, that are delivered; the whole being constructed and made to operate substantially in the manner specified.

THOS. J. SLOAN.

No. 8616.—*Improvements in Bolt-heading Machines.*

Having thus described my improved machine for heading bolts, what I claim therein as new, and desire to secure by letters patent, is the combination of the upsetting punch, the dies for shaping the sides of the head, the levers for working the dies, and the protuberance on the punch stock, for actuating the levers, so that, by the forward movement of the punch stock, the punch is caused to upset the end of the bolt, and, by its retrogade movement, the dies are worked, which give shape to the sides of the head, as herein set forth.

NATHAN STARKS.

No. 8617.—*Improvements in Spinning Rope Yarns.*

What I claim as my invention, and desire to secure by letters patent, is spinning rope yarns upon bobbins, having movable head or heads, so that the yarn can be packed tightly upon the bobbin in spinning, and,

after spinning, can be removed from the bobbin, to be transferred and hauled off into strands, for cordage, from the inner ends thereof, without unwinding, thus effecting a great saving of bobbins and labor.

R. SANDS TUCKER.

No. 8618.—*Improvement in Machines for Dressing Stone.*

Having thus fully described my improvements in cutting stone by machinery, what I claim therein as new, and for which I desire to secure letters patent, is the cylindrical tool holder, constructed and arranged substantially as herein set forth, so as to hold the tools or chisels and turn them in a direction to cut either way, keeping them in such position as always to receive the blows from the cams in the same relative direction, and also incidentally to support the cam shaft by means of the cams resting against its interior, should the cam shaft spring.

WILLIAM WHEELER.

No. 8619.—*Improvement in Machines for Ruling Paper.*

Having thus described our improvements, what we claim is, first, the shaft, S, and its projections, *d*, *d*, (operating as above set forth,) or any mechanical equivalent contrivances, in combination with the carrying apparatus, or endless tapes, P, P, &c., R, R, &c., on which the sheets are received, moved, and introduced to the action of the ruling apparatus, such carrying apparatus being made so as to operate essentially as above described.

And we also claim the shaft, U, and its lifters, in combination with the carrying apparatus, or endless strings, P, P, and the two sets of ruling apparatus, or contrivances, for supporting and ruling the paper on both sides, as described; such shaft and lifters, or the lifting apparatus, as it may be termed, being for the purpose of changing the overlap of the sheets, in manner as hereinbefore explained.

JOHN AMES,
GEORGE L. WRIGHT.

No. 8620.—*Improvements in attaching Cutters for cutting Screws or Rails of Bedsteads.*

Having thus described my improvement in securing V-shaped cutters in rotary cylinder heads, for cutting screws on tenons of bedstead rails, I wish it to be understood that all I claim as my invention, and desire to secure by letters patent, is forming an opening, A, in the end of the cylindrical-head, B, so as to allow the cutter, C, to be placed therein laterally, or inserted into its seat sideways, and securely confined in the manner hereinbefore set forth, whereby the cutter, c, requires no adjustment, and is retained firmly in its position.

JACOB ZIMMER.

No. 8621.—*Improvement in setting Mineral Teeth.*

What I claim as my invention, and desire to secure by letters patent, is a new mode of setting mineral teeth on metallic plates, by means of a fusible silicious cement, which forms an artificial gum, and which also unites single teeth to each other and to the plates upon which they are set.

I also claim to be the inventor of said cement or compound, a full and exact description of which is herein given.

I also claim the combination of asbestos with plaster of Paris, for covering the teeth and plates, for the purpose of sustaining them in their proper position while the cement is being fused.

JOHN ALLEN.

PATENTS REISSUED DURING THE YEAR 1851.

No. 184.—*Improvement in a Machine for bending or setting Felloes for the wheels of Carriages and Wagons.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as described, of bending felloes for carriages by means of a cylinder, upon which the felloe is bent, and a friction roller, or its equivalent, against which it is bent, substantially as described, when used in connexion with a strap for preventing the wood from splitting on its exterior surface, or otherwise.

EDWARD REYNOLDS.

No. 185.—*Improvements in Sofa Bedsteads.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the frames, D, D, which are of the same form as the sofa ends, F, F, with the said sofa ends, substantially in the manner and for the purpose as herein set forth, to wit: when the back, A, is elevated, to convert the sofa bed into a sofa, the frames, D, D, must be swung inwards against the sofa back, to retain it in an elevated position, and to throw the said frames out of the way and out of sight; and when it is desired to change the sofa bed from a sofa to a bed, the said frames, D, D, can only be swung outwards into a line with the sofa ends, F, F, so that the ledges, *l*, *l*, on the inner sides of the same will unerringly catch and retain the back, A, when it reaches a horizontal position as it is thrown backwards, in which position the sofa ends, F, F, and the swinging frames, D, D, will form an ornamental and uniform head and foot to the bed form of my improved sofa bed.

I also claim the placing of the pivots, *t*, *t*, which suspend the mattress frame, A, such a distance from the lower or inner edge of the same that when the said mattress frame is thrown backwards into a horizontal position the lower or inner edge of the mattress, A′, will by that movement be thrown forwards and press against the rear edge of the mattress, B′, with such force as to form a close and an elastic joint between the two, and thereby furnish an extra width to the bed form of my improved sofa bed, substantially in the manner herein set forth.

I also claim the projection of the mattress, A′, below the pivots that it turns upon, in combination with the movement of the mattress, B′, on hinges located at its front edge, by means of which a firm and close joint is formed between the rear edge of the mattress, B′, and the face of the mattress, A′, when they are arranged in the form of a sofa, which joint aids in retaining the said mattress, A′, in an elevated position, substantially as herein set forth.

RUSSELL SCARRITT.

No. 186.—*Improvement in Machines for folding Paper.*

What I claim as my invention, and desire to secure by letters patent, is the method of folding sheets of paper mechanically, by means of a reciprocating straight edge, or its equivalent, which strikes the sheet where the fold is to be made, and forces it into a recess, or space, between two surfaces, through which it can be delivered, in combination with a mechanism, which presents the sheet at the proper place and time, to make the fold or folds at the proper line or lines, substantially as described.

I also claim the method of completing the folds in sheets of paper, by passing them between converging surfaces, in combination with the method of forming the folds, substantially as described.

And, finally, I claim the moving surfaces of endless belts, or their equivalents, on which the sheets of paper are extended, and by which they are moved, in combination with the method of making and completing the folds, substantially in the manner specified.

EDWARD N. SMITH.

No. 187.—*Improvements in Machinery for making Mouldings.*

I do not claim to have invented parallel grooved feed-rollers to force in the material to be planed; but I do not know of any previous machine in which an angular roller has been applied, of either one or more conical rings or disks, that operate to feed material of varying angular forms into the machine by contact with the parts that have to be removed by the cutters; neither do I claim the rotary cutter for forming mouldings, nor a common moulding plane; but I do not know of any machine in which these two have been employed together—the cutter to give the shape, and the moulding plane to finish the surface. Therefore,

What I claim as new, and of my own invention, and desire to secure by letters patent of the United States, is the combination of the feed and pressure rollers, constructed and operating substantially as described, with one or more cutters or planes for giving the proper form or dressing to the moulding, when said combined parts operate upon material which has been sawed or cut, as nearly as may be convenient, into the general form of the moulding to be produced, as herein described, for the purpose of economizing the material or facilitating the operation.

ALFRED T. SERRELL.

No. 188.—*Improvements in Sewing Machines.*

Having thus fully described our improved sewing machine, we shall state our claim as follows:

What we claim as our invention, and desire to have secured to us by letters patent in the above-described rotary sewing machine, is arranging the shuttle which carries the filling thread so that it shall revolve horizontally in a circular shuttle-race, said shuttle being constructed with a curved front and pointed nose, which shall travel in a circular guiding groove sunk below the bottom of said race, so that the shuttle shall inwardly pass through the loop formed in the needle thread; all as hereinabove set forth.

We also claim the pad or washer under the spring arms which carry the shuttle for keeping the filling thread straight, as hereinbefore explained. Furthermore, we claim the combination of the wide spring, c^1, c^1, and the bent lever spring, f^1, f^1, operating as hereinabove described, or any contrivance substantially equivalent thereto, for relaxing the needle thread when the loop is to be formed, and holding it rigidly when each stitch is to be tightened, as hereinabove set forth.

We also claim the converging nipper springs through which the needle, &c., passes to keep the thread up, and prevent the needle from splitting or breaking it, as hereinabove set forth.

We also claim the combination and arrangement of the spring arms, q^1, q^1, q^1, q^1, with the cam ledge, s^1, s^1, or any other means essentially the same, for the purpose of disconnecting, alternately, said arms from the shuttle, for the purpose of allowing the shuttle to pass through the loop, as herein described and represented.

SHERBURN C. BLODGET,
JOHN A. LEROW.

No. 189.—*Improvement in Tanning Leather by Tannin and Acids.*

What I claim and desire to secure by letters patent, is—

First. The process of removing hair and wool from hides and skins, and of "liming" them, so called, preparatory to tanning, by the use of a composition of lime, wood ashes, or potash, and of salt, called composition No. 1, in the manner above described. I also claim the use of a composition of lime and wood ashes, or potash, without the salt; but I do not claim either of these materials separately by itself.

Second. The process of tanning hides and skins by the use of any kind of tannin, in combination either with the muriatic acid of commerce or with muriatic acid generated by a mixture of sulphuric acid and salt, in water, with the tannin, in the manner substantially as above described.

W. W. REID.

No. 190.—*Improved arrangement of Steam Boiler, and Furnace thereof.*

What I claim as my improvement in steam boilers, and desire to secure by letters patent, is the combination of a fire chamber and a water casing, the upper horizontal sections of both of which are greater than their lower, with a descending flue, the fire chamber and water casing being so arranged, with respect to each other, that the larger sections of the one adjoin the larger sections of the other, substantially in the manner and for the purposes herein set forth.

I likewise claim the injection of a jet or jets of air at the flues or passages which connect the combustion chamber with the descending flue, for the purpose of igniting the gases and retarding their progressive motion towards the bottom of the gas chamber.

HORACE BOARDMAN.

No. 191.—*Improvement in Carriages.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of two bars, or reaches, placed in connexion with the straight reach, as above described, and in combination with the spring rod and cross bar, substantially in the manner described.

JOHN JONES.

No. 192.—*Improvement in Cutting Stone.*

What I claim as my invention, and desire to secure by letters patent, is the method, substantially as above described, of dressing, facing, or reducing stone, and other like materials, by means of a rolling edge or edges, acting against the face or surface of the material to be worked, substantially as herein described.

CHARLES WILSON.

No. 193.—*Improvement in Fire Arms.*

What I claim as my invention is—

First. The combination of the two independently adjustable braces, extending one on each side of the breeeh chamber containing the charge that is being fired, to regulate and accurately determine the joint between the breech and barrel, substantially as described.

Secondly. I claim the breech opening and closing on an axis which is parallel to the main barrel, and secured and regulated by the parts, substantially as described.

WM. W. HUBBELL.

No. 194.—*Improvement in Evaporators and Condensers.*

What I claim as my invention, and desire to secure by letters patent, is the partition (n) within the tank, for the purpose of dividing the water of the evaporator from that of the condenser, in the manner and for the purposes substantially as herein set forth.

EDWARD LYNCH.

No. 195.—*Composition for covering Hams.*

I do not intend to claim as my invention the covering of meats, or other articles, with paper and cloth, or other flexible material, previous to coating them with my preserving composition; but what I do claim as my invention, and desire to secure by letters patent, is the formation of a preserving composition for coating meats, cheeses, fruits, vegetables, &c., by the union of rosin, shellac, (or seed lack,) and linseed oil, (or other oil of a similar nature,) substantially in the manner and in nearly the proportions as herein set forth.

HORACE BILLINGS.

No. 196.—*Improvement in Washing Machines for cleaning Rags.*

What I claim as my invention, and desire to secure by letters patent, is an adjustable rotating water elevator and strainer, arranged substantially as herein set forth, in such manner that it can be raised or lowered in the vat of the washing or beating engine, to vary the quantity of water discharged therefrom, or can be raised entirely from the vat, to stop the discharge of water, or for other purposes, as herein set forth.

I also claim a rotating prismatic screen, or strainer, for straining the water from the paper stock in the vat of a washing or beating engine, in combination with devices for discharging the strained water, the prismatic screen being not only more efficient than a cylindrical screen, but also admitting of more ready repair.

JAMES PHELPS.

No. 197.—*Improvement in Machinery for doubling, twisting, and reeling Thread.*

What I claim as my invention, and desire to secure by letters patent, is the above described combination of doubling, twisting, and reeling mechanism, or elements, constructed, applied, and operating together, substantially as herein described, whereby I am able to double, twist, and reel each thread by the same machine, substantially in the manner as hereinbefore specified.

FRANK CHENEY.

No. 198.—*Improvement in the Machinery for manufacturing Felt Cloths without spinning and weaving.*

What is claimed as the invention of the said Thomas Robinson Williams is the method, substantially as described, of forming the bat by the combined use of two endless aprons, which receive the sliver from the doffer or a carding engine or otherwise between them, and from the bat on one of the belts, whilst the other acts as a support, substantially as described.

J. BURROWS HYDE.

No. 199.—*Improvement in the Machinery for manufacturing Felt Cloths without spinning and weaving.*

What is claimed as the invention of the said Thomas Robinson Williams is the method, substantially as described, of hardening the bat by passing the same between two series or tiers of rollers, covered with cloth or otherwise, and arranged over each other, the one series being provided with a reciprocating endwise motion, for the purpose of felting the bat, and the other series with a progressive rotary motion, for the purpose of feeding the bat through, with or without the use of a trough containing hot water and soap suds, or other matter, substantially as described.

J. BURROWS HYDE.

No. 200.—*Improvement in Cut-off, and working the Valves of Steam Engines.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The method, substantially as described, of operating the slide valves of steam engines by connecting the valves that govern the ports

at opposite ends of the cylinder with separate arms of the rock shaft, or the mechanical equivalents thereof, so that, from the motion thereof, the valve that keeps its port or ports closed shall move over a less space, while its port or ports is closed, than the one that is opening or closing its ports, and *vice versa;* while at the same time the two arms by which they are operated have the same range of motion as described, whereby I am enabled to save much of the power heretofore required to work the slide valves of steam engines, and by which also I am enabled to give a greater range of motion to the valves at the periods of opening and closing the ports, to facilitate the induction and eduction of steam, as specified.

And, lastly. I claim the method of regulating the motion of steam engines by means of the regulator, by combining the said regulator with the catches that liberate the steam valves by means of movable cams or stops, substantially as described.

GEORGE H. CORLISS.

No. 201.—*Improvement in Door Locks.*

What I claim as my invention, and for which I desire to secure an exclusive right by letters patent, is making the cases in which the movements of locks and latches for doors are contained double-faced, or so finished that either side may be used for the outside, in order that the same lock or cased fastening may answer for a right or left-hand door, substantially as described.

I also claim the peculiar construction and double action (upon an inclined and horizontal track, or way) of the locking car, B, as hereinbefore described, and the combination of the locking car, B, and safety cars, G, G², with one another, and with the connecting or vibrating bar and bolt, A, as within described, so as to fasten the bolt, c, securely, and prevent its being picked.

CALVIN ADAMS.

No. 202.—*Improvement in the Jacquard Machinery for weaving all kinds of Figured Cloth.*

Having thus described my improvements in looms, and pointed out their application to looms for weaving carpets and other figured fabrics, what I claim therein as new, and desire to secure by letters patent, is—

First. In connexion with looms for weaving figured fabrics, depressing the suspension board, or its equivalent, while the corresponding pattern card, acting as a trap board, or its equivalent, is elevated, substantially as described.

Second. I claim working the card prism by mechanism connected with the loom, and whilst the boards, or their equivalents, for working the harness, are not opening and closing the shed, substantially as described.

ALEXANDER CALDERHEAD.

No. 203.—*Method of attaching Augers to their Handles.*

What I claim as new in my invention, and desire to secure by letters patent, is the handle made in two parts, one of which, D, fits in a socket, B, on the other, A, and carries a bolt, *f*, screwed at its end, the said bolt passing through a hole in the auger-shank, and screwing into a female screw, or nut, *a*, in the part A. for the purpose of clasping or firmly holding the auger-shank between the ends of the parts, A and D, of the handle or stock, substantially in the manner herein described.

JOHN E. LARKIN.

No. 204.—*Improvement in fastening of Scythes to the Snath.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The mode of attaching and securing the blade of the scythe to the snath, substantially as herein specified, to wit: by clamping its shank between the edge, *x*, of an aperture, *a*, in the end of a metal cap secured to the snath and two bearings or points, *g* and *f*, on the opposite side of the shank, and on opposite sides of the first-named bearing point, one, *f*, of the two bearings consisting in a screw, or its equivalent, for the purpose of giving the necessary pressure to clamp it.

Second. The method, substantially as herein described, of setting the edge of the blade more up or down by means of the adjusting screw, *g*, in combination with the edge, *x*, of the aperture, *a*, which forms one of the three bearing points of the shank.

C. S. CLAPP.

No. 205.—*Improvement in Steam and Vacuum Gauges.*

What I claim as my invention, and desire to secure by letters patent, is—

First. The combining with the reservoir of mercury at the lower end of the tube, an elevated chamber, forming part of the reservoir, substantially as herein described, so that the zero-point may be high enough to be visible above the reservoir, as herein described, and also that the air contained in the tube, being condensed by the pressure of the mercury in the elevated chamber, may furnish more desirable divisions on the scale when very high pressures are to be indicated.

Second. The producing a partial vacuum in the tube of the steam gauge at the time of filling it with mercury, for the purpose of bringing the zero-point high enough to be visible above the reservoir, and also in order to prevent any partial vacuum produced in the boiler from draining all the mercury out of the tube.

Third. Surrounding the lower end of the glass tube with a metallic cylinder, provided with a cap or plug at its lower end, for protecting the glass tube, and allowing the mercury only to pass slowly either through a very small hole or between the threads of the screw, and the establishing a connexion between the reservoir and the boiler, substantially in the manner and for the purpose above specified.

Fourth. The method of preventing the air or moisture from passing between the mercury and the cylinder (*d*) into the tube, either by turning the cylinder or washing it with mercury, or by plunging it deeply into the mercury, as above described.

Fifth. Preventing the inside of the tube from being soiled with oxidised mercury, by either placing on the surface of the mercury in the tube some fluid (such as naphtha) which does not act perceptibly upon mercury, or by filling the tube with gas, as herein made known.

PAUL STILLMAN.

No. 206.—*Improvement in Reaping Machines.*

Having thus fully described my invention, what I claim therein as new, and desire to secure by letters patent, is—

Firstly. The crooked arm or coupling piece, in connexion and combination with the rack piece, and the attaching and securing the crooked arm (supporting and sustaining the rack piece to the frame) at or about the centre, so as to produce a balance by securing it at such a point on either side of the centre of the driving wheel as shall secure the balance and give firmness to the rack piece.

Secondly. I claim the endless chain cutter, in combination with the pulleys and rack teeth, for cutting grain and grass, as above set forth.

W. F. KETCHUM.

No. 207.—*Improvement in Screw Wrench.*

I do not claim adapting one jaw to slide on a bar permanently attached to the other jaw, and constituting a handle, or permanently attached to a handle, as this was known prior to my invention, in wrenches having a pall and rachet to fix the sliding jaw in any position required; nor do I claim adjusting the sliding jaw relatively to the fixed jaw by means of a screw; this, also, having been known prior to my invention, with the screw connexion made between the two jaws, and also between the handle and outer jaw—in such cases the connexion between the bar and handle being weak and liable to derangement, and practically defective. But what I claim as my invention, and desire to secure by letters patent, is combining with a wrench in which the inner jaw slides on a bar permanently attached to the outer jaw, and making part of, or permanently attached to, the handle, substantially as described, a screw thread and nut, connecting the movable jaw with the said bar between the said movable jaw and that part of the handle grasped by the operator, in the manner and for the purpose substantially as described.

I also claim the arrangement of the screw upon the two circular edges of the flat bar, in the manner and for the purpose herein described.

SOLYMAN MERRICK.

No. 208.—*Improvement in the manifold permutation Lock for Doors, Vaults, &c.*

What I claim as new, and of my own invention, is—

First. The application of slides, or their equivalents, in combination with tumblers, each so constructed that the slides shall be set through the tumblers by a key or any arrangement of the key-bit sections, or the equivalents of the same, and then retained as set by any competent means, so that on the tumblers resuming their quiescent positions, they abut against the slides, and prevent the retraction of the bolt, substantially as described and shown, but independent and irrespective of the means used to secure the slide in place.

Second. I claim the manner of fitting the slides with the cramp and nut, so as to retain the slides in the position they have been placed in by the key-bits and tumblers, as described and shown.

Third. I claim constructing the barrel of the key-bit in such a manner that it may be inverted with reference to the handle or shank, substantially in the manner and for the purposes herein described.

ROBERT NEWELL.

ADDITIONAL IMPROVEMENTS.

No. 97.—*Improvement in Churns.*

What I claim as my invention, and desire to secure by letters patent, is any desirable number of holes bored lengthwise through the partition, with the scallops at the bottom, all being constructed in the solid partition, substantially as herein described.

JOHN O'NEIL.

No. 98.—*Improvement in preparation of Dye-Stuff from Spent Madder.*

What I claim as my improvement upon my said patent, and desire to secure by annexing this description to said original specification, as dispensing with the washing of the spent madder in the first place, and the drying and pulverizing it after it has passed through the other processes, and substituting drawing or pressing instead.

FREDERICK PFANNER.

No. 99.—*Improvement in Bedsteads.*

What I claim as my invention, and desire to secure by additional letters patent, is the mode of jointing the head and foot rails, and of reversing the arm of the winch, as hereinbefore described.

HENRY PACE, SEN.

DESIGNS.

No. 341.—*Design for a Cook Stove.*

What I claim herein as new, and for which I desire letters patent, is the ornamental design for a stove substantially as represented in the accompanying drawings.

W. C. DAVIS.

No. 342.—*Design for Stove.*

What we claim as our invention or production, and desire to secure by letters patent, is the ornamental design as above described and represented in the accompanying drawings.

CHARLES GILBERT,
W. G. HALLMAN.

No. 343.—*Design for Stoves.*

What I claim, as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms, represented in the accompanying drawings, forming together an ornamental design for a parlor stove.

ELIHU SMITH.

No. 344.—*Design for Stoves.*

What I claim as new, and my invention, is the arrangement and combination of the above-described and represented shapes, figures, ornaments, flutes, and mouldings into the above-specified design, for coal-heating stoves, substantially as above shown.

JOSEPH G. LAMB.

No. 345.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental design for a stove as herein described and represented in the annexed drawings.

S. W. GIBBS.

No. 346.—*Design for Cooking Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the annexed drawings, as making an ornamental design for a cooking stove.

S. W. GIBBS.

No. 347.—*Design for Stoves.*

What we claim as our invention, and desire to secure by letters patent, is the combination and arrangement of the above-represented scrolls, foliage, figures, and mouldings into an ornamental design for coal and wood parlor stoves, to be known and called Harris & Zoiner's patent coa and wood parlor stove.

CONRAD HARRIS,
PAUL W. ZOINER.

No. 348.—*Design for Cooking Stoves.*

What I claim as new, and desire to secure by letters patent, is the design of cook stove substantially the same as herein described and represented.

SAMUEL A. HOUSE.

No. 319.—*Design for Parlor Stoves.*

What I claim as new, and desire to secure by letters patent, is the design of stove plate substantially the same as herein described and represented.

SAMUEL A. HOUSE.

No. 350.—*Design for Umbrella Stands.*

What your petitioner claims as new, and desires to secure by letters patent, is the peculiar ornamental design or figure as shown in the accompanying drawing.

EDWARD J. DELANY.

No. 351.—*Design for Cooking Stoves.*

What I claim as my invention, and wish to secure by letters patent, is the application of the above design to cooking stoves.

S. H. SAILOR.

No. 352.—*Design for Furnace Registers.*

Having thus described my new design, I shall state my claim as follows: What I claim as my production, and desire to have secured to me by letters patent, is the new design, hereinabove described, for a register, in the form of a circle, having within and near to its outer ring, two concentric rings, the space between each of said rings being ornamented with curved lattice work, forming hyperbola-shaped openings, and a ring in its centre, enclosing an eight leaved star, with a small circle in its centre, and curved and notched branches, radiating from the said ring to the smaller of the outer rings, forming irregular and heart-shaped openings, all as hereinabove described and shown in the drawing.

GARDNER CHILSON.

No. 353.—*Design for Furnace Registers.*

Having thus described my new design, I shall state my claim as follows:

What I claim as my invention or production, and desire to have secured to me by letters patent, is the new design, hereinabove described, for a register for furnaces, &c., of rectangular form, having within it a smaller rectangle, connected to the edge of the register by curved bars, of the shape shown in the drawing, said inner rectangle having a square in each corner, and small rectangles within its sides, said squares being ornamented with curved bars, forming the lattice-work, *h*, *h*, *i*, *i*, &c., and said smaller rectangles being ornamented with semi-circular and diamond-shaped lattice work, and a rectangle in the centre of the register, ornamented with irregular curved branches or bars, proceeding from its sides to a ring enclosing a four-notched leaved star, the whole forming a lattice or open work for the heat to pass through, all as hereinabove described.

GARDNER CHILSON.

No. 354.—*Design for Furnace Registers.*

Having thus described my new design, I shall state my claim as follows:

What I claim as my production, and desire to have secured to me by letters patent, is the new design, hereinabove described, for a register of rectangular form, having within its sides two smaller rectangles, one within the other, the space between the outer bars of the register and the larger rectangle being ornamented with curved lattice-work; and the triangular openings, *e*, *e*, and the space between the two inner rectangles, being ornamented with irregular heart and diamond-shaped openings, while the centre of the register is occupied by a five oval leaved star, in a ring, with curved and notched branches or bars running from said ring to the inner rectangle, all as hereinabove described and represented in the drawing.

GARDNER CHILSON.

No. 355.—*Design for Registers for Furnaces.*

Having thus described my new design, I will state my claim as follows:

What I claim as my invention or production, and desire to have secured to me by letters patent, is the new design, hereinabove described, for a register of rectangular form, having within its sides a smaller rectangle, the space between the two being ornamented with the circular and diamond-shaped lattice-work shown in the drawing, the inner rectangle being ornamented with irregular curved bars or branches, running from its sides to a ring in its centre, which encloses a five-pointed star, with curved sides, the whole forming a lattice work for the passage of the heat, all as hereinabove described.

GARDNER CHILSON.

No. 356.—*Design for Stoves.*

What I claim, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the annexed drawings, as making an ornamental design for a six-plate stove

S. W. GIBBS.

No. 357.—*Design for Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the accompanying drawings, forming together an ornamental design for the side of a cooking stove, and the back and front plates of the elevated oven.

S. W. GIBBS.

No. 358.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of ornamental forms and figures represented in the accompanying drawings, and forming a design for an ornamented cooking stove.

JOHN S. PERRY.

No. 359.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent is the combination and arrangement of ornamental figures shown in the accompanying drawings, forming a new ornamental design for an air-tight box stove.

SAMUEL W. GIBBS.

No. 360.—*Design for Pedestals and Columns.*

We do not mean to limit ourselves to the material out of which this is to be formed, but we prefer a casting of iron; neither do we mean to limit ourselves to the exact size or proportions, the ornamental portions remaining substantially as described and shown. What we claim as new, and of our own invention, is the design and configuration shown in fig. 1, as attached to or formed on the pedestal in alto relievo, as described and shown; and we also claim the design shown in fig. 2, as forming the base of the column attached, as described and shown.

WILLIAM LEWIS,
W. H. LEWIS.

No. 361.—*Design for Parlor Grates.*

Having thus described my new design, I shall state my claim as follows: What I claim as my production, and desire to have secured to me by letters patent, is the several ornamented mouldings round the hearth plate, ash pan, and front and top plates, above described and represented in the drawings, with the ornaments above specified and shown in the several drawings, as cast on the front and top plate, and blower and top of the grate, forming a new design for a parlor grate.

JOSEPH PRATT.

No. 362.—*Design for Parlor Grate.*

What I claim is the new and ornamental design for the top plate, the front plate, the base plate, and the blower, as represented in the drawings.

WINSLOW AMES.

No. 363.—*Design for Air-Tight Stoves.*

What I claim as my invention is the ornamental design of the air-tight stove substantially as exhibited in the drawings, and as above described.

N. P. RICHARDSON.

No 364.—*Design for Air-Tight Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the design for stoves substantially as herein set forth and represented in the accompanying drawings.

FRED'K SCHULTZ.

No. 365.—*Design for Stoves.*

I claim as my invention or production the ornamental design essentially as described and represented in the drawings.

SETH WILLIAMS, Jr.

No. 366.—*Design for Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the accompanying drawings, forming together an ornamental design for a cooking stove.

S. W. GIBBS.

No. 367.—*Design for Cooking Stoves.*

Having thus described my new design, I shall state my claim as follows:

What I claim as my invention or production, and desire to have secured me by letters patent, is the design composed of the several ornamental mouldings and configuration hereinabove described and represented in the drawings, for the front, side, and back plates of a cooking stove.

DUTEE ARNOLD.

No. 368.—*Design for Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the design, configuration, and arrangement of the ornaments on the several parts of the cooking stove as herein represented and described.

JNO. ABENDROTH.

No. 369.—*Design for Bust of Jenny Lind.*

Having thus described my new design, I shall state my claim as follows:

What I claim is the design of a bust of Jenny Lind, of the cabinet size, as represented in the drawings above referred to.

THOMAS BALL.

No. 370—*Design for Stove Doors and Panels.*

What I claim as my invention, and desire to secure by letters patent, is the general arrangement and configuration of the ornaments and mouldings, A, B, C, D, E, F, substantially as herein shown.

M. C. BURLEIGH.

No. 371.—*Design for Floor Oil Cloth.*

And what is claimed as my invention, and desired to be secured by letters patent of the United States, is the arrangement of ornamental figures forming a design for floor oil cloths, as shown in the aforesaid drawing.

JAMES HUTCHISON.

No. 372.—*Design for Clock Frame.*

What I claim as my production, and desire to secure by letters patent, is this combination of figures, placed in the manner described, so as to form the front of a block frame or case.

NATH. A. BATCHELOR.

No. 373.—*Design for Stoves.*

Having thus fully described our improvement and design, what we claim therein as new, and for which we desire to secure letters patent, is the foregoing described form and configuration of the plates, forming an ornamental design for a stove, as represented and illustrated by the drawings.

JAMES WAGER,
DAVID PRATT,
VOLNEY RICHMOND.

No. 374.—*Design for Bedsteads.*

What I claim as my invention, and desire to secure by letters patent, is the designs and ornaments upon the parts, A, B, C, and D, combined as in the drawing hereto annexed.

P. M. HUTTON.

No. 375.—*Design for Stoves.*

Having thus described my new design, I shall state my claim as follows:

What I claim as my production, and desire to have secured to me by letters patent, is the new design, consisting of the several ornamental configurations and mouldings hereinabove described and represented in the drawings, for the side and front plates of a cooking stove.

WM. L. HATHAWAY.

No. 376.—*Design for Stoves.*

Having thus described my new design, I shall state my claim as follows: What I claim as my production, and desire to have secured to me by letters patent, is the design, consisting of the several mouldings, leaf work, and scrolls, hereinabove described, and represented in the drawings for the front, side, and back plates of a cooking stove.

N. P. RICHARDSON.

No. 377.—*Design for Stoves.*

What I claim, and desire to secure by letters patent, is the design and configuration of ornamented stove plates substantially the same as described and represented.

EZRA RIPLEY.

No. 378.—*Design for Stove Plates.*

Having thus described my new design, I shall state my claim as follows: What I claim as my production, and desire to have secured to me by letters patent, is the design, consisting of the mouldings, panels, and gothic arches, hereinabove described, and represented in the drawings for the top and front plates of a parlor stove.

LYMAN S. HAPGOOD.

No. 379.—*Design for Stoves.*

What I claim as new, and desire to secure by letters patent, is the border, A, with its corner pieces, the figures, B, C, and D, the borders, E, E, E, E, and F, F; said borders and figures being of the form, situated precisely as represented and described.

WM. L. SANDERSON.

No. 380.—*Design for Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental forms and figures represented in the annexed drawings, forming the ornamental designs for front and side plates of a cooking stove, with the doors thereto belonging.

S. W. GIBBS.

No. 381.—*Design for Stoves.*

Having thus fully described my design, what I claim therein, and desire to have secured by letters patent, is the design or ornamental pattern herein fully set forth and delineated.

W. G. HALLMAN.

No. 382.—*Design for Stoves.*

Having thus fully described our ornamental designs, what we claim, and desire to secure by letters patent, is the ornamental designs (stove pattern) above described, formed of flat ribbons, as fully illustrated.

A. COX,
ELIAS JOHNSON,
D. B. COX.

No. 383.—*Design for Stoves.*

Having thus fully described our improved design, what we claim, and desire to secure by letters patent, is the within-described and illustrated ornamental design stove pattern.

A. COX,
ELIAS JOHNSON,
D. B. COX.

No. 384.—*Design for Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the accompanying drawings, forming together an ornamental design for a six-plate stove.

JNO. F. RATHBONE.

No. 385.—*Design for Stoves.*

We have thus detailed the particular ornamental designs on the respective plates which we wish to patent, and do hereby claim the exclusive right to the said ornamental designs for stove-plates, as we have laid them out and displayed them.

DAVID STUART,
JACOB BEESLEY.

No. 386.—*Design for Stoves.*

Having thus fully described and shown the aforesaid design, what I claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the above-described and represented shapes, mouldings, and ornaments, substantially as herein shown.

JOSEPH G. LAMB.

No. 387.—*Design for Stoves.*

Having thus fully described the various parts of the above-named ornamental design, what I claim as new, and my invention, and desire to secure by letters patent, is the combination and arrangement of the herein-represented shapes, ornaments, mouldings, and figures, when combined and arranged substantially as shown.

JOSEPH G LAMB.

No. 388.—*Design for Stoves.*

What I claim as new, and desire to secure by letters patent, is the design and configuration of box stove, substantially the same as herein described and represented.

SAMUEL A. HOUSE.

No. 389.—*Design for Cooking Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the accompanying drawings, forming together the ornamental designs for the plates of a cooking stove.

JNO. F. RATHBONE.

No. 390.—*Design for Stoves.*

Having described and represented my ornamental design for stoves I wish it to be understood that I do not claim the radiating ornaments or the mouldings, separately considered; but what I do claim is the combination of the ornaments as described and represented

W. C. DAVIS

No. 391.—*Design for Parlor Stoves.*

Having thus described my new design, I shall state my claim as follows:

What I claim as my production, and desire to have secured to me by letters patent, is the design, consisting of the ornamental configurations, flower and leaf work, hereinabove described and represented in the drawings respectively, for the top and bottom plates of a parlor stove.

JOSEPH PRATT.

No. 392.—*Design for Water Coolers.*

What I claim as my design, and desire to secure by letters patent, is, first, the form and general configuration of the outer casing, substantially as described and represented in the drawing; second, the dolphin spout, *l*; and, third, the configuration of the handle, *j*, *j*, *k*, of the cover, substantially as shown.

WILLIAM BURNET.

No. 393.—*Design for Stoves.*

What I claim as new, and desire to secure by letters patent, is the design and configuration of ornamental stove plates as herein described and represented in the annexed drawings.

JAMES V. DE WITT.

No. 394.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the ornaments and mouldings herein described as constituting a design for cooking stoves.

S. W. GIBBS.

No. 395.—*Design for Plates of Franklin Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the accompanying drawings, forming together the ornamental designs for the plates of a Franklin stove.

JOHN F. RATHBONE.

No. 396.—*Design for Cooking Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the accompanying drawings, forming together the ornamental designs for the plates of a cooking stove.

JOHN F. RATHBONE.

No. 397.—*Design for Stove Plates.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental design or production represented by figures 2 and 4, to be used with the carving represented by letters, O, P.

ELIJAH P. PENNIMAN.

No. 398.—*Design for Stove Plates.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental design or production represented by figures 1 and 3, to be used with the carving represented by letter N.

ELIJAH P. PENNIMAN.

No. 399.—*Design for Plate of Parlor Stoves.*

Having thus described my new design, I shall state my claim as follows: What I claim as my production, and desire to have secured to me by letters patent, is the design, consisting of the ornamental arches, panels, and mouldings, hereinabove described and represented in the drawings respectively, for the front and top plates of a parlor stove.

APOLLAS RICHMOND.

No. 400.—*Design for Cast Iron Tomb.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental design for a cast iron "cemetery tomb," ornamented as herein described.

HENRY R. FLINCHBAUGH.

No. 401.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental designs for ornaments upon cast iron stove plates, above described, and more fully shown in the annexed drawings.

R. J. BLANCHARD.

No. 402.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental design for cast iron stove plates shown in the annexed drawings, and above described.

R. J. BLANCHARD.

No. 403.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental design above described, and delineated in the annexed drawings, as an ornament for the plates of cast iron stoves.

R. J. BLANCHARD.

No. 404.—*Design for Stoves.*

What I claim, and desire to secure by letters patent, is the design and configuration of ornaments, as applied to stoves, substantially the same described.

N. S. VEDDER.

No. 405.—*Design for Ladies' Combs.*

What I claim as new and original, and desire to secure by letters patent, is the design, A, placed on the top, or upper part, of the comb, formed or composed of the series of oblique rings, as herein represented and described.

AARON COOK

No. 406.—*Design for Stove Plates.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental design of a stove plate, substantially as herein described and represented.

CALVIN FULTON.

No. 407.—*Design for Cast Iron Bedstead.*

What I claim as my invention, and desire to secure by letters patent is the designs and ornaments upon the parts A, B, C, and D, combined as in the drawing hereunto annexed, as applied to iron bedsteads.

PELLATIAH M. HUTTON.

No. 408.—*Design for Stoves.*

I claim as my invention or production, and desire to secure by letters patent, the above-described and illustrated design for the several plates of a stove, as fully set forth—that is to say, I claim the design on each of the plates separately, and on all the plates in combination.

A. W. JONES.

No. 409.—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental design for a stove as herein described and as represented in the annexed drawings.

S. H. SAILOR.

No 410.—*Design for Stoves.*

I disclaim the hearth, W, in fig. 1, and the projection, L, in fig. 2. But what I do claim as my design and production, and desire to secure by letters patent, is the basso relievo ornaments, form, and configuration of the doors, E, F, and G, in fig. 1, which are substantially the same as before described in the doors, figs. 2, 3, and 4.

SILAS MERCHANT.

No. 411.—*Design for Floor Oil Cloths.*

And what is claimed as my invention, and desired to be secured by letters patent of the United States, is the arrangement of figures forming a design for floor oil cloths, as shown in the aforesaid drawing.

JAMES HUTCHINSON

No. 412.—*Design for Shovel Stands.*

What I claim as my invention, and desire to secure by letters patent, is the design and configuration of the stand as a whole, as fully shown and represented in the drawing at figure I.

I claim, also, the particular ornamenting of the shell or dish used as a base, and the configuration and ornamenting of the standard or upright, and the design of the hooks and the handle, as fully shown and represented in the drawings at figures I, II, III, and hereinbefore fully forth.

CHARLES ZEUNER.

No. 413.—*Design for Metallic Gates.*

I do not claim the design for the posts or pillars in this gateway, but only the form of the gate suspended between the posts; and I claim the design for gates of this pattern, of whatever size they may be made, and of whatever metal they may be cast, and for whatever purposes they may be used.

EBE'R WEEMAN.

No. 414.—*Design for a Ventilating Stove or Furnace.*

What I claim as my production, and desire to secure by letters patent, is the design marked figure 1 and figure 2.

ELIJAH P. PENNIMAN.

No. 415.—*Design for Tables.*

What I claim as my invention, and desire to secure by letters patent, is the design and configuration of table pillars in the form of vines, supporting, by their branches, the drawer and upper part of the table with flaring scroll, balustrade pillars, supporting a rim which encircles the main pillars, together with the configuration of an ornamental, openwork drawer and Capital exposed to view on all sides; the whole combining various styles of architecture, as hereinbefore described.

NATHAN CHAPIN.

No. 416.—*Design for Stove Fronts.*

What I claim, and desire to secure by letters patent, is the design and configuration of parlor stove fronts substantially the same as described and represented.

EZRA RIPLEY.

No. 417.—*Design for Stoves.*

Having thus distinctly represented and described the nature and arrangement of the respective ornaments and figures upon the front and hearth plates of my Franklin stove, what I claim therein as new, and desire to secure by letters patent, is the design, configuration, and arrangement of the said ornaments as herein designated and represented.

LYMAN COBB.

No. 418.—*Design for Stoves.*

What I claim as my invention, and wish to secure by letters patent, is the ornamental design and general configuration of the parts of my stove as herein designated and represented.

CHARLES J. WOOLSON.

No. 419.—*Design for Cast Iron Fences.*

What I claim, and desire to secure by letters patent, is the design and configuration of ornamental iron fence railing, substantially the same as described and represented in the annexed drawing.

JOHN T. DAVY.

No. 420.—*Design for Stoves.*

What I claim as original, and wish to secure by letters patent, is the design and configuration of the several ornamental figures on the front and side plates and doors of a certain stove, as represented in the annexed drawings and as above described.

WILLIAM SAVERY.

No. 421.—*Design for Stoves.*

What I claim as new, and desire to secure by letters patent, is the design of ornament and configuration of cook stove substantially the same as herein described and represented.

EZRA RIPLEY.

No. 422—*Design for Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the ornamental design for a stove as herein described and as represented in the annexed drawings.

S. W. GIBBS.

No. 423.—*Design for Iron Railings.*

What I claim as my invention, and desire to secure by letters patent, is the design, arrangement, and configuration of the several ornaments composing the balustrade and step-railing branching or leading there from, as represented and described.

FREDERICK FITZGERALD

No. 424.—*Design for Parlor Stove Plates.*

Having thus described my new design, I shall state my claim as follows: What I claim as my production, and desire to have secured to me by letters patent, is the new design, consisting of the mouldings, panels, and ornamental configurations hereinabove described and represented in the drawings, respectively, for the top, front, and end plates of a parlor stove.

APOLLOS RICHMOND.

No. 425.—*Design for a Hat Stand.*

What I claim as my invention is the design and configuration of a hat stand, representing a Triton, or similar figure, holding up the branches of a plant, in the manner aforesaid, with the basin lying in a bed of leaves or flowers, all arranged substantially as above described and set forth.

C. MULLER.

No. 426.—*Design for a Parlor Stove.*

What we claim, and desire to secure by letters patent, is the design and configuration of a parlor stove substantially the same as herein described and represented in the annexed drawing.

EZRA RIPLEY,
N. S. VEDDER.

No. 427.—*Design for Stove Registers.*

What we claim as our invention, and desire to secure by letters patent, is the ornamental design for a register as herein described and represented in the annexed drawings.

DAVID STUART,
JACOB BEESLEY.

No. 428.—*Design for Stoves.*

What I claim, and desire to secure by letters patent, is the ornamental design and configuration of cook stove substantially the same as described and represented in the annexed drawing.

J. D. GREEN.

No. 429.—*Design for Stoves.*

The said design consists of the ornamental semi-star and rays and mouldings of the end or side of the top plate, (as seen in the drawings,) the circular ornament, A, and four or more surrounding ornaments, B, C, D, E, together with the mouldings of the top and bottom plate, all essentially as represented in either of the side or end views, and their sections, and such ornamental design, substantially as exhibited in the above-mentioned drawings, I claim as my invention or production; and I also claim the ornamental design or configuration of the water urn, as shown in figures 1, 2, and 3.

WINSLOW AMES.

No. 430.—*Design for Frames for Presses, Mantel Pieces, &c.*

What I claim as new, and desire to secure by letters patent, is the design of the frame for presses, mantel-pieces, &c., above described.

EDMUND L. FREEMAN

DISCLAIMERS ENTERED DURING THE YEAR 1851.

Crackers—Cutting.

Your petitioner, therefore, hereby enters his disclaimer to that part of the claim in the said last-named specification which is in the following words, to wit:

"What I claim as my invention, and desire to secure by letters patent, is cutting, by means of reciprocating cutters, on an apron having an intermittent motion, substantially as described, by combining and connecting together, in the manner substantially as herein described, the reciprocating motion of the cutters with the intermitting progressive motion of the apron that carries the dough to and under the cutters, to be delivered as described, whereby the apron moves the dough forward the required distance while the cutters are up, and remains at rest while they are cutting and leaving the dough."

Your petitioner further represents, that at the expiration of the said letters patent he was the owner of all the rights thereunder for making the machines therein described throughout the United States, but that he had sold several of such machines, together with the right to use the same, to different persons in various parts of the United States; and this disclaimer is to operate to the extent of the interest in said letters patent vested in your petitioner at the time of the expiration thereof, your petitioner having paid $10 into the treasury of the United States, agreeably to the requirements of the acts of Congress in that case made and provided.

WILLIAM R. NEVINS.

Heddles—Wire Machinery for making.

The subscriber further represents that he is the sole and exclusive owner of the said letters patent, and of the right, interest, and property therein and thereby secured; and although he did not intend, in or by the specifications and drawings upon and in reference to which said letters patent were issued, (and of which copies are annexed to and form a part of said letters patent,) to represent or claim that he was the original or first inventor of the wheel, collar, or flange, with a sliding tooth and pulley, and treadle, or other device hereinafter particularly mentioned, or of any part thereof; and he insists that said specifications and drawings do not, when rightly understood, represent or claim that he was such inventor; and he also insists that said letters patent do not, when rightly understood, assume to confer on him any right as the supposed, assumed, or alleged inventor thereof, or of any part thereof; yet, in order to guard against any mistake or misconstruction in these respects, the subscriber states:

(1.) That he did not mean to assert, claim, or represent, in and by said specifications or drawings, that he was the original or first inventor of the wheel mentioned as wheel fig. 8, in said specifications and drawings.

(2.) Nor did he mean to assert, claim, or represent, in and by said specifications or drawings, that he was the inventor of the collar or flange, with a sliding tooth, which are partially represented on the drawing, fig 1, near letter Q, and also partially represented on the drawing, fig. 2, at that end of the cylinder where the receiving and discharging hook rod shows the hook, and near letter B.

(3.) Nor did he mean to assert, claim, or represent, in and by said specifications or drawings, that he was the inventor of the cord, pulley, or treadle partially represented on the drawing, figure 1, which cord, as there shown, extends from said pulley, near letter C, to said treadle.

(4.) Nor did he design, or intend by said specifications or drawings to claim, assert, or represent, that his invention would make a heddle, with a slack twist, in the half or part thereof which is towards the end where the wire is doubled.

And the subscriber says, that if said specifications and drawings import or mean that any or either of the aforesaid things was, or were, invented by him, or that his invention, as claimed by him, would make a heddle with any such slack twist, as aforesaid, the same was, and were, by and through inadvertence, accident, and mistake, not being so designed or intended by him; and he hereby fully disclaims the several matters and things aforesaid, numbered above, (1,) (2,) (3,) (4,) each and every part thereof, under and pursuant to the seventh section of the act of Congress entitled "An act in addition to the act to promote the progress of science and useful arts," approved March 3, 1837, and under and pursuant to the law in such cases made and provided; insisting, however, as he does, that the same are not, nor is any part thereof, claimed in and by said specifications and drawings, or either of them, or embraced in said letters patent; this disclaimer being made for greater caution, and to guard against misconstruction and mistakes in regard to such matters.

A. J. WILLIAMS.

Hide-handling Cylinders—Beaters in.

Your petitioner, therefore, hereby enters his disclaimer to that part of the claim in the aforenamed specification which is in the following words, to wit: "Second. The *rollers* or *slats*, in combination with the chamber;" which disclaimer is to operate to the extent of the interest in said letters patent vested in your petitioner, he having paid ten dollars into the treasury of the United States, agreeably to the act of Congress in that case made and provided.

JAMES R. INNIS.

EXTENSIONS.

Improvement in the Machine for moulding and pressing Bricks.

I claim as my invention the combination of the parts of said machine in the manner above described, or in any other manner substantially the same, for the purposes aforesaid, but no one part separately or independently of this combination.

NATHANIEL ADAMS.

Improvement in the mode of supporting the Bodies of Railroad Cars and Carriages.

What I claim as my invention is the application of the vibrating cylinder plates, as set forth in the specification, whereby to support all kinds of eight-wheeled railroad carriage bodies upon springs, or in any other form or size whereby the same principle is used to obtain the same object.

RICHARD IMLAY.

Improvement in the Horse Rake.

What I claim as my improvement in the above-described machine, not before used or known before my application, is the iron, steel, or other elastic rods or teeth, as above specified.

DAVID DEWEY.

Improvement in the Loom for Weaving Knotted Counterpanes and other Fabrics in which the woof is raised from the surface.

Separately and singly, I claim as my inventions and improvements as follows:

First. Raising the knots which compose the figure from the surface of the cloth by a series of movable dents, or teeth, or hooks.

Second. Supporting the woof during the operation of the movable dents, or teeth, or hooks, and thereby regulating the length of the knots, by a bar, beam, or race piece, as hereinabove described.

Third. Separating or dividing asunder the threads of the warp by means of bevelled pieces of metal on the sides of the movable dents, or hooks, or teeth, to prevent them from catching into and breaking the threads.

Fourth. A toothed cylinder, or cylinders, acting on the machinery intervening between them and the dents, or teeth, or hooks, and operating the dents, or teeth, or hooks, successively, to raise the knots which compose the figure.

Fifth. The application of a prism and pattern card, to regulate the operation of the hooks, or teeth, or dents, to produce the variations in the pattern or figure.

ERASTUS B. BIGELOW

Improvement in the Figure Power Loom.

What I claim as my invention, and wish to secure by letters patent, is the entire manner of constructing and combining the apparatus for working the jacks, as herein described, consisting essentially of the lifting and depressing rods; the rods with rollers, for throwing out the jacks, arranged upon a cylinder, or otherwise; the lifting rods and the upper shaft, with its connexion by gearing with the roller cylinder. I also claim the two notched wheels upon the upper shaft, as constructed, combined, and used for working the pick.

WILLIAM CROMPTON.

Improvement in the Rotary Press for pressing Woollen and Cotton Goods.

What I claim as my invention in the within-described apparatus for pressing cloth, is the using of a metallic box, so formed as that a pressing roller may be made to revolve within a concave extending along it, and into which box steam, or other heated material, may be admitted when required; the whole constructed for the pressing of the cloth, either hot or cold, substantially in the manner herein set forth.

MOSES BAYLEY.

Improvement in the Plough.

What I claim in reference to the share is the making it with plain surfaces instead of curved ones, in the manner described, continuing such surfaces to the shoulder on each side, so as to leave the metal throughout so thin, that when it wears off by use, the share will still present a thin edge to the ground I claim, also, the reversing cutter, received into a recess on the land side, and capable of having either of its edges presented forward, so as to form the cutting edge of the plough, and secured in its place on the land side by a wedge, or wedges, or in any other manner which may be preferred.

I likewise claim the mode of forming the renewable points, as herein specially set forth.

BANCROFT WOODCOCK.

Improvement in the Machine for spinning Woollen Roving.

What I claim as my invention is this: the application of this endless belt, so as to twist the thread of the woollen roving on its passage from the back rollers to the front rollers, as before described.

EDGAR M. TITCOMB.

Improvement in the Machine for Threshing and Cleaning Grain.

We claim as our invention the construction and use of an endless apron, divided into troughs or cells, in a machine for cleaning grain, operating substantially in the way described. We claim, also, the revolving rake for shaking out the straw, and the roller for throwing it off the machine, in combination with such a revolving apron as set forth. We claim the guard slots, E, in combination with a belt, constructed substantially as above described, and the combination of the additional sieve and shoe with the elevator, for carrying up the light grain, in the manner and for the purpose herein set forth.

JOHN A. PITTS,
HIRAM A. PITTS.

VIII.

PAPERS AND ABSTRACTS

RELATING TO

EARLY AMERICAN INVENTIONS.

FROM THE ARCHIVES OF THE STATES.

No returns have been received under this head during the past year. This is to be regretted, as there is reason to believe much interesting matter still remains unexplored in State and municipal documents, and in the collections of societies and of individuals. With the view of reminding statesmen, historical and archæological societies, and citizens at large, of the importance of embodying the desired information in the Reports of this Office, for the use of future historians of the arts, their attention is again invited to the Circulars issued on the subject, the one marked [A] to Governors of States and Territories, and [B] to members of Congress.

[A.]

United States Patent Office.

Sir: Endeavoring to trace up the history of American inventions as a duty appertaining to this Bureau, and supposing that interesting facts may lie hidden in the archives of the various States, particularly in the records of patents, of which some are known to have been granted under colonial rule, and others by more or less of the States, previous to their conceding the right to the general government, I respectfully request to be furnished with copies of any such documents as may be on file in the State Department of your State, the expense of which will be cheerfully borne by this Office.

It is well known that the application of machinery to many branches of art was begun, and has been brought to its present degree of perfection, almost solely by the ingenuity and labors of our countrymen. I need hardly instance the working of lumber, improvements in ploughs, the cut nail and card making mechanism; yet definite information respecting these and other inventions, while in their infancy, is entirely wanting.

It is necessary that this Office should possess information on these points, the law clearly requiring, though not in express terms, that descriptions of all known inventions should be within reach, that patents may not be granted for things previously secured. Irrespective of the light they will reflect on the origin of inventions to which they relate, and early struggles of inventors, an increasing interest will be attached to them as matters of enlightened curiosity.

Information respecting the forms of patents, length of time for which they were granted, fees paid, &c., will be highly acceptable, as also anything relating to the early progress of the arts in your State.

In case no official documents of the kind are on file, may I beg the favor of your referring the subject to any literary or scientific society, or to private individuals who may be in possession of the information sought.

With sentiments of high regard, I have the honor to be your obedient servant,

THOMAS EWBANK, *Commissioner.*

His Excellency ———, *Governor of* ———.

[NOTE.—It is not known that patents were issued for inventions in Louisiana by the French, or in Florida, Texas, and New Mexico by the Spaniards; but if any were granted, copies of them would be of unusual interest.]

[B.]

UNITED STATES PATENT OFFICE.

SIR: A copy of the accompanying Circular has been addressed to each of the governors of the States and Territories of the Union, and I respectfully solicit your co-operation in furthering the objects sought to be accomplished. Whatever assistance or advice your more important engagements may permit you to give, will be highly appreciated.

There are, it is believed, among your constituents, descendants of old inventors and patentees, who, having documents of the kind referred to in their possession, would be glad to have them filed in this Office, and noticed in its Reports, as an act of justice to the ingenuity and memories of their ancestors.

I have the honor to be, with sentiments of high regard, your obedient servant,

THOMAS EWBANK.

Hon. ———.

IX.

COMMUNICATIONS.

1. ON CHINESE HOROLOGY, WITH SUGGESTIONS ON THE FORM OF CLOCKS ADAPTED FOR THE CHINESE MARKET.
2. ON THE TALLOW-TREE OF CHINA. [See the Agricultural portion of the Report.]

NINGPO, *August* 29, 1851.

MY DEAR SIR: As the object of the accompanying papers is of a public character, and as they were drawn up in accordance, it is believed, with the wishes of the Department over which you preside, I trust I shall not be considered trespassing in forwarding them overland, particularly as I can avail myself of no other safe channel. I have already forwarded, via the Cape, per ship, sundry seeds, eggs of the silk-worm, with specimens of vegetable tallow and insect wax, which will be anticipated doubtless in their arrival by this. The paper on the Tallow tree may be useful to southern agriculturists, as the same, or a kindred species, is common in that section of our country. I hope, also, that I have not taken too much liberty in sending a duplicate of my paper on Clocks, under cover to your Department, for Silliman's Journal.

I cannot conclude this note without expressing my personal regard for you as a townsman and acquaintance. I knew you well in my boyhood as one of the fathers and patrons of the New York Mechanics' Institute, with which I was early connected; again I became acquainted with you as an author, (but, alas! I have not your work in my library;) and now, in my voluntary exile, I meet you as it were, after the lapse of many years, as the director of an important institution of my native land. Will you not suffer the acquaintance to be continued so far as to favor me with copies of all public documents of scientific interest which you may have at your disposal.

Be so good as to let me know if I can serve you in any way in China, and believe me, my dear sir, yours, most faithfully,

D. J. MACGOWAN.

THOS. EWBANK, Esq.,
Commissioner of Patents.

On Chinese Horology, with suggestions on the form of Clocks adapted for the Chinese market.—Written for the Patent Office Report, by D. J. Macgowan, M. D., of Ningpo, China.

A request made about two years since by the United States Patent Office, for information from American citizens resident in China, calculated to be useful to home industry, has not received that attention which it merits, notwithstanding there exist as incentives, on the one hand, the unrenounceable claim of country, and, on the other, the ample opportunities for complying with that request. Her wide-spread territory, the varied productions of her soil, and the high position of China as an agricultural State, lead us to expect that no inconsiderable addition to our own agriculture would result from a careful survey of the various points accessible to foreigners; and it would doubtless be found that many plants, indigenous to this soil, are capable of being naturalized in one part or another of our continent.

In a manufacturing point of view, although there is much less to repay research, yet there are some branches of industry in this department the investigation of which could not fail to bring valuable facts to light; and, if no more can be done than to point out defects in Chinese labor, which our artisans can supply, that alone would prove mutually advantageous to the two great nations on the opposite shores of the Pacific.

Clock-making, which forms the subject of this note, is a case in point; and it is believed that, with a modification to be suggested, American clocks can be made an article of extensive import into China. For a long period the importation of clocks and watches, chiefly the former, into this country from the continent of Europe, was little short of half a million of dollars annually. This trade has nearly ceased, partly owing, no doubt, to the rapid impoverishment of the country by the opium traffic, and partly to the fact that native manufacturers are able to compete with foreigners. Yet clocks are not often met with in China; they are generally confined to the public offices, where it is common to find half a dozen all in a row. The number annually manufactured cannot be large, for in the richest cities of China clock-makers are not numerous. At Nankin there are 40 shops; at Suchau, 30; Hangchau, 17; and at Ningpo, 7; the average number of men employed in each being less than four, who are mostly occupied in *repairing* watches and clocks. The cheapest clock they make costs $7. Some are worth as much as $100—the most common price being about $25 each. A manufacturer estimates the number of clocks made at the above places at 1,000 per annum; and probably 500 more would more than cover the whole annual manufacture of the empire. A few watches are made, with the exception of chain and spring, which are imported. The oil used by Chinese workmen to abate friction appears to be particularly adapted for that purpose, though expensive; it is obtained from the flowers of the *Olea Fragrans*.

Before describing the kind of clock which seems adapted for this market, a brief glance at the history of the horological art in China may not be inappropriate. It had its rise, as in the western side of Asia, in the *clepsydra*.

Assuming—what is in the highest degree probable—the authenticity and accuracy of the *Shuking*, we find that, forty-five centuries* ago, the

* CHRONOLOGY.—Although doubts may exist respecting the absolute accuracy of Chinese chronology, it must, nevertheless, be admitted that it is so far correct as to render arguments founded on the commonly-received chronology altogether untenable; and it is matter of regret, therefore, that the latter has been followed, in their Chinese publications, by all Romish and Protestant missionaries. I cannot too earnestly urge the adoption of Hale's Chronology, and that speedily, lest, in the mean time, some Chinese Celsus or Porphyry should arise, and bring objections against our faith not easily answered to the satisfaction of their countrymen.

Chinese had occupied themselves with the construction of astronomical instruments somewhat similar to the quadrant and armillary sphere, and the observations they made with them, even at that remote period, are remarkable for their accuracy, enabling them to form a useful calendar. The present cycle of sixty was adopted at that time, by Hwangti, (2697–2597 B. C.) To this emperor is attributed the invention of the clepsydra. The instrument at that period was probably very rude, and not used as a time-piece, but for astronomical purposes, in the same manner as employed by Tycho Brahe, for measuring the motion of stars, and subsequently by Dudber in making maritime observations. It was committed to the care of an officer of rank styled clepsydra adjustor.

The greatest philosopher in Chinese history anterior to Confucius was Duke Chau, the alleged inventor of the compass. He appears, also, to have been the first to employ the clepsydra as a time-piece. He divided the floating index into one hundred equal parts, or "*kih*." In winter, forty kih were allotted to the day, and sixty to the night, and in summer this was reversed. Spring and autumn were equally divided. This instrument was provided with forty eight indices, two for each of the twenty-four terms of the year. They were consequently changed semi-monthly—one index being employed for the day and another for the night. Two were employed every day, probably, to remedy in a measure the obvious defects of all clepsydras—of varying in the speed of their rise or fall, according to the ever-varying quantity of water in the vessel, which might be done by having the indices differently divided. To keep the water from freezing in winter, the instrument was connected with a furnace, and surrounded by heated water. Chau flourished eleven centuries before our era. The forms of the apparatus have been various, but they generally consisted of an upper and a lower vessel, always of copper, the former having an aperture in the bottom, through which water percolated into the latter, where floated an index, the gradual rise of which indicated successive periods of time. In some this was reversed, the float being made to mark time by its fall. A portable one was occasionally employed, in ancient times, on horseback, in military tactics. Instruments constructed on the same principles with the above were in use among the Chaldeans and Egyptians at an early period—that of Ctesibius, of Alexandria, being an improvement over those of more ancient times. The invention of Western Asia was doubtless wholly independent of that of the East, both being the result of similar wants. Clepsydras were subsequently formed of a succession of vessels communicating by tubes passing through dragons, birds, &c., which were rendered still more ornamental by the indices being held in the hands of genii.*

The earliest application of motion to the clepsydra appears to have been in the reign of Shuenti, (126–145 A. D.,) by Tsianghung, who constructed a sort of orrery representing the apparent motion of the heavenly bodies around the earth, which was kept in motion by dropping water. There is reference, also, to an instrument of this description in the third century.

* The accompanying drawings of two of the numerous forms of the instrument are from an old astronomical work, where they are found without any description.

In the sixth century, an instrument was in use which indicated the course of time by the weight of water, as it gradually came from the beak of a bird and was received into a vessel on a balance, every pound representing a *kih*. About this time mercury began to be employed. instead of water, which rendered the aid of heat in winter unnecessary. Changes were made also in the relative number of *kih* for day and night, so as to vary with the seasons.

As in Europe, monks of the Roman church devoted considerable attention to mechanical inventions, especially in the construction of instruments for measuring time for the regulation of their worship and vigils; in like manner, also, Buddhist monks, in their silent retreats, but at an earlier period, similarly occupied themselves, and for the same purposes. Several instruments, designed as time-pieces, the invention of priests, are mentioned in Chinese history. They present nothing novel, however, with the exception of one, which is nothing more than a perforated copper vessel, placed in a tube of water, which gradually filled and sunk every hour, requiring, of course, frequent attention. Although their knowledge of hydrodynamics has ever been very limited, the Chinese appear to have been the first to devise that form of clepsydra to which the term water-clock is alone properly applied; that is to say, composed of apparatus which rendered watching unnecessary by striking the hours. Until the commencement of the eighth century, the persons employed to watch the clepsydra in palaces and public places struck bells or drums every *kih;* but at this period a clock was constructed, consisting of four vessels, with machinery which caused a drum to be struck by day, and a bell by night, to indicate the hours and watches. No description of the works of this interesting invention can be found. It is possible, however, that the Saracens may have anticipated them in this invention of water-clocks.

In the history of the Tong dynasty, (620-907,) it is stated that in the Fahlin country, (which, in this instance, doubtlessly means Persia, though the best living authority amongst the Chinese makes it Judea,) there was a clepsydra on a terrace near the palace, formed of a balance, which contained twelve metallic or golden balls, one of which fell every hour on a bell, and thus struck the hours correctly. It is not improbable that this instrument is identical with the celebrated one which the king of Persia sent, in 807, to Charlemagne.

In 980 an astronomer, named Tsiang, made an improvement on all former instruments, and which, considering the period, was a remarkable specimen of art. The machine, which was in a sort of miniature terrace, was ten feet high, divided into three stories, the work being in the middle. Twelve images of men, one for every hour, appeared in turn before an opening in the terrace; another set of automata struck the twelve hours, and the *kih*, or eighths, of such hours. These figures occupied the lower story; the upper was devoted to astronomy, where there was an orrery in motion, which, it is obvious, must have rendered complex machinery necessary. We are only told that it had oblique, perpendicular, and horizontal wheels, and that it was kept in motion by falling water.

As the Saracens had reached China by sea at the close of the eighth century, and by land at an earlier period, some assistance may have been derived from them in the construction of this instrument; but I am disposed to consider it wholly Chinese. Beckman, after much learned research, ascribes the invention of clocks to the Saracens, and the first

appearance of these instruments in Europe to the eleventh century. Mention may here be made of other instruments of the same description, also constructed about this period. One (which, like the last, united an orrery and clepsydra) was formed in one part like a water-lily; whilst in another were images of a dragon, a tiger, a bird, and a tortoise, which struck the *kih* on a drum, and a dozen gods, which struck the hours on a bell, with various other motions, besides a representation of the revolution of the heavenly bodies. The machinery of another of these was moved by an under shot water-wheel; its axis was even with the ground, and consequently the frame containing it was partly below the surface. The motions of the sun and moon, stars and planets, were made to revolve around a figure of the earth, represented as a plain from east to west. Images of men struck the hour, and its parts. In this, however, as in all the aforenamed instruments, the sounds struck were always doubtless the same, as the Chinese do not count their hours. Another machine was constructed which also represented the motions of the heavenly bodies. It was a huge, hollow globe, containing lights, and perforated on its surface, so as to afford, in the dark, a good representation of the heavens. This, also, was set in motion by falling water. Subsequently to this, various machines are mentioned, but the brief notices given afford nothing of interest, until we approach the close of the Yuen dynasty, the middle of the fourteenth century. Shungtsing, the last of the race of the great Genghis Khan, who is depicted in history as an effeminate prince, and as having the physiognomy of a monkey, was evidently a man of great mechanical skill, and to the last, when his dominions were slipping from him, and confusion reigned everywhere, he amused himself by making models of vessels, automata, and time-pieces. His chief work was a machine contained in a box seven feet high, and half that in width, on the top of which were three small temples. The middle of these temples had fairies holding horary characters, one of which made her appearance every hour. Time was struck by a couple of gods, and it is said they kept it very accurately. In the side temples were representations of the sun and moon, respectively, and from these places genii issued, crossing a bridge to the middle temple, and after ascertaining, as it were, the time of day from the fairies, returning again to their quarters. The motions in this case were, it is thought, effected by springs. An instrument somewhat similar is described as an ornament in the palace of the capital of Corea; it was a clepsydra, with springs, representing the motions of the celestial orbs, and having automata to strike the hour. Since the introduction of European clocks, clepsydras have fallen into disuse. The only one, perhaps, in the empire, is that in the watch-tower in the city of Canton; it is of the simplest form, having no movements of any kind, but it is said to keep accurate time.

In dialling, the Chinese have never accomplished anything, being deficient in the requisite knowledge of astronomy and mathematics. It is true, the projection of the shadow of the gnomon was carefully observed at the earliest historic period; but this was for astronomical purposes only.*

* It was by a gnomon that the ancient Chinese endeavored to ascertain the centre of the earth. A measurement of the length of the solstitial shadow, made at Loyang, on the Yellow river, 1200 B. C., was found by Laplace (quoted by Humboldt, in Cosmos, vol. 2, p. 115) to accord perfectly with the theory of the obliquity of the ecliptic, which was only established at the close of the last century.

Proper sun dials were unquestionably derived from the West; but they were not introduced, as Sir J. F. Davis supposes, by the Jesuits. The Chinese are probably indebted to the Mahomedans for this instrument, although we find an astronomer endeavoring to rectify the clepsydra, by means of the sun's shadow, projected by a gnomon, about a century earlier than the Hegira. There is a sun dial in the Imperial Observatory at Pekin, above four feet in diameter. Smaller ones are sometimes met with in public offices. These were all made under the direction of missionaries of the Roman church, or their pupils. From remote antiquity, a family named Wang, residing in Hiuning, north latitude 29° 53′, longitude E. G. 118° 17′, in the province of Canhwui, has had the exclusive manufacture of pocket compasses, with which sun-dials are often connected. In most of these, a thread attached to the lid of the instrument serves as a gnomon, without any adaptation for different latitudes, although they are in use in every part of the empire. Another form, rather less rude, is employed by clock-makers for adjusting their time pieces; it is marked with notches, one for each month in the year, to give the gnomon a different angle every month. The Chinese instrument exceeds that of Corea in every respect.

Time is not unfrequently kept by igniting incense sticks, the combustion of which proceeds so slowly and regularly as to answer for temporary use tolerably well.

Hour glasses are scarcely known in China, and only mentioned in dictionaries as instruments employed in Western countries to measure time.

A native writer on antiquities says: "The western priest, Limatau, (M. Ricci) made a clock which rendered and struck time a whole year without error." The clock brought out by Ricci, if not the first seen in China, is the earliest of which mention is made in Chinese history. They subsequently became an article of import, and, as already mentioned, this branch of trade was at one time of considerable value. Clocks and watches of very antique appearance are often met with—specimens of the original models scarcely to be found in any other country; some of the latter, by their clumsy figure, remind one of their ancient name, "Nuremberg eggs;" but their workmanship must have been superior to that of most modern ones, or they would not be found in operation at this late day.

The Chinese must have commenced clock-making at an early period, as none now engaged in the trade can tell when or where it orignated; nor can it be easily ascertained whether their imitative powers alone enabled them to engage in such an undertaking, or whether they are indebted to the Jesuits for what skill they possess. It is certain the disciples of Loyola had for a long time, and until quite recently, in their corps at Pekin, some who were machinists and watch-makers. One of these *horologistes* complains, in "*Les Lettres Edifiante et Curiouse*," that his time was so occupied with the watches of the grandees that he had never been able to study the language. Doubtless the fashion which Chinese gentlemen have of carrying a couple of watches, which they are anxious should always harmonize, gave the fathers constant employment. A retired statesman of this province has published a very good account of clocks and watches, accompanied with drawings representing their internal structure, in a manner sufficiently intelligible.

The Chinese divide the day into twelve parts, which are not numbered, but designated by characters termed, rather inaptly, horary. These terms were originally employed in forming the nomenclature of the sexagenary cycle, (2657 B. C.,) which is still in use. It was not until a much later period that the duodecimal division of the civil day come into use, when terms to express them were borrowed from the ancient calendar. The same characters are also applied to the months. The first in the list (meaning son) is employed at the commencement of every cycle, and to the first of every period of twelve years, and also to the commencement of the civil day at 11 p. m., comprising the period between this and 1 a. m. The month which is designated by this term is not the first of the Chinese year, but, singularly enough, it coincides with January. Each of the twelve hours is divided into eight *kih*, corresponding to quarter hours. This diurnal division of time does not appear to have been in use in the time of Confucius, as mention is made in the spring and autumn annals of the *ten* hours of the day, which accords with the decimal divisions so long employed in clepsydras, the indices of which were uniformly divided into one hundred parts. A commentator of the third century of our era, in explaining the passage relating to the ten hours, adds a couple more; but even at that time the present horary characters were not employed.

The accompanying diagram represents the form I would recommend as suitable for the dial-plates of clocks manufactured for this market. The small characters on the outer circle are numerals, exactly corresponding to the Roman figures on Western clocks. The inner circle contains the twelve horary characters, and within these are the signs for noon, evening, midnight, and dawn. In the horary circle, the large single characters represent whole hours, and the small double ones half hours, equal to a whole European hour.

Let the minute hand extend to the inner part of the outer circle, and make *twelve* revolutions in a diurnal period. The hour hand should reach to the inner edge of the horary characters, and make one revolution in the same period of time. Let the pendulum vibrate seconds as now, and the minute hand, at the expiration of 60 seconds, make half a revolution. It should strike from 1 to 12 a. m. and p. m., and correspond in this respect to European clocks. It will be understood, then, that at our *even* hours the short hand will point to a large horary character—the middle of a Chinese hour—and the long hand will be *directly upward;* and at our odd hours the former will be opposite the small characters, which point the commencement of their hour, and the latter will point *directly downward,* or at the 12 p. m. of our clocks, or to repeat the same in another manner: at 1 o'clock p. m. our reckoning the hour hand will be half way between the large characters on the top and the next one to the right, and the minute hand, having made half a revolution, will point perpendicularly downwards, and the clock strike one. At the expiration of another of our hours, a whole Chinese hour will have expired when the former hand will have reached the first large character to the right, and the latter be directed to the zenith, the clock striking two.

After this perhaps unnecessarily minute description of what is wanted in the machinery, a few words remain to be added respecting the instrument as a whole. In the first place, it should be well made. A few worthless ones would damage the business irreparably. They should be of brass, and placed in frames of wood, which will not be easily affected by atmospheric changes. Common pine wood, veneered with mahogany, have answered well. Spring clocks will not succeed. Some of this description, sent from New York, cannot be kept in repair; whilst a quantity of clocks moved by weights, manufactured chiefly in Connecticut, imported into China above seven years ago, have proved good time-pieces, and give no trouble.

With regard to the external appearance, on which so much depends, I would advise that, in every case, there be as much of the works exposed as possible through an opening in the dial plate. A Chinaman not only wishes to see what he is buying, but what is going on in his instruments when bought; and, as his countrymen have the merit of being extreme utilitarians, mirrors in the lower part of the door will be generally preferred to any other ornament. Some, however, should be ornamented at this point for the sake of variety; and perhaps nothing would please more than such a grouping of objects by the artist as would represent a river, bringing into view a steamboat and a sloop, and on the banks a railroad, locomotive, and cars; a steepled church, or a many storied hotel, in the distance; and a stage coach also. Or another interesting device would be afforded by a representation of the solar system; but this would need to be accompanied with several Chinese characters.

It is of primary importance that a particular description of the manner of using the clock, the mode of putting it up, setting it off, winding up, and regulating, should be given. These directions, which should be more minute than if designed for English readers, can be translated and printed very easily in this country. But there would be no difficulty in printing the directions by means of wooden blocks in the manufactory at home. In copying the characters for the dial extreme care is requisite that every stroke and each line should be represented exactly as given in the diagram. Astronomical characters or descriptions of any kind which may be needed by individuals trying the experiment of clock-making for China, I shall furnish most cheerfully, for the privilege of increasing the utility of the instrument by introducing with them a few passages of sacred Scripture.

It may be asked, why, if such a clock be needed by the Chinese, they have never constructed one for themselves? It is certainly marvellous that they should manufacture clocks, including dial plates, and always employ Roman figures, and follow the reckonings of foreigners, which so few of them are able to comprehend, and which by all are considered mysterious and outlandish. It is only to be accounted for on the ground of their limited inventive abilities and high powers of imitation. That a time-piece of this description would be in demand in China, I am perfectly satisfied from inquiries made of natives in various quarters. Chinese merchants say that they should be retailed at about $5 or $6 each. If I recollect rightly, they can be made in Connecticut at $2 50, which would afford sufficient profit both for the mechanic and merchant.

NINGPO, *July* 4, 1851.

MEAT BISCUIT.

Extract from the Lecture of Professor Lindley, on substances used as Food: Illustrated by the Great Exhibition.

What is more important than all other preserved provisions is the article to which I must next request attention. A great deal of interest was excited when the contents of the Exhibition first became known—and it did not diminish afterwards—by a certain meat biscuit introduced among the American exhibitions from Texas by Mr. Gail Borden. We were told that its nutritive properties were of a very high order. It was said that ten pounds weight of it would be sufficient for the subsistence of an active man for thirty days; that it had been used in the American navy, and had been found to sustain the strength of the men to whom it had been given in a remarkable degree. Statements were made to us, which have since been corroborated, that it would keep perfectly well without change under disadvantageous circumstances. Colonel Sumner, an officer in the United States dragoons, who had seen it used during field operations, says he is sure he could live upon it for months and retain his health and strength. The inventor, he says, names five ounces a day as the quantity for the support of a man; but he (Colonel Sumner) could not use more than four ounces, made into soup, with nothing whatever added to it. The substance of these statements may be said to amount to this: that Borden's meat-biscuit is a material not liable to undergo change, is very light, very portable, and extremely nutricious. A specimen, placed in the hands of Dr. Playfair for examination, was reported by him to contain 32 per cent. of flesh-forming principles; for it is a composition of meat—the essence of meat—and the finest kind of flour. Dr. Playfair stated that the starch was unchanged; that, consequently, there could have been no putrescence in the meat employed in its preparation, and that the biscuit was in "all respects excellent." It was tasted: I tasted it—the jury and others tasted it—and we all found nothing in it which the most fastidious person could complain of. It required salt, or some other condiment, as all these preparations do, to make them savory. This meat biscuit, as I said just now, was reported to be capable of keeping well; and this might well be true, because no foreign matter had been introduced into its composition. There was no salt to absorb moisture, and nothing else to interfere with the property of flour or of essence of meat. These biscuits are prepared by boiling down the best fresh beef that can be procured in Texas, and mixing it in certain proportions with the finest flour that can be there obtained. It is stated that the essence of five pounds of good meat is estimated to be contained in one pound of biscuit. That it is a material of the highest value there can be no doubt. To what extent its value may go nothing but time can decide; but I think I am justified in looking upon it as one of the most important substances which this Exhibition has brought to our knowledge. When we consider that by this method, in such places as Buenos Ayres, animals which are there of little or no value, instead of being destroyed, as they often are, for their bones, may be boiled down and mixed with the flour which all such countries produce, and so converted into a substance of such durability that it may be preserved with the greatest ease, and sent to distant countries, it seems as if a new means of subsistence was actually offered to us. Take the Argentine republic, take Australia, and consider what they do with their meat there in time of drought, when they cannot get rid of it while it is fresh. They may boil it down, and mix the essence with flour, (and we know they have the finest in the world,) and so prepare a substance that can be preserved for times when food is not so plentiful, or sent to countries where it is always more difficult to procure food. Is not this a very great gain?

IX.

THE WORLD'S EXPOSITION OF 1851.

Presuming that an examination of, and a report on, the works of industry and art to be exhibited at the World's Fair would be advantageous to the agricultural and manufacturing interests of the Union, the following communication on the subject was addressed to the Secretary of the Interior:

PATENT OFFICE, *February* 10, 1851.

SIR: The present year will be one of unprecedented interest as regards the arts and industry of the world. The natural productions, the plastic arts, and the results of the inventive ingenuity of all nations—their machinery and manufactures—will be displayed side by side, their respective merits scrutinized, and prizes, it is announced, awarded by discriminating and impartial judges.

The United States have been invited to participate in the great concourse of material sources and productive skill, and, judging from the arrangements already made, they are likely to be largely represented in every department.

A report of such an exhibition of the skill, industry, and ingenuity of the world would be of the highest value to *this Office*, even if viewed only in relation to the various branches of invention of which it is the primary function of the Office to take cognizance. In discharging the daily duties of examining and deciding upon inventions, many questions arise which can only be decided by extensive researches among books, or in workshops and factories. The works pertaining to the arts contained in the Library of the Patent Office are too few in number to give all the information required, and, even if much more numerous, they would not serve to make known all the inventions that have been patented in foreign countries, of which many are not published till the patents expire, and others only in abstracts or imperfect descriptions.

Hundreds of minor devices and processes, simple and seemingly trifling accessories of staple mechanism, will be found there, of which it is equally important for this Office to be informed. These constitute a class of contrivances not found in books, and a knowledge of them is therefore highly desirable. Instances have occurred where patents have been issued for such, because evidence of their use in work-shops was lacking. They often present remarkable examples of simplicity and efficiency, and of neat turns of mechanical thought, which few besides practical men can appreciate. Of course none but the eye of one familiar with the details of modern manufactures and arts could detect them.

The usefulness of such a report, however, would not be confined to the immediate operations and duties of this Office. If prepared with due regard to the state of the arts in this country, and to the ground which we have yet to occupy, it would, by becoming a work of reference among farmers, mechanics, manufacturers, artists, and inventors, react favorably on the future transactions of the Office—often relieving it from the necessity (always disagreeable) of refusing in cases lacking the essential features of novelty. Inventors would be apprized of many facts necessary to be understood before applying for patents; and, while deriving useful hints from the inventions of foreign nations, they would probably be spared the mortification of finding too late that they had, in some important points, been anticipated, and thereby avoid the waste of much time, ingenuity, and money.

From the nature and extent of the proposed exhibition, it is believed that much of the inventive talent of the world will be presented in its most recent developments. The direct utility of the information which may be there collected, and which is not elsewhere attainable, will, it is thought, be sufficiently important to warrant the expense of collecting it, for the purpose of embodying it in the Annual Report of this Bureau. Accompanied by necessary illustrations, the documents would be of lasting interest.

Under the impression that the Commissioner of Patents has no authority to depute any person or persons for the purpose of making such a report at the expense of the Patent Fund, I beg to call your attention to the subject, and solicit for it your consideration. The reporter should, of course, be a person thoroughly conversant with mechanical science and the entire range of the arts, and it would be well were he attended by an assistant and draughtsman.

I have the honor to be, very respectfully, your obedient servant,

THOS. EWBANK.

Hon. Alex'r H. H. Stuart,
Secretary of the Interior.

One of the clerks of this Office, who had been sent out in charge of the articles shipped in the St. Lawrence, was authorized by the Department of the Interior to remain and report on the contents of the Crystal Palace with special reference to such substantial arts and inventions as should be found more immediately adapted to the United States—to the development of our resources and to the genius and condition of our people.

As no report has been made by him, the undersigned solicited of the Executive Committee for the United States the one made to that committee by Mr. Riddle, the American Commissioner. It was politely furnished, and, with the accompanying letter, is here presented.

Washington, *January* 27, 1852.

Sir: By order of the Executive Committee on the London Industrial Exhibition, the following resolution, which was adopted at a meeting of said committee, held on the 20th instant, is hereby transmitted to you:

"On motion, *Resolved*, That the chairman and secretary of the Executive Committee communicate to the Commissioner of Patents, in

compliance with his request, the report of Mr. Edward Riddle on the Industrial Exhibition, for publication as a portion of the Patent Office Report."

In compliance with the above, the report is herewith transmitted.

Very respectfully, your obedient servant,

PETER FORCE, *Chairman.*

Jno. C. G. Kennedy,
Secretary.

Hon. Thomas Ewbank,
Commissioner of Patents, Washington.

REPORT ON THE WORLD'S EXPOSITION.

By Edward Riddle.

Part I.—CHEMICAL AND PHARMACEUTICAL PRODUCTS.

In this class of the department appropriated to Great Britain for the display of raw materials was found little that was interesting, or much that was inquired into, by the majority of those who daily visited the building; but to others—to those who had a higher aim in view than a mere cursory glance at objects of unseeming interest to the scientific and practical chemist—in fact to all who sought to acquire knowledge rather than amusements—there was presented an ample field for inquiry, and a large scope for gathering valuable information.

Chemistry was known to the ancients only as the art of "making silver and gold," or what is more generally known by the name of alchemy. Various definitions of its modern meaning have been given—that by Dr. Black being most generally received, namely, that "Chemistry is the study of the effects of heat and mixture, with a view of discovering their general and subordinate laws, and of improving the useful arts."

From the earliest times to the seventh century the operations in chemistry were limited to expressions, digestions, and decoctions, and it may be naturally inferred that at this period the dawn only of chemistry had begun, and that it was rather a collection of unconnected and ill-founded axioms, the result of observation, than a science established upon the broad basis of an infinite variety of experiments.

From the seventh to the seventeenth century several important facts were discovered, and several products added to the few already known; the chief of these discoveries being the process of making sulphuric acid from green vitriol, or sulphate of iron, of nitric acid from nitre, and hydrochloric acid from common salt. Several salts and some alkaline bodies were also discovered, or more perfectly known.

Of the earths in general, but little was known, and even that little was unsupported by the principles of chemistry. Clay was distinguished from sand, but not by its genuine chemical characters.

About the year 1674 Sir Isaac Newton contributed some new and general ideas on chemical phenomena to the Royal Society. He observes that sugar dissolves in water, alkalies unite with acids, metals dissolve in acids; and he inquires whether these effects are not occasioned by an attraction between their particles? Copper dissolved in aquafortis is thrown down by iron. Is not this, he inquires, because the particles of the iron have a stronger attraction for the particles of the acid than those of copper, and do not different bodies attract each other with different degrees of force?

From the seventeenth to the commencement of the present century little further advancement was made in this science; but from that period to the present time chemistry has received a marked impulse from the unremitting attention of the most eminent men of nearly all nations; discoveries have been made, inventions brought out, and systems promulgated, which would have astonished the world had they occurred at an earlier period; and this, too, not only as applied to the purposes of medicine, manufacture, &c., but also, and that to a very great extent, as connected with agriculture.

In a commercial point of view, chemistry has also made some very rapid strides. Within the last twenty years the manufacture of caustic and carbonate of soda has originated and developed itself to a degree almost unparalleled in the history of commerce. The fires of the kelp business on the coasts of the islands of Scotland are scarcely now extinct, when vast factories, employing large numbers of individuals, produce, in enormous quantities, the same alkali which, until recently, was derived from the fused ashes of marine plants. The manufacture of this alkali, by an ingenious decomposition of common salt, by the simple aid of sulphuric acid, chalk, saw-dust, and coal, is now prosecuted to a vast extent for the supply of the industrial arts generally, the quantity used in medicine being comparatively insignificant. At some alkali works, fifty and sixty tons, and upwards, of common salt are decomposed every week, and converted into caustic and carbonate of soda. The alum factories are not less extensive; at these establishments crystallizations, on a scale emulating those of nature, are constantly in progress. The manufacture, also, of sulphuric acid, and of the compounds used by the dyer and calico printer, occupies a prominent feature of commercial enterprise.

The prussiates of potash, forming large masses of yellow and red crystals, and the green but perishable crystals of copperas, are substances largely used in the arts, and the colors and dyes produced by their assistance present themselves in every direction when textile printed fabrics are examined.

Amongst the varied specimens of chemical and pharmaceutical products displayed, were many worthy of notice, and, taken throughout, they formed a valuable collection, and furnish remarkable illustrations of the extensive applications of chemistry to modern arts and manufactures.

Crystal of Copperas, or Sulphate of Iron.—T. Bramwell & Co., Newcastle-upon-Tyne.

This substance, so largely used in the arts for dyeing, &c., and also in chemistry and pharmacy, is obtained, as a natural product, from aluminous chalybeate springs, as well as by the spontaneous decomposition of certain native sulphurets of iron, or iron pyrites; and is prepared in

large quantity by the action of air and water. The sulphur and iron are thus both oxidated; and sulphate of iron, or copperas, is obtained by crystallizing the lixiviated masses.

Crystallization, and the circumstances under which it takes place, form an interesting subject of inquiry. Not having the operations of nature open to our inspection, our only sources of information relative to the formation of crystals are those afforded by the process of artificial crystallization; and here, until very recently, our experiments were circumscribed by a very few modes of operation: that of the deposit of crystals from solution in some fluid; their production while gradually cooling from a state of fusion; and their volatilization by heat, or otherwise. Latterly, however, by the aid of that universal agent—electricity—new methods of producing crystals have been pursued; and there can now be little doubt that all the phenomena of crystallization are governed, in a greater or lesser degree, by electric influence.

Specimens of Crystallized Alum and Bicarbonate of Soda.—W. Patterson, Newcastle upon-Tyne.

The first of these products is also extensively used in the arts, as well as in chemistry and medicine. It is an earthy salt, and occurs in a native state only in small quantities. In a great measure, however, it is prepared artificially from alum slate—a rock belonging to the coal formation, and containing a considerable proportion of sulphur, iron, and alumina. The slate is broken in pieces, roasted, exposed to air and moisture; and, the soluble parts being dissolved in water, crystals of alum are obtained as the solution cools.

Bicarbonate of soda is chiefly used in medicine, and may be obtained by passing carbonic acid through a concentrated solution of the carbonate.

Camphor and Borax.—Howards & Kent, Shstford, London.

Camphor is one of the principles arising from the separation of the volatile oil of two trees: the one, a native of Japan and China; the other, a native of Borneo and Sumatra. From these it is procured by different processes. It exists in every part, root, stem, branches, and leaves of the first-mentioned tree, which is chopped into pieces sufficiently small to be thrown into iron vessels. These vessels are afterwards covered with earthen hoods, in which are placed rice, straw, and rushes; heat being subsequently gradually applied. The camphor is volatilized, and afterwards condenses on the straws, rushes, &c. This, after being purified from the intermixture of straw, is found in commerce under the name of crude camphor; but it still retains many impurities, and on arrival in Europe is refined. The tree is familiarly known in this and other temperate countries as an ornament of conservatories. It is a graceful evergreen tree, whose wood and leaves emit, when bruised, an agreeable camphoraceous odor. In the camphor tree of Borneo, on the contrary, the volatile oil is not procured by distillization. The camphor here occupies the place of the pith of the tree, existing in its stem, in a crude solid form, along with camphor oil.

Camphor has been long and extensively used in medicine; but even yet its physiological and therapeutic actions have not been fully discovered, from the fact that more systematic inquiries have not been made as to its medicinal results.

Borax is, in reality, a compound of boracic acid and soda, correctly termed biborate of soda. It is chiefly brought from the East Indies, Persia, and Ceylon, and also from a lake in Thibet entirely supplied by springs, where it is collected by the natives from the edges in a state of crystallization. It is imported under the name of tincal. The crystals are bluish, or greenish-white, and sometimes nearly transparent, as well as soft and brittle. It is purified by solution in water and crystallization, and is then sold as borax.

On the continent, borax is prepared by decomposing carbonate of soda with the boracic acid of Tuscany, and purifying the biborate by various processes.

Little is yet known of the medicinal actions of borax. Its chief use in the arts is for glazing porcelain and making green fire.

Ferrocyadine of Potassium, used for Dyeing Blue, in place of Indigo.—T. Bramwell & Co., Newcastle-upon-Tyne.

This is perhaps one of the most important chemicals used in the art of dyeing, and calico printing. Its preparation consists in projecting a mixture of pearl ashes with hoofs, horns, and other animal matters, in the proportion of two to five, into a red-hot iron crucible, and stirring diligently the pasty mass thus formed until fetid vapors cease to arise from it. When the product has cooled, it is lixiviated with cold water, filtered and concentrated, upon which yellow crystals of ferrocyadine of potassium are formed. By the addition of a salt of iron to ferrocyadine of potassium, that most beautiful blue, called Prussian blue, is produced.

A Pyramid of best Table Salt, with several other specimens of salt.—F. Cheshire, Northwitch.

These specimens of salt were from the extensive mines of Northwitch, in Cheshire, where there are also brine springs. They are of two kinds—the one white and transparent, the other of a reddish-brown. The rock salt is found from 28 to 48 yards beneath the surface of the earth. The first stratum is from 15 to 20 yards in thickness, extremely solid and hard, resembling sugar candy. Many tons at a time are loosened by blasting with gunpowder.

The second stratum is of hard stone, from 25 to 35 yards in thickness. The salt lies beneath this stratum in a bed above 40 yards thick, generally perfectly white, and clear as crystal. It is stated that the annual production of salt in England is upwards of 800,000 tons, and the population engaged in its manufacture 11,000 to 12,000. The sources of supply are said to be inexhaustible; and latterly the salt manufacturers have so far extended their works that the opening of a new market would be of the greatest advantage. Common salt, for ordinary purposes, can now be obtained at about 20 shillings sterling per ton. In India the British government monopolizes both the manufacture and sale of salt, and the exportation of British salt to India is prohibited. Attempts have been made by the salt manufacturers and ship owners to obtain admission for British salt into the ports of India at a moderate duty; and the latter, especially, complain of disadvantage of not being allowed to take so convenient an article of merchandise to that part of the British empire. The salt monopoly had existed in India long before the sway of the East India Company commenced; and its modification, or total abolition, is considered only as a question of time. It is believed that a moderate duty on salt would soon yield quite as large a revenue if the monopoly were abolished, while commerce would be benefited by the exchange of sugar and other commodities for salt; smuggling in salt, which is extensively carried on, would cease; and, in place of arbitrary and harsh restrictions, the consumer would obtain a better article at a much cheaper rate.

Refined Indigo.—John Marshall, Leeds.

This substance is the innoxious and beautiful product of an interesting tribe of tropical plants, and is very extensively employed in dyeing and calico printing; being esteemed the most useful and substantial of all dyes. When the plant is in full flower it contains most coloring matter. It is then cut, dried, put into vats, and covered with water; fermentation takes place, accompanied with the evolution of carbonic acid, and other gaseous products, and the yellow liquor is covered with a froth. This froth, in a little time, becomes of a violet color, and a substance is evolved, which is rendered blue by absorbing oxygen of the air, and, being thus rendered insoluble, is precipitated. This, when collected and dried, is indigo.

Specimen of Ultramarine.—Gorton & Co., City road, London.

This is a well known blue pigment of extraordinary beauty. Until within the last few years it was entirely prepared from the lapis lazuli, or lazulite, and from the great costliness attending its preparation, its use was confined to the artist. It is now prepared artificially, at a very moderate rate, and equal in beauty to that obtained from the lazulite. It is stated that by adding freshly precipitated silica and alumina, mixed with sulphur, to a solution of caustic soda, evaporating the mixture to dryness, and placing the residue, in a covered crucible, and exposed to a white heat, where the air has partial access to it, a pure ultramarine is obtained. The product is then reduced to impalpable powder. The proportions of materials to be used are about 36 silica, 36 alumina, 24 soda, and 3 sulphur. Since this discovery, its value has become very much reduced, and it is now used extensively in the arts.

Specimen of Carmine.—J. Leichfield, Clapton, London.

This beautiful product is obtained from cochineal, and is so valuable an article as to be rarely met with in a state of purity. It is obtained by the following process: boil 12 pounds of filtered rain-water in a tin vessel, and add to it four ounces of finely-powdered cochineal; boil for five minutes, constantly stirring with a glass rod; then add five scruples of alum in fine powder, perfectly free from iron; boil again for two minutes, remove the vessel from the fire, cover it, and allow the contents to settle.

As soon as the liquor is clear, pour it, while still hot, into glass or porcelain vessels, and suffer it to remain some days, covered from dust. The alum gradually precipitates the coloring matter, in combination with animal matter and a little alumina. The precipitate is put on a filter, washed, and dried in the shade. It is one of the most beautiful red colors used by painters.

Several Specimens of Wood preserved by Chemical Process.

All wood contains what is called albumen—an essential ingredient in vegetable bodies, entering largely into the composition of the sap. As long as this albumen is supplied with sufficient moisture, so long will it be liable to enter into a kind of fermentation, especially if placed in damp or ill-ventilated situations, and often even where the ventilation is perfect, and the atmosphere in its ordinary state of humidity. If a piece of green timber, containing this albumen in a perfect state of solution in the moisture of the wood, be employed in the construction of a house, the albumen undergoes fermentation, and the rot and decay of the wood speedily follow.

How is this waste and destruction of wood to be prevented? To a certain extent, by thoroughly drying the timber in a current of air. This, however, takes considerable time to effect. For instance, a large piece of oak requires exposure for eight or ten years to dry it completely. This is demonstrated by the fact that it loses weight for that period. We may apply heat to hasten the process of drying, but the wood, when exposed to the ordinary temperature of the atmosphere, absorbs moisture in quantity varying with the compactness of the wood. In a dry room, without a fire, the quantity of water reabsorbed by wood amounts, on an average, to ten per cent. As long as the albumen of the wood is supplied with sufficient moisture to render it soluble, so long will there be danger of dry rot. The best plan, therefore, to adopt is, to render this albumen perfectly insoluble, so that, however much moisture shall be absorbed, it cannot be brought into an active state again. For this purpose, Sir H. Davy recommended that the wood should be steeped in a solution of corrosive sublimate—a salt, called bichloride of mercury by chemists, which has the property of forming an insoluble compound with the albumen, and thus preventing its further action. This process was commercially applied by Wm. Ryan; but, from the great expense attending the preparation, and the fear that the use of this poisonous salt might prove deleterious to the health of persons coming in contact with it, the employment of corrosive sublimate has been abandoned. Creosote oil, obtained from wood and coal tar, has been used with great success; but this also possesses a disadvantage, as it imparts a disagreeable odor, and increases the inflammability of the wood.

Some of the specimens exhibited by Mr. Payne are prepared, first, by injecting a soluble salt of baryta into the pores of the wood, and then adding solution of sulphate of iron. By this means a compact solid substance is formed, which remains in the wood, thereby increasing its weight, and partly converting it into stone. Sir W. Barnett & Co. have some specimens prepared by injecting chloride of zinc into the pores of the wood. This substance makes the albumen perfectly insoluble, even in sea-water, does not communicate any color or odor to the wood, renders it less inflammable, whilst its use is perfectly innocuous in a sanitary point of view.

Vegetable and Animal Substances used in Manufactures.

This class, although embracing a variety of substances, was not an extensive one, the chief and most interesting features relative to vegetable substances having been those comprised in the growth and manufacture of flax and hemp, including preparations by Claussen's patent.

Of the flax plant there are several varieties in cultivation, the best seed coming from Riga and Holland. As the different varieties arrive at maturity at different times, and the stem rises to different heights, it is very essential that the seed be not mixed, as this would occasion great inconveniences and loss in the pulling of the flax. The most common variety of flax in Great Britain is of a moderate length, with a strong stem. If it is not sown very thick, it will throw out branches at the top, and produce much seed. It is, therefore, a matter of calculation whether it will be most profitable to have finer flax, with less seed, or an inferior quality of flax, and an abundance of seed. There is a small variety which does not rise above a foot, grows fast, and ripens its seed sooner. When the principal object is to get linseed, this variety is preferred; but the flax is shorter, and also coarser.

The soil best adapted to the growth of flax is a deep, rich loam, in which there is much vegetable mould. It should be yellow, and loose to a considerable depth, with a sound bottom, neither too dry nor too moist. Either of these extremes invariably destroys the flax. It is, therefore, not suited either to hot, gravelly soils, or cold, wet clays; but any other soil may be so tilled and prepared as to produce good flax. The land should also be free from weeds, as the weeding of this crop forms a very important item in the expense of cultivation. These circumstances suggest the following mode of preparing the land: a long fallow, including two winters and a summer, will be a good preparation for the heavier loams, which should be trenched, ploughed, and worked deep. The manure generally used is rotten dung, or a compost of earth and dung, or some artificial dressings. If the land is sufficiently clean, a crop of potatoes, well manured, may be substituted with advantage for the fallow. Flax has also been found perfectly successful, when grown after clover, on a single ploughing, especially if the clover be biennial. The stubble of the clover is ploughed up, either in the spring or autumn, with some care, and then the harrow and roller are passed over the ground before sowing. If the soil contains a great portion of clay, lime may be used with advantage; but in the lighter loams it may be dispensed with. At all events, it should not be used immediately before the flax is sown, but for some previous crop. Peat ashes make an excellent manure, as they improve the soil, and keep off insects, which are apt to injure the roots of the flax. For want of peat ashes, those made by the burning of weeds and earth in a smothered fire are a good substitute. There is another manure, also, which has been found to answer exceedingly well, composed of the sweepings of streets in towns, mixed with night soil. Where night soil cannot be obtained in sufficient quantities, rape cakes, from which the oil has been expressed, dissolved in cows' urine, form a very excellent manure.

When the flax begins to get yellow at the bottom of the stem, it is time to pull it, if very fine flax is desired, such as is made into thread for lace or fine cambric; but then the seed will be of little or no value. Every flax-grower judges for himself what is most profitable on the whole. The pulling is done carefully by small handfuls at a time. These are laid upon the ground to dry, two and two, obliquely across each other. Fine weather is essential to this part of the operation. Soon after this they are collected in larger bundles, and placed with the root end on the ground, the bundles being slightly tied near the seed end. The other end is spread out, that the air may have access, and the rain not damage the flax. When sufficiently dry, they are tied more firmly in the middle, and stacked on the ground till the next season. Some carry the flax, as soon as it is dry, under a shed, and take off the capsules with the seed by rippling. Sometimes, if the capsules are brittle, the seed is beaten out by means of a flat, wooden bat. The flax is then, according to usual process, immediately steeped. By Claussen's invention, this method, to a certain extent, is dispensed with, the pure fibre being more easily and rapidly separated from the wood. As this process has excited great attention, both in this country and Europe, it is certainly deserving of a fair trial. In order to explain it as far as possible, we cannot, perhaps, do better than to use the Chevalier's own words.

In alluding to some remarks which appeared in the *Morning Chronicle* upon a system which involves the necessity of steeping the flax in one form or other, he says:

"The remedy for this state of things is a perfectly simple one, and consists merely in placing at the disposal of the grower the means of reducing the bulk of his flax crop without resorting to steeping, so as to admit of its easy and convenient transit to the best and most advantageous market.

"The grower of flax will not then be compelled to dispose of his produce upon the terms which may be offered by an individual possessing the exclusive right of preparation under any system, but may avail himself of the facilities which the great extension of the railway system provides for sending his crop, reduced both in weight and bulk, to any market where better prices may be obtained. I am as deeply interested as any person in upholding the rights of inventors, and of persons holding licenses under them; but I protest I would infinitely rather prefer sacrificing my own interest in the matter, and throwing open my invention to the public, than consent to derive advantages obtained at the expense of a class of producers for whose prosperity I have, from my youth, felt the deepest interest, and in whose pursuits and employments many of the happiest years of my life have been passed.

"That a reduction of the bulk, by a partial separation from the stem of the flax plant, may be effected without steeping, and by a very simple and unexpensive mechanical process, is a point which is now completely set at rest. All that is required is simply to pass the stem between a pair of rollers, or break it by means of a common 'breaker;' after which the straw may be separated by any beating motion with the most perfect ease. The cost of a hand-machine for this purpose would be about £10, and may be used, without payment for license or royalty, by any grower of flax in the United Kingdom. The flax so prepared, according to the report of the Royal Flax Society, is peculiarly well adapted to the manufacture of sail cloths, standing and running rigging, ropes, canvas, nets, bags, and other coarse articles for manufacture. It is also excellently adapted for the after-treatment required in order to prepare it for spinning, alone or combined with cotton, silk, or wool, upon the ordinary machinery. In addition to these large and important markets, it is also equally available for the great and growing branch of the linen manufactures, for which it is considered necessary that the flax should be steeped either in cold or hot water previous to being spun. Mr. McAdam, the secretary of the Royal Flax Society, when shown at the meeting of the Royal Agricultural Society some samples of the flax thus partially cleaned without steeping, expressed his belief that considerable advantages would be derived from such a complete or partial separation of the straw or woody part of the plant previous to steeping.

"The two great advantages which would be gained from the treatment of the flax in this state, as compared with the present mode of steeping it while in the straw, would be the greater quantity which it would be possible to put into the steep vats, and considerable reduction of the period at present required for steeping.

"In addition to the advantages which the grower would derive from this partial removal of the straw and diminution of the bulk of his crop, by being enabled to avail himself of the best market for his produce, he would also be enabled to return to the soil, in the shape of manure, a large portion of the crop which would otherwise be lost to it.

"Thus, for instance, a grower having four tons of flax in the straw, would, by the separation of the straw by a purely mechanical process, obtain from two to three tons of a material of equal, if not of greater value, than wheat straw, which would be available for mixing with linseed, or other articles of cattle food, and thus increase the quantity and value of the manure. He would also have the means of profitably providing more constant and steady employment for his laborers, as such preparation of the flax might be carried on at times when the state of the weather, or other circumstances, rendered field labor impracticable."

The report of the Royal Agricultural Society states the advantages connected with this mode of preparing flax, to be the following:

"That by the new process flax is rendered capable of being spun, either in whole or in part, on any existing spinning machinery.

"That the fibre to be mixed with cotton, or spun alone on cotton machinery, is so completely assimilated in its character to that of cotton, that it is capable of receiving the same rich opaque color that characterizes all dyed cotton; and, consequently, any cloth made from flax cotton yarn can be readily printed, dyed, or bleached by the ordinary cotton process.

"That flax fibre can be always produced with profit to the British grower at a less price than cotton can be imported into this country with profit to the foreign producer.

"That, as a consequence of this advantage, the manufacturers of this country will be less dependent on the fluctuations of the cotton crop for a supply of the raw material, and a more regular employment will be given to the manufacturing population.

"That with respect to the advantages of being able to spin flax, in combination with wool, on the existing woollen machinery, the first is, that the flax prepared by M. Claussen is capable of being 'scribbled,' 'spun,' 'woven,' and 'milled,' in all respects as if it were entirely wool, having an advantage in this respect over cotton, which has not the slightest milling properties. On the contrary, the flax fibre is capable of being even made into common felt hats with or without an admixture of wool. To such an extent has the milling property of flax been proved, that the sample of cloth exhibited had been woven 54 inches wide, and milled up to 28 inches wide.

"That the flax fibre will not, under any circumstances, when prepared for spinning with wool, cost more than from 6d. to 8d. per pound; while the wool with which it may be mixed will cost from 2s. to 4s. per pound; consequently, reducing the price of cloth produced from this mixture 25 or 30 per cent. below the present prices of cloth made wholly from wool, and being of equal if not greater durability.

"That short wool refuse, which cannot by itself be spun into a thread, may, by being mixed with this thread, be readily spun and manufactured into serviceable cloths.

"That, by this process, flax may be also prepared as to be spun in any certain proportions with silk upon the existing silk machinery; that, when so spun, it is capable of receiving considerable brilliancy of tint; that the fibre may be prepared for thus spinning at a uniform price of from six pence to eight-pence per pound; that, as it may be spun in any proportion with silk, it is evident that the price of the yarns must be reduced according to the relative proportions of the materials employed—thus extending the markets, and giving increased employment to the operatives.

"And, lastly, that, by M. Claussen's plan of bleaching, any useless flax can be converted into a first rate article for the paper-maker at a less price than the paper-maker is now paying for white rags, and suitable for the manufacture of first class paper."

In following M. Claussen in his remarks upon the preparation of flax-cotton, according to his process, he states as follows:

"The principle of the invention by which flax is adapted for spinning upon cotton, wool, and silk, independent of flax machinery, consists in destroying the cylindrical or tubular character of the fibre by means of carbonic or other gas, the action of which splits the tubes into a number of ribbon-like filaments, solid in character, and of a gravity less than cotton; the upper and under surfaces of which are segments of circles, and the sides of which are ragged and serrated. In order to explain the nature of the process by which this change is effected, it is necessary first to explain the structure of the flax plant. The stem of the plant consists of three parts—the wood, the pure fibre, and the gum resin, or glutinous matter, which causes the fibres to adhere together. In the preparation of the plant for any purpose of fine manufacture, it is necessary first to separate from the pure fibre both the wood and glutinous substance. The former of these may be removed by mechanical means, previously referred to, almost as simple as those employed in the threshing of wheat. In order, however, to remove the glutinous substance from the fibre, recourse must be had either to the fermentation produced in the steeping process, or to some other chemical agent. The present system of steeping in water, whether cold or hot, is, however, ineffectual for the complete removal of the glutinous substances adhering to the fibres, a large per-centage of which is insoluble in water. The first process, therefore, which it is necessary to adopt in the preparation of flax-cotton, is to obtain a perfect and complete disintegration of the fibres from each other by the entire removal of the substance which binds them together.

"This is effected by boiling the flax for about three hours, either in the state in which it comes from the field, or in a partially cleaned condition, in water, containing about one-half per cent of caustic soda. After undergoing this process, the flax is placed in water, slightly acidulated with sulphuric acid—the proportions of acid used being one to 500 of water. Any objections urged against the employment of such substances, even in the small proportions above stated, are at once met by the fact that the soda present in the straw, after the first process, neutralizes the whole of the acid, and forms a neutral salt, known as sulphate of soda. This process, producing as it does a complete separation of the integral fibres from each other, is equally adapted for the preparation of long fibre for the linen, or of short fibre for the other branches of textile manufacture. When required to be prepared for linen, all that is necessary after the above process is to dry and scatch it in the ordinary mode. The advantages which this mode of preparation possesses over any other mode in use are stated in the official report of the Royal Agricultural Society to be as follow:

1. "'That the preparation of long fibre for scatching is effected in less than one day, and is always uniform in strength and entirely free from color, much facilitating the after-process of bleaching, either in yarns or in cloth.

2. "'That it can be also bleached in the straw at very little additional expense of time or money.

3. "'That the former tedious and uncertain modes of steeping are superseded by one perfectly certain, with ordinary care.

4. "'That, in consequence of a more complete severance of the fibres from each other, the process of scatching is effected with half the labor usually employed.'

"Complete, however, as may be the separation produced by this mode of treatment, the fibres, from their tubular and cylindrical character, are still adapted only for the linen or present flax manufactures, as their comparatively harsh and elastic character unfits them for spinning on the ordinary cotton or woollen machinery. At this stage, therefore, it is that the most important part of the invention is brought into operation. The flax, either before or after undergoing the processes required for the severance of the fibres, is cut by a suitable machine into the required lengths, and saturated in a solution of sesqui-carbonate of soda (common soda) a sufficient length of time to allow of the liquid entering into, and permeating by capillary attraction, every part of the small tubes. When sufficiently saturated, the fibres are taken out, immersed in a solution of dilute sulphuric acid, of the strength of about one part to 200 parts of water. The action of the acid on the soda contained in the tube liberates the carbonic gas which it contains; the expansive power of which causes the fibres to split, and produces the result above described. The fibre is then bleached, and, after having been dried and carded in the same manner as cotton, is fit for being spun upon the ordinary cotton or woollen machinery.

"The practicability of transforming flax into this cotton-like substance was demonstrated by Professor Way as follows:

"'Although we have long been practically familiar with the expansive effects of æriform fluids suddenly disengaged chemically from an apparently solid and inert substance like gunpowder, either in fire arms or the blasting of rocks, and with their elastic recoil when released from the pressure of condensation, as in the air-gun or the liquid gases of Dr. Farrady we were not prepared for so beautiful an instance of the application of this principle as the one Chevalier Claussen has given us in the splitting of vegetable fibres by conveying into its interstices the carbonic acid gas concealed in condensation and chemical alliance with soda, and then setting it free by the addition of acid, which breaks off that alliance by its own superior elective affinity for the alkali. The flax fibre, soaked in the solution of sub-carbonate of soda, was no sooner immersed in the vessel containing the acidulated water than its character became at once changed from that of a damp, rigid aggregation of flax to a light, expansive mass of cottony texture, increasing in size like leavening dough, or an expanding sponge. This change was no less striking when this converted mass, in its turn, was placed in the next vessel, which contained the hypo-chlorite of magnesia, and became at once bleached, attaining then the color, as it had just before received the texture, of cotton.'"

Some objections have been taken to this process by persons who appear to regard flax as a material which ought to be solely applied to the manufacture of linen or cambric, and think that any preparation of it which does not best adapt it to the manufacture of these fabrics is to be discountenanced. The attempt to substitute flax for cotton has even been stigmatized as a *reductio ad absurdam* by an extensive flax-grower and manufacturer in Belgium, and who also expressed his opinion that any invention by which cotton could be transformed into flax would be justly entitled to the merit of a great discovery.

The objection is founded upon the supposition that the fibre is greatly reduced in strength by the process resorted to. When compared with fibre of an equal degree of fineness, prepared upon the most improved methods of steeping, the results have been decidedly in favor of the mode just described. When the fibres, however, are split, it is perfectly natural to suppose, inasmuch as "a part is less than the whole," that the filaments into which they are split are not of the same strength as the fibres of which they originally formed a part. The strength of the fibre is reduced in proportion to the division of the parts which takes place, and is not impaired by the action of any of the chemical ingredients employed. The strength of the fibre, when brought into a fit state for the cotton-spinner, is not, therefore, to be compared with that required for the stronger and more durable linen yarns, but with that for which it is intended to be used as a substitute or auxiliary—namely, cotton or wool, with which it will bear the closest comparison.

Should the grower of flax not be disposed to undertake the complete preparation of his produce, and the existence of markets in his immediate neighborhood for the flax in the straw should render it unnecessary for him to reduce its bulk, the sale of the flax in that state would be attended with profit greater than can be obtained from any ordinary crops, as shown by the following statement made by Mr. Druce, of Ensham, in Oxfordshire, the piece of ground on which his flax was grown consisting

of a deep-red loam, in extent 5 acres, 2 rods, and 36 perches. His profits were as follow:

Expenses of Cultivation.

	£	s.	d.
One ploughing, at 10*s.* per acre	2	17	3
Sowing and harrowing, at 1*s.* 6*d.* per acre		8	7
Weeding, at 2*s.* per acre		11	5
Flax-seed, 13½ bushels, at 9*s.*	6	1	6
Rent of land, at 4*s.* 8*d.* per acre	13	14	9
Taxes, at 6*s.* per acre	1	14	4
Pulling flax, at 1*s.* 4*d.* per acre	4	0	1
Carting and stocking, at 4*s.* per acre	1	2	10
Threshing	5	7	1
Winnowing		12	6
Total expenses	36	10	4

Sale of Produce.

	£	s.	d.
Sale of flax-seed, 20¼ bushels per acre, 116¼ bushels, at 8*s.*	46	10	0
Sale of flax straw, 12 tons, 2 cwt., 2 qrs., at £3 per ton	36	7	6
Sale of chiff, at 5*s.* per acre	1	8	7
Total receipts	84	6	1

Thus leaving a net profit of £47 15*s.* 9*d.*—being equal to £8 6*s.* 2*d.* per acre of land employed in this trial of flax cultivation.

It may not be improperly asked, why, if the cultivation of flax be so advantageous, it has not been more generally carried out in England? The answer to such an inquiry may readily be found in the difficulties which have hitherto existed with respect to its preparation, and the uncertainty of the market for the produce when so prepared. Objections, founded on the character of the crop, and the comparatively high prices of grain, have, no doubt, had some influence in preventing the cultivation of a plant which was considered to be highly exhaustive, and had not the advantage of a protective system. By a change in the commercial policy of Great Britain, both flax and corn crops are placed upon the same footing; and the agriculturist, under these circumstances, will doubtless devote himself to the production of any article that promises an adequate return for his labor and capital.

The opinion that flax is an exceedingly exhaustive crop, is one that has long been entertained by the agriculturist; and the clauses which, in many cases, are introduced into the agreements and leases of farming tenants in Great Britain, forbidding the culture of flax, hemp, and woad, have, no doubt, tended to strengthen this opinion. It is quite certain that flax, in itself, like all other crops, is an exhaustive one. The farmer does not refuse to grow wheat because it is exhaustive, as he knows that a great proportion of the crop is returned to the soil. There are two modes of testing the accuracy of opinion with respect to the injurious effects of the flax crop—namely, by chemical analyses, and also by practical experience; the last of which is the most convincing to the grower.

Specimens of Woad.—E. Gilman, Twickenham.

This plant was once cultivated to a great extent for the blue dye extracted from it, but has been greatly superseded by indigo. It might still be cultivated to great advantage, as it improves the quality and color of indigo when mixed with it in a certain proportion. The plants, when just about flowering, are mown with a scythe, washed in water, and sun-dried; after this they are ground into a paste, which, kept in heaps for about a fortnight, is then formed and pressed into solid balls. It is also occasionally sown as food for cattle, and has lately been recommended for this purpose, under the name of "pastel." Its vigorous growth and hardy nature are in its favor; but it will only flourish in very rich soils.

Manures.

Superphosphate of Lime and Bone Dust; prepared by A. Ramsey, 65 Mark Lane, London.
Manures for Corn, Hops, Turnips, and all other Crops; prepared by the Inorganic Manure Company, Bow, London.
Peruvian Guano, Saltpetre, Nitrate of Soda, Prepared Night Soil.

Every substance which has been used to improve the natural soil, or to restore to it the fertility which is diminished by the crops annually carried away, has been included in the name of manure. It is well known to all practical agriculturists that the texture of the soil, and the proportions of the earths of which it is composed, are the first and most important conditions of its productive powers. Where there is a good natural loam, which retains moisture without being overcharged with wet, and permits the influence of the atmosphere to pervade it, the crops cannot fail to be more certain and remunerating than in loose sand, or tenacious clays; but at the same time it is equally true, that the best texture of soil will not produce good crops for any length of time without the help of manure, to recruit the loss produced by vegetation.

The methods employed in the cultivation of land are different in every country; and when we inquire the cause of these differences, we receive the answer that they depend upon circumstances. No answer could show ignorance more plainly, since few have ever yet devoted themselves to ascertain what these circumstances are. Thus, also, when we inquire in what manner manure acts, we are answered that the excrements of men and animals are supposed to contain an incomprehensible something which assists in the nutrition of plants, and increases their size. This opinion is often embraced without even an attempt being made to discover the component parts of manure, or to become acquainted with its nature.

In addition to the general conditions, such as heat, light, moisture, and the component parts of the atmosphere, which are necessary for the growth of all plants, certain substances are found to exercise a peculiar influence on the development of particular plants. These substances either are already contained in the soil, or are supplied to it in the form of substances known under the general name of manure. But what does the soil contain, and what are the components of the substances used as manure? Until these points are determined, a rational system of agriculture cannot exist. The power and knowledge of the physiologist, agriculturist, and chemist must be united for the complete solution of these questions.

The general object of agriculture is to produce, in the most advantageous manner, certain qualities, or a maximum size, in certain parts or organs of particular plants. Now this object can be attained only by the application of those substances which we know to be indispensable to the development of these parts or organs, or by supplying the conditions necessary to the production of the qualities desired.

The rules of a rational system of agriculture should enable us, therefore, to give to each plant that which it requires for the attainment of the object in view.

As the composition of soils forms an important feature in the profession of agriculture, it will be our duty to explain, as briefly as possible, some of those which have the most distinct characters from their connexions with different geological formations.

There are various modes of distinguishing soils without entering into a minute analysis of their component parts. The simplest and most natural is, to compare their texture, the size and form of the visible particles of which they are composed, and to trace the probable source of their original formation from the minerals which are found around or below them. The science of geology is of great utility in aiding us to compare different soils and ascertain their composition.

The soils which are immediately derived from those rocks, in which no traces of organic remains are to found, consist either of visible fragments of hard minerals, which are not affected by exposure to air or water, or of minuter particles of the same, of which the shape is not readily distinguished by the naked eye. When they are altogether composed of visible particles and stones, the water readily passes through them; and unless they are kept continually moist by a regular irrigation, without any stagnation of the water, they are absolutely incapable of sustaining vegetation.

It is seldom, however, that any gravel or sand does not contain some portion of earth or other matter, of which the particles become invisible when diffused through water, and to which we will here give the general name of impalpable substance. A certain portion of this finer part of the soil, and its due admixture with the coarser, especially where there is some regular gradation of size, and no stones of too large dimensions to obstruct the instruments of tillage, may be considered as essential to fertility.

The soils which have been formed from the disintegration and decomposition of the primitive rocks, such as granite, basalt, or limestone, and those which contain all these minerals minutely divided and intimately mixed, are always naturally fertile and soon enriched by cultivation. The hard particles of quartz maintain a certain porosity in the soil, which allows air and moisture to circulate, while the alumina prevents its too rapid evaporation. The silicate of potash is highly favorable to the vegetation of those plants which contain silica in their stems; in fact silica is present in the ashes of nearly all plants, having entered the plants by means of alkalies.

The primitive limestone, which is very hard, is yet gradually decomposed by the action of air and water, being in a very small degree soluble in the latter. The water which flows through these rocks is soon saturated; but when it springs out and comes to the light, the carbonate of lime is deposited by the evaporation of the water; and if this meets with the clay which results from the decomposition of the slate, it forms a marl, which, naturally or artificially added to silicious sand, forms the basis of a very good soil, particularly well adapted to pasture.

The soils, which have evidently been formed from the rocks, which are supposed to be of secondary formation, are fertile according to the proportion of the earths of these rocks which they contain. It is of these chiefly that those loose, sandy soils are formed, of which the particles appear as distinct crystals, easily distinguishable with the aid of a lens, or even by the naked eye. Air and water have been the chief agents in the decomposition of those secondary rocks called sandstones, and agitation in water has washed from them the finer portions which have remained suspended. The immense sandy plains, which are for the most part barren, have probably once been the shores of the sea, from which the waves have washed all that portion which was impalpable and easily suspended in water, depositing this in the depths, which, by some convulsion in nature, may some time or other be raised above the level of the waters, and form hills or plains of clay.

Argillaceous earth exists, in some proportion, in almost every rock. Some of the hardest gems are chiefly composed of alumina. It has the property, when mixed with other substances, as silica or lime, of fusing into a stone of great hardness and insolubility. In this state, its effect on the soil is not to be distinguished from that of silica; and by burning common clay, or clay mixed with carbonate of lime, a sandy substance is produced, resembling burnt brick, which tends greatly to improve the texture of those clays which contain little or no sand in their composition. It must be remembered that the stiffest clays contain a large portion of silica in an impalpable state; but this, instead of correcting their impermeable and plastic nature, rather adds to it. It is only palpable sand, which, with clay, forms what is commonly called loam, and which, when the sand is in due proportion with a mixture of organic matter, forms the richest and most easily cultivated soils. Some of the rocks of secondary formation contain a considerable portion of alumina and lime; and when these earths meet with crystallized sand, a compound, or rather a mixture, is formed which has all the requisite qualities, as to texture, to produce the most fertile loams. The only deficiency is organic matter; but this is so readily accumulated wherever vegetation is established, or can be so easily added artificially, that these loams may be always looked upon as the most favorable soils for agricultural operations; and if a considerable depth of loam is found, which neither retains water too long nor allows it to percolate too rapidly, it may be looked upon as a soil eminently capable of the highest degree of cultivation. It is known that the aluminous minerals are the most widely diffused on the surface of the earth; and all fertile soils, or soils capable of culture, contain alumina as an invariable constituent. There must, therefore, be

something in aluminous earth which enables it to exercise an influence on the life of plants, and to assist in their development. The property on which this depends is that of its invariably containing potash and soda.

It will be seen that each distinct formation gives rise to a great variety of fertility, even where the basis remains the same; but it is of great importance to the farmer to ascertain the general nature of the rocks and strata on which his farm lies. In these soils which we have mentioned no notice has been taken of organic matter, because this does not seem in any way connected with their formation. The primary strata are distinguished by having no traces of organic remains in their composition. It is in the tertiary strata, especially those which have been formed by the destruction of animal and vegetable substances, that organic matter becomes a peculiar object of attention; and it is doubtless from this reason alone that the alluvial soils of later date are found so highly fertile. The alluvial soils formed by the deposit of a variety of earths in a state of great division, and mixed with a portion of organic matter, form by far the most productive lands. They will bear crop after crop with little or no addition of manure. These soils are found along the course of rivers which traverse extensive plains, and which have such a current as to keep very fine earth suspended by a gentle, yet constant, agitation, but not sufficiently rapid to carry along with it coarse gravel or sand. Wherever there is an obstruction to the current, and an eddy is formed, there the soil is deposited in the form of mud, and, gradually accumulating, forms those alluvial soils which are so remarkable for their fertility. In these soils the impalpable matter greatly predominates; but the intimate mixture of the earths with organic matter, in a state which has been called *humus*, prevents their consolidating into a stiff clay, and the gases which are continually evolved from the organic matter keep the pores open, and give scope to the growth and nourishment of the root.

Organic matter is no doubt essential to great fertility in a soil, but some soils require more of it than others. *Humus*, which is the form which organic matter naturally comes to by slow decomposition in the earth, gives out certain elements which the roots can take up in their nascent state, and from which they obtain the carbon so abundant in all vegetable productions. But organic matter, in every stage of its spontaneous decomposition, keeps the pores of the soil open, and admits, even if it does not attract, air and moisture to the fibres of the roots.

Professor Liebig, however, takes a different view of this subject. He says: "Land of the greatest fertility contains argillaceous earths, and other disintegrated minerals with chalk and sand, in such a proportion as to give free access to air and moisture. The land in the vicinity of Mount Vesuvius may be considered as the type of a fertile soil, and its fertility is greater or less in different parts, according to the proportion of clay or sand which it contains.

"The soil which is formed by the disintegration of lava cannot possibly, on account of its origin, contain the smallest trace of vegetable matter; and yet it is well known that when the volcanic ashes have been exposed for some time to the influence of air and moisture, a soil is gradually formed in which all kinds of plants grow with the greatest luxuriance."

This fertility is owing to the alkalies which are contained in the lava, and which, by exposure to the weather, are rendered capable of being absorbed by plants. Thousands of years have been necessary to convert stones and rocks into the soil of arable land, and thousands of years more will be required for their perfect reduction—that is, for the complete exhaustion of their alkalies.

Air, water, and the change of temperature, prepare the different species of rocks for yielding to plants the alkalies which they contain. A soil which has been exposed for centuries to all the influences which affect the disintegration of rocks, but from which the alkalies have not been removed, will be able to afford the means of nourishment to those vegetables which require alkalies for their growth during many years; but it must gradually become exhausted, unless those alkalies which have been removed are again replaced: a period, therefore, will arrive when it will be necessary to expose it from time to time to a further disintegration, in order to obtain a new supply of soluble alkalies; for, small as is the quantity of alkali which plants require, it is nevertheless quite indispensable for their perfect development.

The first colonists of Virginia found a country the soil of which was similar to that just mentioned; harvests of wheat and tobacco were obtained for a century from one and the same field without the aid of manure; but now whole districts are converted into unfruitful pasture land, which, without manure, produces neither wheat nor tobacco. From every acre of this land there were removed, in the space of one hundred years, 12,000 pounds of alkalies in leaves, grain, and straw. It became unfruitful, therefore, because it was deprived of every particle of alkali which had been reduced to a soluble state, and because that which was rendered soluble again in the space of one year was not sufficient to satisfy the demands of the plants. It is the greatest possible mistake to suppose that the temporary diminution of fertility in a soil is owing to the loss of *humus;* it is the mere consequence of the exhaustion of the alkalies.

Let us look at the condition of the country around Naples, which is famed for its fruitful corn land. The farms and villages are situated from eighteen to twenty-four miles distant from each other, and between them there are no roads, and consequently no transportation of manure. Now, grain has been cultivated on this land for thousands of years, without any part of that which is annually removed from the soil being artificially restored to it. How can any influence be ascribed to *humus* under such circumstances, when it is not even known whether *humus* was ever contained in the soil?

The method of culture in that district explains the permanent fertility. A field is cultivated once every three years, and is in the intervals allowed to serve as a sparing pasture for cattle. The soil experiences no change in the two years during which it lies fallow, further than that it is exposed to the influence of the weather, by which a fresh portion of the alkalies contained in it are again set free or rendered soluble. The animals fed on these fields yield nothing to these soils which they did not formerly possess. The weeds upon which they live spring from the soil, and that which they return to it as excrement must always be less than that which they extract. The fields, therefore, can have gained nothing from the mere feeding of cattle upon them; on the contrary, the soil must have lost some of its constituents.

Experience has shown, in agriculture, that wheat should not be cultivated after wheat on the same soil, for it belongs, with tobacco, to the plants which exhaust a soil. But if the humus of a soil gives it the power of producing grain, how happens it that wheat does not thrive in many parts of Brazil, where the soils are particularly rich in this substance?

The cause is, that the strength of the stalk is due to silicate of potash, and that the grain requires phosphate of magnesia, neither of which substances a soil of humus can afford, since it does not contain them. The plant may, indeed, under such circumstances, become an herb, but will not bear fruit.

Potash is not the only substance necessary for the existence of most plants; indeed the potash may be replaced in many cases by soda, lime, or magnesia. But other substances besides alkalies are required to sustain the life of plants. Phosphoric acid has been found in the ashes of all plants hitherto examined, and always in combination with alkalies or alkaline earths. Most seeds contain certain quantities of phosphates. In the seeds of different kinds of corn, particularly, there is abundance of phosphate of magnesia.

The soil in which plants grow furnishes them with phosphoric acid, and they in turn yield it to animals, to be used in the formation of their bones, and of those constituents of the brain which contain phosphorus. Much more phosphorus is thus afforded to the body than it requires when flesh, bread, fruit, and husks of grain are used for food; and this excess is eliminated in the urine and the solid excrements.

Although by artificial cultivation the quantity of humus in a soil may be increased almost to any degree, still, in spite of this, there cannot be the slightest doubt that a soil must gradually lose those of its constituents which are removed in the seeds, roots, and leaves of the plants raised upon it. The fertility of a soil cannot remain unimpaired, unless we replace in it all those substances of which it has been thus deprived. Now this can only be done by manure.

The manures thus used are divided in two classes—

1. Animal or natural manures.
2. Chemical or artificial manures.

Among the most important of the animal manures are the excrements of animals. The peculiar property of earth in absorbing putrid effluvia, and removing disagreeable smells, appears an indication of nature, to lead us to bury putrid animal substances, of which the excrements and dead carcasses of animals are the most numerous and obvious. It would require no length of experience to show that wherever this is done, vegetation is more vigorous. There is, therefore, another motive for burying manure than merely to get rid of a disagreeable substance. From the most ancient times, of which there are any records, the manuring of a field has been an important part of cultivation.

We may now inquire whether the excrements of animals are all of a like nature and power, and whether they in every case administer to the necessities of a plant by an identical mode of action. These points may easily be determined by ascertaining the composition of the animal excrements, because we shall thus learn what substances a soil really receives by their means. According to the common view, the action of solid animal excrements depends on the decaying organic matters which replace the humus, and on the presence of certain compounds of nitrogen, which are supposed to be assimilated by plants, and employed in the production of gluten and other azotized substances. But this view requires further confirmation with respect to the solid excrements of animals, for they contain so small a proportion of nitrogen, that they cannot, possibly, by means of it, exercise any influence upon vegetation.

We may form a tolerably correct idea of the chemical nature of the animal excrements, without further examination, by comparing the excrements of a dog with its food. When a dog is fed with flesh and bones, both of which consist in great part of organic substances containing nitrogen, a moist white excrement is produced, which crumbles gradually to a dry powder in the air. This excrement consists of the phosphate of lime of the bones, and contains scarcely $\frac{1}{100}$ part of its weight of foreign organic substances. The whole process of nutrition of an animal consists in the progressive extraction of all the nitrogen from the food, so that the quantity of this element found in the excrements must always be less than that contained in the nutriment.

When horse excrement is treated with water, a portion of it, to the amount of three or three and a half per cent., is dissolved, and the water is colored yellow. The solution is found to contain phosphate of magnesia and salts of soda, besides small quantities of organic matters. The portion of the excrement undissolved by the water yields to alcohol a resinous substance, possessing all the characters of gall, which has undergone some change; while the residue possesses the properties of sawdust, from which all soluble matter has been extracted by water and burns without any smell. One hundred parts of the fresh excrement of a horse, being dried at 212° F., leave from 25 to 31 parts of solid substances, and contain accordingly 69 to 75 parts of water. From the dried excrements, we obtain variable quantities of salt and earthy matters, according to the nature of the food which has been taken by the animal. It results, then, that with from 3,600 to 4,000 pounds of fresh horse manure, corresponding to 100 pounds of dry manure, we place on the land from 2,484 to 3,000 pounds of water, and from 730 to 800 pounds of vegetable matter, and also from 100 to 270 pounds of salt and other inorganic substances.

The latter are evidently the substances to which our attention should be directed, for they are the same which formed the component parts of the hay, straw, and oats with which the horse was fed. Their principal constituents are the phosphates of lime and magnesia, carbonate of lime, and silicate of potash; the first three of these preponderating in grains, the latter in hay. Thus, in 1,000 pounds of horse manure, we present to a field the inorganic substances contained in 6,000 pounds of hay, or 8,300 pounds of oats.

The peculiar action, then, of the solid excrements is limited to their inorganic constituents, which thus restore to a soil that which is removed in the form of roots or grain. When we treat land with the manure of the cow or sheep, we supply it with silicate of potash and some salts of phosphoric acid; and when enriched with the manure of the horse, we supply it with silicate of potash and phosphate of magnesia. In the straw which has served for a litter, we add a further quantity of silicate of potash and phosphates; which, if the straw be putrified, are in exactly the same condition in which they were before being assimilated.

It is evident, therefore, that the soil of a field will alter but little if we collect and distribute the manure carefully. A certain portion of the phosphate, however, must be lost every year, being removed from the land with the grain and cattle; and this portion will accumulate in the neighborhood of large towns. The loss thus suffered must be compensated for in a well managed farm; and this is partly done by allowing the fields to lie in grass. It is considered that, for every 100 acres of corn land, there should be 20 acres of pasture land, which produce annually, on an average, 5,000 pounds of hay. Then, assuming that the ashes of the excrements of the animals fed with this hay amount to nearly seven per cent., 341 pounds of the silicate of lime, and phosphates of magnesia and lime, must be yielded by these excrements, and will, in a certain degree, compensate for the loss which the land had sustained.

We could keep our fields in a constant state of fertility by replacing every year as much as we remove from them in the form of produce; but an increase of fertility, and consequent increase of crop, can only be obtained when we add more to them than we take away. It will be found that, of two fields placed under conditions otherwise similar, the one will be most fruitful upon which the plants are enabled to appropriate more easily, and in greater abundance, those contents of the soil which are essential to their growth and development.

It will now be easily understood that, for animal excrements, other substances containing their essential constituents may be substituted. In Flanders, the yearly loss of the necessary richness in the soil is completely restored by covering the fields with ashes of wood or bones, which may or may not have been lixiviated, and of which the greatest part consists of the phosphates of lime and magnesia. The great importance of manuring with ashes has been long known by agriculturists. Now, bone manure possesses a still greater importance in this respect. The primary sources from which the bones of animals are derived are hay, straw, or other substances used as food. If we admit that bones contain 55 per cent. of the phosphates of lime and magnesia, and that hay contains as much of them as wheat straw, it will follow that eight pounds of bones contain as much phosphate of lime as 1,000 pounds of hay or wheat straw, and two pounds of it as much as 1,000 pounds of the grain of wheat or oats. These numbers express pretty nearly the quantity of phosphates which a soil yields annually on the growth of hay and corn. Now, the manure of an acre of land with 40 pounds of bone dust is sufficient to supply three crops of wheat, clover, turnips, &c., with phosphates. But the form in which they are restored to a soil does not appear to be a matter of indifference; for, the more finely the bones are reduced to powder, and the more intimately they are mixed with the soil, the more easily are they assimilated.

Experiments on bones, as a manure, were made long before their use was extensively adopted, and these, in general, were not attended with a very favorable result, in consequence of the bones not being broken into sufficiently small pieces, or being put upon the land in too fresh a state; but since the proper use of them has been ascertained, the advantage of this article as a manure, in distant and uncultivated spots, where the carriage of common stable-manure would have been too expensive, and where it could not be made for want of food or cattle, is incalculable. By means of bones large tracts of barren heaths and sands in Grea

Britain have been converted into fertile fields. The bones are broken into different sizes, and are accordingly called inch bones, half-inch bones, and dust. Most of the bones used in England—which are procured from the large manufacturing towns—have undergone the process of boiling, by which the oil, and a great part of the gelatine which they contain, have been extracted. At first sight we should be led to imagine that, having lost much of the rich animal matter which they contained, they would be proportionably less effective in the soil. This, however, seems not to be the case, as experience has shown that, while little difference can be observed, many give the preference to those from which the oil and glue have been extracted; in fact, from late experience it has been found that bones act more speedily and efficaciously after being boiled. But oil and glue form excellent manures. This is explained by the fact that bones do not furnish much nourishment to the roots of plants until they have undergone a certain degree of decomposition; the fat and the gelatine, being intimately blended with the bony matter, and contained in cavities or cells, may remain a long time in the earth without decomposition. As a proof of this, it has been found that bones which had lain in the earth for many centuries, on spots where ancient battles had been fought, afforded, on analysis, nearly as much gelatinous matter, by the abstraction of the earthy parts, as fresh bones would have done. It would seem, therefore, that the great effect of bones, as a manure, must depend on the phosphate of lime, and the effect of bone ashes seems to strengthen this opinion. A close examination of the fields manured with bones has led to a surmise that much of their importance depends upon the mechanical texture of the bone, and on its power of absorbing and retaining moisture; for if a plant which vegetates with peculiar vigor in a field manured with bones be pulled up, it will be almost invariably found that small pieces of bones are attached to the roots; and when these are minutely examined, the smaller fibres of the roots will be found to have grasped them and to pervade their cavities, always more or less moist. The moisture, then, and a small portion of the remaining gelatine dissolved in it form the food on which the plant has thriven. The more the bones have undergone fermentation, the more soluble the gelatine will be. In its fresh state it is only soluble in very warm water, and the oil repels moisture. This accounts for the seeming anomaly of the superiority of boiled bones, since by this process they have undergone a fermentation; the residue, although not deprived of all its animal matter, is much more porous, and will imbibe and retain moisture. The food of the plants is here ready prepared and dissolved, and kept in store without being in danger of being washed through a porous soil, or being evaporated by the heat. The solid substance, which is chiefly phosphate of lime, has a stimulating effect, and assists that of the more soluble parts; but phosphate of lime is not soluble in water, and does not decompose readily in the earth, and it therefore acts slowly upon the roots of crops, to which it is applied as a manure. Dr. Liebig's great discovery—that oil of vitriol, (sulphuric acid,) if mixed with bones, would take to itself a part of this lime, leaving behind a new salt containing at least a double portion of phosphorus, and therefore called super phosphate of lime—was founded upon correct analysis. This salt, being readily dissolved by water, he hoped would afford a more digestible food for root crops; and the result has answered his expectations.

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Hitherto this mixture has been applied as a liquid manure, diffused sometimes in fifty times its bulk in water. This process, however, was found too tedious and expensive.

The methods now adopted by artificial manure-makers in England, and by large farmers, are as follows—premising, however, that coarse bone-dust is preferred, and the ingredients are mixed in a brick tank in the ground, some eight feet long by four feet wide, with a depth of from eighteen to twenty-four inches, the rakes and shovels employed being of copper: to any quantity of bone (not more than fifteen hundred weight should be mixed at a time) put into this tank, half its weight in oil of vitriol should be gradually added. This will soon begin to heat, seething violently, and sending out a great deal of steam, with a peculiarly offensive stench; presently the whole mixture will wear the appearance of a boiling mass and swell greatly from the escape of gas. This mixture, from the time of the pouring in of the vitriol, should be continually raked about, so that every particle of the bone may be dissolved by the acid. Great attention should be paid to this. In a short time the bones will disappear altogether; and when it has been raked until it gets so thick that it can be worked no longer, it should be shovelled out on to the ground, where, in the course of a day or two, it will become quite dry, and may then be broken up into powder and put on the land. It will be found necessary, if the bone is dry when put into the tank, to add seven or eight pailfuls of water, and mix with the bone, before pouring in the acid. In England super-phosphate of lime is used to a very great extent as a manure for turnips, and scarcely any other manure could produce such results. The best mode of applying it is to sow it broadcast, at the rate of from four to five hundred weight per acre, harrowing it in, that it may not come in contact with the seed.

Night Soil.—In respect to the quantity of nitrogen contained in excrements, 100 parts of the urine of a healthy man are equal to 1,300 parts of the fresh manure of a horse, and to 600 parts of that of a cow. Hence, it is evident that it would be of much importance to agriculture if none of the human urine were lost. Its disagreeable odor; its erroneous modes of application, either in such excessive quantities, or mixed with other composts in such proportions that its powers could not be distinguished in the mass; its semi-fluid nature, requiring for its removal carriages of a peculiar construction; and several other minor obstacles, have rendered its use infrequent in most countries.

The powerful effects of urine as a manure are well known in Flanders, and they are considered invaluable by the Chinese, who are the oldest agricultural people. Davis, in his history of China, states that every substance convertible into manure is diligently husbanded. The cakes that remain after the expression of their vegetable oils, horns and hoofs reduced to powder, together with soot and ashes, and the contents of common sewers, are much used. The plaster of old kitchens, which in China have no chimneys but an opening at the top, is much valued, so that they will sometimes put a new plaster on a kitchen for the sake of the old. All sorts of hair are used as a manure, and barbers' shavings are carefully appropriated to that purpose. The annual produce must be considerable in a country where some hundred millions of heads are kept constantly shaved. Manure of all animals, but more especially night soil, is esteemed above all others. Being sometimes formed into cakes, it is dried in the sun, and in this state becomes an object of sale to farmers, who dilute it previous to use. They construct large cisterns, or pits, lined with lime plaster, as well as earthen tubs, sunk into the ground, with straw over them to prevent evaporation, in which all kinds of vegetable and animal refuse are collected. These, being diluted with a sufficient quantity of liquid are left to undergo the putrefactive fermentation, and then applied to the land. In the case of everything except rice the Chinese seem to manure the plant itself rather than the soil, supplying it copiously with their liquid preparation.

The Chinese husbandman always steeps the seeds he intends to sow in liquid manure until they swell, and germination begins to appear, which experience has taught him will have the effect of hastening the growth of the plants, as well as of defending them against the insects hidden in the ground in which the seeds are sown. To the roots of plants and fruit trees liquid manure is also applied. The business of collecting urine and night soil employs an immense number of persons, who deposit tubs in every house in the cities for the reception of the urine of the inmates, which vessels are removed daily with as much care as our farmers remove their honey from the hives. Indeed, so much value is attached to the influence of human excrements by these people that the laws of the State forbid that any of them should be thrown away; and no other manure is used for their corn fields.

China is the birthplace of the experimental arts. The incessant striving after experiments conducted the Chinese a thousand years since to discoveries which have been the envy and admiration of all nations for centuries, especially in regard to painting and dyeing, and to the manufactures of porcelain, silk, and colors for painters. These we were long unable to imitate; and yet they were discovered by them without the assistance of scientific principles; for in the books of the Chinese we find recipes and directions for use, but never explanations of processes.

Half a century sufficed to Europeans not only to equal, but to surpass, the Chinese in the arts and manufactures; and this was owing merely to the application of correct principles deduced from the study of chemistry. But how infinitely inferior is the agriculture of Europe to that of China! The Chinese are the most admirable gardeners and trainers of plants, for each of which they understand how to prepare and apply the best-adapted manure. The agriculture of their country is the most perfect in the world, and yet very little value is attached to the excrements of animals.

If we admit that the liquid and solid excrements of man amount, on an average, to one and a half pound daily, and that they contain three per cent. of nitrogen, then in one year they will amount to 547 pounds, which will contain nearly 17 pounds of nitrogen—a quantity sufficient to yield the nitrogen of 800 pounds of wheat, rye, oats, or of 900 pounds of barley.

This is much more than it is necessary to add to an acre of land in order to obtain, with the assistance of the nitrogen absorbed from the atmosphere, the richest possible crop every year. Every town and farm might thus supply itself with the manure, which, besides containing the most nitrogen, contains also the most phosphates; and if rotation of the crops were adopted they would be most abundant. By using at the same time bones and the lixiviated ashes of wood, the excrements of animals might be entirely dispensed with. Except another powerful manure, produced by the herring-oil-works' refuse, none can come into competition for richness with the contents of the privy mixed with urine. The effects of this manure no doubt diminish gradually, yet its operation may be plainly perceived in the fourth successive crop. When human excrements are treated in a proper manner, so as to remove the moisture which they contain without permitting the escape of the ammonia, they may be put in such a form as will allow them to be transported even to great distances. This is already attempted in many towns in England; and the preparation of night soil for transportation constitutes not an unimportant branch of industry. But the manner in which this is done is very injudicious.

The excrements are preserved in the houses in open casks, from which they are collected and placed in deep pits, but are not sold until they have attained a certain degree of dryness, by evaporation in the air. But whilst lying in the receptacles appropriated for them in the houses, the greatest part of their area is converted into carbonate of ammonia; lactate and phosphate of ammonia are also formed, and the vegetable matters in them putrify; all their sulphates are decomposed, whilst their sulphur forms sulphuretted hydrogen and hydro-sulphate of ammonia. The mass, when exposed to the air and dried, has lost more than half of the nitrogen which the excrements originally contained; for the ammonia escapes into the atmosphere along with the water which evaporates; and the residue now consists principally of phosphate of lime, with phosphate and lactate of ammonia, and small quantities of urate of magnesia and fatty matter. Nevertheless, it is still a very powerful manure; but its value, as such, would be twice as great if the excrements, before being dried, were neutralized with a cheap mineral acid.

In other manure manufactories, the night soil, while still soft, is mixed with the ashes of wood, or with earth, both of which substances contain a large quantity of caustic lime, by means of which a complete expulsion of all its ammonia is effected, and it is completely deprived of smell. But such a residue, applied as manure, can act only by the phosphates which it still contains; for all the ammoniacal salts have been decomposed, and their ammonia expelled.

A patent has been taken by a manufacturer in London for the preparation of this useful manure, which states, in its specification, that the night soil is to be mixed with calcined mud and finely-divided charcoal. By this means the smell is completely and instantaneously removed, and the ammonia retained by virtue of the affinity which alumina and charcoal exert for that compound. This plan is both simple and efficacious, but the ammonia is apt to be expelled by the application of the heat employed in drying the manure. The addition of a cheap mineral acid to the night soil, before admixture with these ingredients, would materially improve the process. Perhaps the best and most practical method of fixing the ammoniacal salts of urine and night soil is to mix them with the ashes of peat or coal. When the latter are employed, care must be taken to select such as are of a porous, earthy consistence. The ashes, both of peat and coal, contain, in general, magnesia; hence their value as an ingredient of prepared night soil. The night soil should be mixed thoroughly with the ashes, and exposed to the air to dry. The disagreeable smell is thus quickly removed, and a pulverulent manure obtained, which can be applied to the fields with facility.

Guano.—That the sea, in a variety of shapes, is the great receiver of the riches of the soil, has been long remarked by the natural philosopher. The considerable value and extent of the various organic matters which have been in all ages incessantly washing from the land through a multitude of streams into the ocean, is in fact an observation of remote antiquity. The finely-divided vegetable and animal substances poured down by the flood-waters of the Nile, and other Eastern rivers—the extensive and fertile deltas, which the deposit of these matters formed at their mouths—spoke a language that even the indolent Oriental cultivators could not but understand; and they not only perceived the value of the riches thus washing from the upland soil, but they soon began to strive, in many directions, to intercept them as they glided towards the ocean. But these partial attempts to intercept the organic substances floating down every streamlet towards the ocean, the farmer will perceive, can only be partial in their nature, and comparatively trifling in their results. Great masses of these matters are, in truth, still, as they have been from time immemorial, carried in the river waters to the sea, where, becoming either the food for fishes and insects, or deposited in its depths, they become lost to the soil, which their departure has impoverished. It is true that the agriculturist has long endeavored to recover from the ocean, in other forms, a portion of these matters; that he carries off collections of sea-weed, and buys up all the fishes that he can profitably procure, to enrich his land; and that mankind in all directions are doing the same, when they are seeking for and using fish as an article of food. But when all these supplies are taken into account, how small a proportion do the organic matters thus recovered from the sea bear to the great streams every hour pouring into it through an endless number of mouths?

Of such attempts, perhaps, one of the most extensive, as well as the most promising, of all modern efforts, is the introduction into agriculture of the Peruvian guano; for this is in truth a return to the land, in a very concentrated form, of a portion of the phosphate of lime, and other salts, which, washed from it by the drainage of waters, became the food, and entered into the composition, of the fish, the insects, and the weeds of the ocean. These, becoming in their turn the food of birds, are, in the undigested excremental matters of multitudes of sea-fowl, deposited on the rocky islands of the Pacific ocean, constituting a chief portion of the guano of the Peruvian farmers.

The date of the discovery of guano, and its introduction as a manure, is unknown, although no doubt exists as to its great antiquity; for it has been used as a manure by the Peruvians since the twelfth century, and its value was considered so inestimable, that the government of Incas issued a decree by which capital punishment was inflicted upon any person found destroying the fowl of the guano islands. Overseers were also appointed over each province, for the purpose of insuring them further protection. Under this state of things, the accumulation of the excrements may have well taken place. All those regulations are, however, now abandoned. The composition of guano points out how admirably fitted it is for manure; for not only does it contain ammoniacal salts in abundance, but also those inorganic constituents which are indispensable

for the development of plants. Guano, to be good, being in some measure soluble in water, can never be found in its most powerful state in any climate where rain falls; and consequently any that may be brought from the coast of Peru, taken from without the limits of dryness, must be of inferior value, compared with that which comes from the Chincha islands, situated in about 10½ degrees south latitude, and about 10 miles distant from the main. The soil to which it is applied in South America, principally for the growth of maize, is of a sandy, sterile nature, containing but little organic matter. The plant is manured three times: the first in small quantity, at the time of sowing the seed; a larger application when the plant is less than half grown; and the third just previous to the commencement of ripening the seed. After each application the land is irrigated.

Experiments have been made, the results of which showed that three hundred weight of good Peruvian guano were equal to 20 tons of good farm yard dung. But the question may arise whether guano and other stimulating manures do not exhaust the land while they produce great immediate results? This has been the result in California, and though such deterioration of the soil is comparatively of little consequence where there is abundance of wild land, yet it becomes a matter of great importance in all countries where cultivation has been carried on for a length of time.

Guano is now so extensively adulterated, that it is next to impossible for the farmer to obtain it in a pure state; and instances have occurred in which the adulterated matter prevailed to the extent of ninety-seven per cent. Umber-stone, ground into a fine powder, various earths, old mortar, and partially decomposed saw-dust, are employed for this purpose. The mixture is moistened with putrid urine, and redried. Even genuine guano differs so frequently in quality, that it is never advisable to purchase it without a satisfactory analysis.

In the application of guano, care should be taken to prevent its coming in contact with the seed. The guano should be mixed with three times its bulk of finely pulverized earth, burnt clay, ashes, &c. It is important that rain should follow the application of guano within a short time, and a wet season is generally considered most favorable to its success.

Artificial guano may be made by an admixture of the constituents of natural guano. The following is a good receipt:

	Pounds.
Bones, dissolved in spirits of salt, instead of oil of vitriol	18¾
Charcoal powder	18¾
Sulphate of ammonia (gas salt)	9½
Common salt	9½
Gypsum	9½
Wood-ashes	46
Nitrate of soda	28
Sulphate of soda (Glauber salts)	10
Sulphate of magnesia (Epsom salts)	10
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These ingredients, well incorporated together, and applied at the rate of five hundred weight per acre, have been successfully used as a substitute for Peruvian guano.

Composts.—The increase of manure by the formation of composts is now generally understood in England, and by their means the land has in many districts been rendered much more productive. The fundamental principle upon which composts have been made, is that of impregnating portions of earth with those of the excrement of cattle, which from want of management in the common dunghills, would have been dissipated and lost; and also accelerating or retarding the decomposition of animal and vegetable substances by the addition of earths—such as chalk, marl, clay, and even sand; according to the nature of the soil on which the compost is to be used. All solid manure which is to be ploughed into the ground should contain certain parts already soluble in water, which promote vegetation; while other portions should be in a progressive state, so as to afford a succession of soluble matter by a gradual and slow decomposition. Sir H. Davy, who so much enlarged the sphere of chemical science by his discoveries, hastily asserted that the manure from the stables and yards should be buried in the soil as soon as possible, because when it is collected in a dung-hill a great portion of volatile and gaseous matter escapes into the atmosphere. But he did not then proceed to show whether the ammonia or hydrogen which escapes would have been of any use in the soil. It does not appear that fermenting manure produces carbonic acid; for a man may sleep upon it without much danger, which would not be the case if much carbonic acid were evolved. The ammonia is produced in the very first stage of decomposition, as may be perceived in opening the door of a stable where horses have been shut up for some time; but a heap of manure does not produce the same effect when its first heat is gone off. Most observant practical farmers have followed a contrary practice, and let their manure be tolerably short and rotten before it is ploughed into the soil. In Flanders they pour liquid manure on the small heaps of dung in the field to excite fermentation, before they spread it and plough it in; some, on the other hand, let the manure spread over the soil; rolling it, in order to pulverize it some time before it is ploughed in.

In the formation of composts, the principal objects are to regulate the decomposition of the organic substances, and to increase the bulk of the manure by means of less expensive materials than straw. For these purposes, lime or chalk is generally used; the former in its caustic state, to accelerate the decomposition of fibrous matter; the latter to add to the mass, and absorb any portion of acid, which is always produced in a certain stage of the fermentation. The stiffest clay may be used with advantage in composts, where better soil is not at hand; and for light lands the stiffer the clay the better, provided it be thoroughly incorporated with the manure. The most useful material, under proper management, is peat or turf. This may be laid in layers with quick lime and earth; the whole being well soaked with liquid manure. If any kind of vegetable matter, such as fern, broom, weeds, &c., can be added, it will be so much the richer. The lime and urine, acting on the peaty matter, decompose its tannin, and transform it into humus; the woody fibre is dissolved, and the whole mass, when turned over, and well mixed, becomes a very rich earth, which being spread on the land, and slightly ploughed or harrowed in, greatly enriches its surface. By this means, many poor soils may be improved, where the cultivation is not sufficiently extended to produce straw. As a substitute for urine,

several mixtures of animal and saline matters have been tried, which are supposed to resemble it in composition. There is no reason why such a liquid might not be formed artificially; and if it can be made with cheap materials, which may be obtained in abundance, and at a less expense than by keeping cattle, it would be of great importance to the farmer.

Peat Charcoal.—Within the last few months, a society has been formed in Great Britain, called "The Irish Amelioration Society," having for its purpose the manufacturing peat fuel and charcoal out of the peat bogs of Ireland—thus converting large tracts of land, previously worthless, to a state of great fertility. Its action on vegetation is stated to be as follows:

Peat charcoal, placed in the soil in autumn, becomes a most valuable manure in spring. During winter the rain fills it with ammonia, phosphates, &c., which are yielded to the plant when nature demands sustenance. The action of charcoal, in absorbing from the atmosphere the gases essential to vegetable life, is unceasing.

Peat charcoal is therefore a vehicle to collect and hold the nutriment of plants, which is usually at large in the soil and atmosphere, and which every gleam of sunshine now draws from the soil. Again, it absorbs above 80 per cent. of water. If rain continue until it can bear no more water, it commences to act as a grain of sand, and aids filtration. When the soil subsequently becomes drier than itself, it then, and not before, yields its moisture to the soil or plant. Thus it is usually a reservoir of water, ready to irrigate, if required, its immediate locality. Assume that each grain be filled with water to the extent it will absorb, and that rain still falls, so strong is the affinity, that it will absorb the gases and reject the water. This can be readily proved by the following experiment:

"Take a quantity of sewage water, containing the average of gaseous components, and place it in a glass vase, and put as many lumps of properly made peat charcoal into the vase as it will hold. Although the pores of the charcoal will almost immediately become filled with water, without any change taking place in the general appearance, after a time (proportioned to the quantity) the charcoal will absorb the impurities of the water, and leave it transparent, although originally opaque."

Other advantages arise in addition: whilst ammonia, phosphates, &c., are yielded to the root of the plant by the process described, so is carbon, in the shape of carbonic acid. Experience has led to this conclusion, from the fact that plants which contain carbon in abundance appear to be specially benefited by the use of charcoal. When placed in the soil, the action of the atmosphere and the soil combined produces combustion, aided or retarded by the greater or lesser amount of oxygen present. Carbonic acid is thus produced and evolved in contiguity to the root of the plant, and assimilated by it in the same manner as the ammoniacal and other gases, each of which, although known to be inhaled by the leaf, practice has shown is more beneficial to the plant when given to the root. Why, then, should one gas be withheld and another given? All chemists of note now agree that ammonia and sulphuretted hydrogen, &c., will be absorbed by the root. Why not, therefore, carbon? In fact it cannot longer be questioned. The most eminent chemists in the world—the French, led by Dumas, Boussingault, Cayen, &c.—now admit this fact although it had previously been laid down as a rule, that "all plants derive from the atmosphere the carbon they contain." There cannot have been a greater fallacy. The well-known value of farm-yard manure proves this point. The manure of animals alone never produces the same effect as when mixed with straw; hence practice established that admixture, which has continued for centuries. The action of the acids of the animal excrement on the straw, which is one of the essential components of farm-yard manure, produces fermentation. All who see a heap of manure understand this fact: that fermentation produces a slow combustion of the straw, converting it into *charcoal*, and thus carbon is continually obtained; and whilst being thus produced, it draws to itself (as its vital powers come into existence) the ammoniacal and other gases surrounding it, and holds them for the future nurture of the plant. Every straw used in the bed of farm-yard cattle contains 40 to 50 per cent. of carbon. That carbon is essential to vegetation, cannot now be questioned; hence the value, primarily, of peat charcoal. It contains, when perfectly made, about 80 per cent. of the purest carbon—more than the per-centage of the richest animal or bone charcoal. It immediately acts—absorbs all the components of the atmosphere essential to vegetation, holds them, and subsequently gives forth its own properties, which are equally valuable. If used by itself, it is well to impregnate it with water before being sown with the seed, which should be intimately intermixed. Whether rain follow or not, the seed will not be injured; if it do not, the seed must be served, for the moisture will aid in its germination; and in turnips especially the growth will have so far advanced before the fly, that the latter will be incapable of injury to the plant.

The quantity of charcoal per acre need not exceed a ton; in many instances it may be less. But if properly mixed with excretory matter or urine, from half that quantity to even one quarter will be sufficient.

Dr. A. Bachner, writing in the "Garten Zeitung," makes a very clear, scientific statement of the manner in which he supposes the charcoal to produce its beneficial results. The following is the most important part of his statement:

1. "*Absorption of Light and generation of Heat.*—It is well known that bodies receive the light of the sun the more perfectly the darker and looser they are, and that the consequent development of heat is in proportion to this absorption of light; hence, a black, light soil is, under the same circumstances and relations, much more favorable to vegetation than a light colored grey earth. Heavy, clayey soil, with a deficiency of humus, is less suitable to vegetation, inasmuch as it soon loses its porosity through rain and snow, and assumes a smooth surface, by which it is prevented from absorbing air and light, and generating heat; hence, agriculturists justly name these clayey soils, which are deficient in humus, cold soils. As charcoal dust is one of the darkest, dullest, and most porous of bodies, it must, on account of its peculiar capacity of receiving the sun's light, and changing it into heat, be particularly favorable to vegetable life.

2. "*Absorption of Atmospherical Air.*—Among all the porous bodies that have the capacity of absorbing gases and vapors, charcoal has been proved, by numerous experiments, to hold the first rank. If, therefore, clayey soil, deficient in humus, is in general less suitable to the growth of plants than rich, loose garden mould, the reason lies not only in the latter receiving more light and creating warmth, but also in its more readily condensing, by its greater porosity, the constituent parts of the atmospheric air, and consequently supplying oxygen, nitrogen, and carbonic acid gas, for the nourishment of the spongioles. We come now to a very important point—the nourishment of plants—which cannot be slightly passed over in elucidating the theory of the effects of charcoal in this respect. Modern vegetable physiologists are, for the most part, of opinion that plants can receive no solid nourishment from the earth—that is, that everything that they can assimilate must be in a liquid and gaseous, or vapory state. If we, therefore, meet with silica, chalk, magnesia—in short, such substances in plants as could only be received from the soil, we may always consider it certain that these sorts of matter can only be absorbed by the roots in proportion as they are in a fluid or dissolved state in the soil. These sorts of matter, and particularly the different organic salts which we find in the ashes of vegetables, are not actually to be considered sources of nourishment, but stimulants to assist in digesting—as salt and spice are to the higher animals and man. We also not unfrequently observe that a superfluity or mixture of certain inorganic substances in the soil, prejudicial to certain families and species of plants, is the cause of disease, when this inorganized matter is in a dissolved state, and capable of being absorbed by them. If we analyze the nourishment of plants, we shall find that it is only the constituent part of air, water, and charcoal. The experiments of Boussingault on the origin of nitrogen in organic bodies show, first, that no plant exists without a proportion of nitrogen; and secondly, that while men and animals receive the portion of nitrogen of their bodies not from the air by breathing, but from food by assimilation, plants, on the contrary, draw their supply of nitrogen not from manure or humus, but from the air. We now come to a very important point in the nourishment of plants, to which M. Payen has particularly called our attention, viz: that charcoal operates as a condenser, under the influence of water, on the constituent parts of the air in the same manner as spongy platina on the elements of detonating gas—so that nitrogen and oxygen are dissolved, and, mixing with water, are absorbed by the spongioles. This property of condensing the air and making it fit to be received by plants, does not exclusively belong to charcoal, for it is also more or less perceptible in other sorts of earth; chiefly in porous or pulverized bodies. We know that water, even when not disturbed, through charcoal or earth, absorbs some air, which becomes a watery fluid, and by heating is again expelled in the form of gas; but charcoal powder appears to possess this power in the highest degree; consequently, besides light and heat, is capable of carrying to the roots both air and water, namely: nitrogen, hydrogen, and oxygen, in the greatest abundance.

"3. Decomposition of the charcoal, and formation of a nourishing substance for plants.

"It is well known that manure, as such, does not nourish plants, and that, on the contrary, when it touches the root it causes disease. We know that it is the matter produced by decay which affords the nourishment to plants. This apparently takes place because the humus, with the co-operation of air and water, is continually forming oxide of charcoal, or carbonate and nitrogen, which, together with the saline particles, is absorbed and assimilated by the roots. For a long time it was

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generally believed that charcoal, as an inanimate body, incapable of decay, contributed in no degree to the nourishment of plants, and that charcoal dust could only serve, at most, to make the earth looser and warmer. But it has been ascertained by experiments that the charcoal in which plants grow by degrees undergoes decomposition, and at last becomes a sort of humus. This obviously takes place merely because the charcoal dust acts as humus, and, with the co-operation of water and air, continually gives out to the plants oxide of charcoal, or carbonate, together with the saline particles which are in the charcoal, and remain in the ashes after burning.

"4. Antiseptic power of charcoal.

"In judging of the effects of charcoal on vegetation, its antiseptic properties are of great importance, for it has very little power of retaining water, and the little it retains is partly absorbed by the roots, and partly evaporated. This property deserves the greatest attention of gardeners in respect to recovering the health of plants the roots of which have become injured by being in a clayey soil, and too frequently watered, or after continued rain, or being in contact with manure not sufficiently decomposed. They should be immediately transplanted into charcoal powder, as the most effectual method of cure."

Liebig, though not offering any lengthened explanation, but speaking as if the point were more a matter of long established notoriety than of recent experiment and theory, gives his powerful testimony in the same direction as Buchner, and says: "Charcoal, in a state of powder, must be considered as a very powerful means of promoting the growth of plants on heavy soils, and particularly on such as consist of argillaceous earth." "The free access of the carbonic acid gas of the atmosphere to the plants promotes their growth, increases their vigor, and enriches their secretions. The application of the same gas to their roots, although it has not been examined with the same care as its action upon their leaves, is yet evidently attended with the highest advantage. Thus the gas is one of the constant products of putrefaction. Wherever this is going on—as over stagnant drains, dung heaps, and other putrefying matters—there vegetation is sure to be rankly luxuriant; and that, too, in situations where the roots of the plants are far removed from immediate contact with the decomposing organic matters. This may be easily shown by the repetition of a very simple experiment which was first made by Sir H. Davy. This great chemist filled a glass retort, capable of containing three pints, with the hot fermenting dung and litter of cattle, and examined the elastic fluids which were generated. In thirty five cubic inches, which were thus produced in three days, he found twenty-one of carbonic acid gas, the remainder being chiefly nitrogen; and after thus ascertaining the composition of these gases, he introduced the beak of another retort, filled in a similar manner, in the soil, under the roots of some grass growing in the border of a garden. In less than a week a very remarkable effect was produced on the grass exposed to the action of these gaseous matters of putrefaction; their color became deeper, and their growth was much more luxuriant than the grass in any other part of the garden. And hence, too, is derived one of the chief advantages of applying organic matters to the soil, and that in as immediate contact with the soil as possible, just as is effected when manures are added to to the soil by the drill; for the roots or leaves of the plants are, by the

adoption of this plan, immediately in contact with the evolved carbonic acid, and other gases of putrefaction. They are thus readily absorbed as they are generated, and nothing is lost by escaping in the atmosphere; the gas, in fact, is instantly, yet gradually, transmuted from the putrefying products of the farm yard into the flour of the wheat. Owing to its peculiarly porous texture, charcoal possesses the property of absorbing a large quantity of air, or other gases, at common temperatures, and of yielding the greater part of them when heated."

M. F. Towers thus speaks of charcoal and carbonized substances: "To whatever quality may be ascribed the fertilizing powers of wood charcoal, certain it is that when newly made it absorbs given quantities of gases."

By the experiments of M. Laussure, it was proved that after charcoal was again heated to a red heat, then suffered to cool under mercury, and instantly plunged in a vessel of the gas, on being taken from the mercury it absorbed, (assuming 1 to represent a single volume of charcoal,)

Of ammoniacal gas	90
Muriatic gas	85
Carbonic acid gas	35
Oxygen gas	9.25
Hydrogen	1.75

It is stated, also, that if wood charcoal remains in contact with valerian, galbanum, balsam of Peru, or musk, it destroys their peculiar odor.

This absorbent power appears to depend upon the great porosity of charcoal, which itself is produced by the action of heat. Wood is composed chiefly of the elements of carbon, oxygen, hydrogen, with some salts of potassa and lime. When acted upon in iron cylinders, oxygen and hydrogen are expelled, and water is formed; also, some carbonaceous compounds, amongst which are pyroligneous acetic acid, pyroxilic spirit, and tar. The remaining charcoal retains the exact form of the wood employed. It is, however, lighter than water, and full of pores. When thus completely decomposed, it consists chiefly of carbon, with a little silica, and the bases of the salts above alluded to. Many years ago, a process was discovered by which the carbonate of soda, (*Sesqui carbonate,*) then just coming into practical use, might be much improved. Crystals of the purest soda were exposed, on flat shallow trays, having canvas bottoms, to the vapor of ignited charcoal, and conveyed into close leaden vessels through a leaden cylinder. The combustion was effected in iron crucibles regulated by an air-stopper. The gas developed was pure carbonic acid. It acted upon the crystals of soda, combined with the neutral salt, and displaced the water of crystallization which drained through the canvas. In the fire crucible the residue of the combustion was very small in bulk and weight, and consisted of silex, lime, and potassa, which constitute the impurities of common charcoal. From these and corresponding data, we infer that wood charcoal is very inferior to the carbonized matter of peat, containing vegetable animal matters, either in respect to depurating, deodorizing, or fertilizing properties.

"Not only does it," to use the language of Liebig, "surpass all other substances in the power which it possesses in condensing ammonia within its pores, but it is at the same time the most unchangeable substance known. It must constitute, therefore, one of the most powerful applications known, but really the most durable one in existence."

Several of the practical purposes to which this valuable article may be advantageously applied are so important, that they may be specially adverted to with advantage.

1. As a covering for manure and compost heaps, no other substance is more suitable. Its capacity for absorbing ammonia and carbonic acid gas renders it the efficient means of preserving much of the effluvium which is usually permitted to escape into the air during the fermentation of manure. Much has been written on the necessity of due care on this branch of farm economy, and many suggestions have been offered on the best methods of remedying the evil. To prevent, in a great measure, this loss of fertilizing power in manure, no agent is more certainly efficient than charcoal. Equal in capabilities to any other, it is accessible to almost a nominal cost; easily applied to the surface of the manure-heap, its action is not impeded by any irregularity in the application, as would be the case with many chemical agents which are recommended for the purpose of fixing the gases, substances of which the cost—in the first instance not insignificant—is augmented by the injudicious use of them, arising from imperfect knowledge or inattention. Of itself, also, it carries to the heap, and afterwards to the soil, physical and chemical properties which have been stated to be favorable to vegetation.

2. As an auxiliary to artificial or highly azotized manures, charcoal is a substance much esteemed.

For the purpose merely of giving bulk, these manures frequently require to be mixed with other substances. By this step an even distribution, either by drill or hand, is facilitated, and danger to the seed from contact with the manure is avoided. Charcoal is eminently capable of insuring these advantages, and, at the same time, it is materially useful, when applied in conjunction with potent and active manures, in absorbing the ammonia that may happen to be liberated more freely than can be appropriated by the plant in its early stages. Mixed with guano, an inodorous compound is formed; and numberless experiments with this and other azotized manures, in conjunction with bulky carbonaceous substances, have been successfully carried out

With reference to its agricultural value as an absorbent, its uses upon the liquid and solid manures indicate how easy it would be, by a simple but well-regulated system, to mix the valuable excrementitious substances, that exist in such enormous quantities in towns, with charcoal, and thus prevent all escape of noxious effluvia, and convert it into a useful, portable, and inodorous manure.

Urate.—This substance has been highly extolled as a manure. It is only within the last ten years that it has been used by English agriculturists. It derives its name from being a compound of urine and plaster of Paris, and is formed by mixing sand and burnt gypsum with urine, and forming a hard compound, which is afterwards reduced to powder.

The Royal Society of Agriculture at Paris caused some experiments to be made with this manure, for the purpose of comparing it with some of the most effective manures then in use. The result was in favor of the urate for the duration of its effect on lucern in a light soil. The portion manured with the urate produced the greatest return at the third and fourth cuttings; when that manured with night soil and pigeon's dung had lost a portion of their effect. It requires a moist season to act powerfully. When mixed with dried night soil its effect on various crops is very great—more especially upon potatoes, carrots, and turnips. For the latter it is particularly adapted, as it promotes a rapid growth, and rarely fails to produce a full plant and great weight per acre.

The urate of the London Manure Company, of which a specimen was exhibited, has now been used successfully for nearly ten years. It is now prepared in a concentrated form; one ton will be found sufficient for six to seven acres of land; at seven guineas per ton. It can be sown either by the hand or by the drill, and in either case it is desirable that it should not be placed more than two or three inches from the surface. Unlike guano, it does not destroy the seed if in immediate contact; though, in all cases it is better to mix it with a few ashes, to make it drill more equally. The following is a testimonial as to its effects:

Oakley Beds, *August* 29, 1849.

Sir: I beg to furnish you with an account of a field of ten acres, manured in 1845 with six hundred weight of the urate per acre. The first crop was Swedish turnips, and by far the best crop in the parish. In 1846 the crop of barley was great, both as regards straw and yield. In 1847 white clover; fed until 20th May by sheep, and in the autumn mown for seed; the crop very good. In 1847 the same field was wheat, and a most excellent crop. The field the following year was again turnips, grown with six hundred weight as before, and again the best crop in the parish. I have used this year four tons of urate for turnips, on another part of the farm, and am happy to say they are very fine, and have escaped the ravages of the fly, which is not the case with some manured with dung.

I am, yours, &c.

W. ANDERTON.

Nitrate of Soda has lately engaged much attention, and is supposed to exert its favorable action upon vegetation by yielding nitrogen. The experiments hitherto made do not warrant us in concluding with positive certainty that it is the nitrogen alone to which it owes its efficacy; but they certainly render this a plausible explanation of its virtues. The usual effect produced by nitrate of soda is to increase the intensity of the green coloring matter, to augment the quantity of straw, but to produce a light grain. There is nothing opposed to the supposition that nitric acid may be decomposed by plants, and its nitrogen assimilated. We find that vegetables possess the power of decomposing carbonic acid, and of appropriating its carbon for their own use. But this acid is more difficult to decompose than nitric acid. There are other circumstances which oppose the adoption of the view that nitrate of soda acts by virtue of the nitrogen which enters into its composition. Were this the case, the action would be more uniform than it has hitherto been found to be. On some soils the salt does not possess the smallest influence; whilst on others it affords great benefit. We can only furnish an explanation of this seeming caprice by a reference to the chemical composition of the soil to which it is applied. If the advantages attending the application of nitrate of soda are due to the alkaline base which it contains, then it is evident that this manure can be of small value on soils containing a quantity of alkalies sufficient for the purposes of the plants grown upon them; whilst, on the other hand, such as are deficient in these must experience benefit through its means. In certain cases in which nitrate of soda has failed, nitrate of potash (saltpetre) has been very successful. Analyses of wheat grown with nitrate of soda and nitrate of potash would be of interest, in order to determine whether a mutual substitution of their bases is effected.

On light barley soils, the effect of nitrate of soda has been universally successful when applied at the rate of three-quarters of a hundred weight, or one bushel, per acre. Much, however, remains yet to be proved: whether, for instance, a still smaller proportion per acre, either in its simplest state or mixed with other manures, such as with ashes or gypsum, when it is used for the grasses, or when employed for corn crops by merely well incorporating it with a sufficient quantity of finely sifted earth to insure its uniform distribution over the field, would not render it more efficient.

Patent Inorganic Manures; prepared at Bow, London.

If we may judge from the numerous flattering testimonials respecting the use of these manures, we should say at once that the farmer can have no better compound in the shape of manure than the inorganic. A distinct manure is prepared for the different crops, so that the agriculturist has but to name the crop he wants to produce, and a manure is prepared especially adapted for that crop, which hitherto, so far as we can learn, has not failed of success.

The company, in their prospectus, state that their principle is to supply, in special and distinct manures, all the substances required to be present in the soil for the production of the largest crops. A separate manure is prepared for each crop, adapted to its particular wants, in order to supply the soil with all the food or elements required from it. As far, therefore, as manure can, they insure good crops; because, unlike other artificial dressings, their effects are to enrich, and not to exhaust land. Every crop grown takes from the soil nine or ten inorganic elementary substances. If only one, two, or three of these be supplied, as happens in the use of guano, nitrate of soda, bones, saltpetre, wool, rape, rags, soot, salt, lime, &c., the crops can only be obtained by impoverishing the soil; and if the use of such substances as manure were continued alone on the same land year after year, their true character and action would soon be seen; for they must always ultimately fail, by exhausting and rendering barren the land. The use, too, of one manure for all crops is almost as much a quackery as one medicine to cure all diseases; for the rotation system of cropping fully proves that different elements of the soil are required by, and ought to be supplied to, the various plants. A few hundred weight of manure applied per acre may seem to some insufficient; but it must be remembered that plants are formed chiefly of matter drawn from the atmosphere and water; the ash left after their combustion being really all that is taken from the soil. Dung, as it decays, acts as a manure, by again supplying to the soil the substances found in the ashes of plants; and it is by the presence of these ashes in the soil, or by the supply of them in manure, that plants are enabled to appropriate from the air and water the elements of which they are chiefly formed. The quantity per cent. and the composition of the ash vary in different plants and grain; but the ash of any particular plant is always essentially the same, whether the plant be grown on chalk, clay, or sand. By using, therefore, manures similar in composition to the ashes of plants, we are enabled to produce good crops on all soils—to grow wheat year after year on the same land, and to render poor soils gradually as productive as rich. That the inorganic manures do enrich the land, and that these principles are correct, is fully proved by the accumulated evidence of upwards of ten years' use; and they were the first and only manures offered to the farmer based on a true and scientific principle, which has been since approved and recommended by the highest authorities.

These manures require no mixing for use; nor is any other matter needful. They are lasting in their effects, and any portion not taken away in one crop remains to benefit the next; so that, when once on the land, they must always effect good more than equal to their cost. They should be sown generally broadcast, or drilled, so as not to be in contact with the seed; on stiff land, it is desirable to harrow or hoe them well in, or to plough them lightly. The effect of any dressing of this manure will be found quite equal to dung, and the continued use of them must make the land cleaner, and free it from vermin.

The price is £7 per ton, and the quantity per acre three to six hundred weight. A farmer, writing from Tunbridge Wells, Kent, says:

"I have used in one year nearly £250 worth of your inorganic manures for wheat, oats, and peas, and confidently assert, and feel it my duty to confess, that the benefits in the several crops where it was duly applied so far exceed all other kinds of manure, that I have much satisfaction in recommending it to my friends and the public generally. I also witnessed its effects on hops, where different manures were tried. The land was divided into three parts—one portion manured with sprats, another with rotten dung, and the third with your inorganic manure. The result is manifestly much in favor of your valuable invention."

Part II.—MINING AND MINERALS.

Mining, Quarrying, Metallurgical Operations and Mineral Products.

The objects exhibited in mining and metallurgy were extremely varied and interesting. They comprehended specimens not only of all the more important mineral ores, building stones, gems and native metals, but also numerous illustrations both of their useful applications and of the several processes by which the natural productions of the mineral kingdom are made subservient to the daily wants of man.

On the west end of the building, extending along the southern wall, was placed the mining and metallurgic collection of Great Britain. These were found a very excellent educational collection of minerals, together with a set of apparatus necessary to enable the student to examine chemically the substances brought under his notice.

Plumbago.—This plumbago was from the mines of Borrowdale, England, which produce the best black lead for the manufacture of pencils. This substance is found in irregular deposits, which usually occur in granite, gneiss, mica, slate, or graywacke; as also sometimes, though more rarely, in the coal formations. At Borrowdale, in order to prevent robbery, it is found necessary to protect the entrance to the pit by a strong building, where the men change their clothes on leaving the mine, and where they are carefully watched by proper superintendents, to prevent their taking with them any portion of the valuable commodity. This mine is usually worked for a period of six weeks only during the year. Its net produce has often amounted to £40,000 per annum.

China Clay, or Kaolin, from St. Stephen's, Cornwall.—This substance is produced by the decomposition of the feldspar occurring in granite rocks, which, by losing a portion of its alkaline constituents, leaves a substance rich in silica and alumina, but retaining a very feeble percentage either of potash or soda. This kaolin is separated from the silicious sand, with which it is invariably associated, by being exposed to a current of clear water, which leaves the sand behind, while the clay is carried off in suspension, and subsequently deposited in deep pits, in which it is allowed to settle. In connexion with the kaolin are exposed specimens of what is called China stone, which appears to be feldspar in a less decomposed state than where it exists as kaolin. This stone, from still retaining a large amount of the alkalies originally contained in the feldspar, is fusible at a high temperature, and it is consequently used in forming the transparent glaze with which the surface of the object previously formed in clay is covered, before being brought to a finished state. The works employed in extricating and preparing the China clay give labor to a large portion of the population of St. Stephen's.

Various models illustrating the methods of working and ventilating Coal Mines.—One of these consisted of a very simple contrivance, by which wagons passing through a level are made to open and shut the various doors established in different places to facilitate a free circulation of air. By this contrivance the constant attendance of a man to open the door on the approach of the wagons is obviated; and as the work is so much more surely and readily done by the wagons themselves, one great cause of accidents is thereby avoided. Another machine for the ventilation of the collieries involves a principle seldom resorted to for this purpose. The current of air is obtained by the rapid motion of a wheel, having a series of radiating tubes, connected with a hollow axle, forming the extremity of the pipe by which the contaminated air is to be exhausted. When this mechanism is made to revolve with great rapidity, by means either of steam or water power, a current of air is by centrifugal force established from the centre of the periphery, and a corresponding movement of exhaustion is induced in the central column, forming the prolongation of the axis of the apparatus connected with the upcast shaft to be ventilated.

Circular Buddle.—A very valuable and interesting contrivance for the dressing or separation of metallic ores from the many earthy impurities with which they are invariably found associated. It is intended to effect the final separation of the slime or pounded earthy matter from the metalliferous particles, with which it is more or less mixed. It consists of a hollow shaft, carrying two brushes, which continually sweep the surface of the circular space, of which the extremities of the brushes describe the circumference. The mineral, in the form of a thin paste, suspended in water, is allowed to enter this area through the hollow spindle in the centre, and as it is then constantly brushed over the floor, which is higher in the middle than towards the edges, it is evident that the metallic or heavier portions will arrange themselves nearly in the order of their respective densities, and accumulate on the central part of the buddle.

Patent Fuel.—There are several specimens of this. It is composed of coal-screenings, mixed either with pitch or coal tar, and then lightly forced into a proper mould, usually in the form of bricks. In some instances the excess of pitch and tar is subsequently eliminated by the bricks being heated to about 600° Fahrenheit in ovens properly constructed for that purpose; while in other cases the coal dust is made to assume solid and regular forms by great pressure only. The advantages of this fuel are that it is less likely to crumble than common coal during a long voyage, and it also stores into less space; but, from the impurities which are always associated with the small coals employed, it is nevertheless liable to produce a large quantity of ash and clinker on the base of the furnace.

Coal.—Pit coal, which is now raised in England to the annual amount of more than 35,000,000 tons, and the applications of which are daily becoming more extended, was but little known in England, as an article of commerce, prior to the commencement of the thirteenth century. In the year 1238, the first researches for this mineral were commenced on the high ground in the neighborhood of Newcastle-upon-Tyne. These were followed in the year 1330 at the coal field at Colliery, near Lanchester; in 1343, at Merrington and Ferry Hill; and in 1500 the several collieries at Gateshead, Whickham, and Tynemouth were first opened. At this period the principal demand was for the use of blacksmiths and limeburners, who appear to have been in the habit of employing this fuel long before it came into anything like general use for household purposes. The mechanical resources of the miner were of a very limited nature, and the principal part of the coal extracted was consequently raised from such situations as afforded considerable facilities for the removal of the water which naturally drains into all subterranean excavations. In the earliest periods of coal-mining, this was drawn off through the level, or gallery, by which the fuel itself was carried to the surface; but as the demand for the latter became more extensive, the mines were gradually worked at greater depths. This was effected either by extracting the water by an endless chain, carrying a series of properly-arranged buckets, or by a system of pumps, worked by a water-wheel. The aid of horses was also frequently called in; but these were only employed in situations where water-power could not be obtained; and they were subsequently superseded by windmills, which either raised the water by an endless chain, passing over pulleys, or by pumps, worked by a due arrangement of cranks. The discovery of the steam-engine has, however, produced by far the most important revolution in this branch of industry; for, by means of this machine, the working of the mines is not only in a most remarkable degree facilitated, but, from the immense demand thus created for fossil fuel, the extraction of coal has become a most important branch of national industry in all those countries which have the good fortune to possess large deposits of this invaluable production.

England and Belgium are, in proportion to their extent, the richest with regard to the coal fields which they contain. In the former country, the coal deposits are estimated at $\frac{1}{20}$ of the total superficies of the Kingdom; whilst in Belgium they are supposed to occupy about $\frac{1}{22}$ of the entire surface of the country. In France, all the known deposits scarcely occupy $\frac{1}{200}$ part of the soil; and all the other European States are much poorer still in this respect. Sweden, Norway, Russia, Italy, and Greece are almost entirely without these formations. Bohemia is, in this particular, the richest part of Germany, although its annual productions are far from being considerable. Spain, Portugal, Austria, and Poland have likewise their beds of coal; and the mineral is also more or less abundant in India, China, Madagascar, Van Dieman's Land, Borneo, and the other East India islands, New Holland, and at Conception Bay, in Chili.

In Great Britain there are several extensive coal districts, among the most important of which may be named those of Wales, Newcastle, Lancashire, Derbyshire, Staffordshire, and Scotland. The veins are worked by means of shafts and galleries, in the same way that the metallic minerals are extracted from the lodes in which they are found; but, as the seams of coal are generally much more extensive than the metallic deposits, and as much larger masses are removed from the interior of the mines, the greatest care is required not only to prevent the crushing together of the workings, but also to introduce a current of air into every part of the colliery, so as to supply the workmen with fresh air for the purpose of respiration, and to prevent the accumulation of the explosive gases which frequently issue from the beds of coal. The very numerous varieties of coal have given rise to distinctions, founded partly on its age and appearance, and partly on its quality. In all kinds the structure of the wood from which they are supposed to have been formed is obliterated, although partial impressions of plants, indicating their origin, frequently occur. The coals form a more or less compact mass, of a dark-brown or black color, sometimes dull, but more frequently possessing a vitreous lustre, which often exhibit a decided iridescence. Their specific gravity is considerably above that of wood, and their structure decidedly granular. They are always distinctly stratified, and have generally a cleavage at right angles to the plane of deposition. The different laminæ of which they are made up are usually in close contact with each other; but are sometimes separated by thin layers of other minerals—such as iron pyrites, carbonate and sulphate of lime, galena, sulphate barytes, the soda salts, and still more frequently by a double carbonate of lime and iron. The fracture of the shining kinds of coal is conchoidal; that of the duller varieties is hackly. Common coal, and particularly that from the newer formations, is frequently observed to be made up of layers of very different appearance—the one kind, which is black and shining, with a conchoidal fracture, is rich in carbon; whilst the duller varieties are of a brown color.

The composition of the ashes of coal is in a great measure determined by the nature of the rock in the vicinity of the seam from which it is extracted; for, besides containing the inorganic elements originally forming part of the plants by the decomposition of which the coal has been produced, they will also, to a certain degree, consist of earthy particles, deposited in the pores of the coal by the infiltration of water from the overlying strata. The chemical composition of coals varies according to their different geological ages, and the localities from which they are obtained; but although they differ considerably in the relative amount of their various constituents, the nature of their ultimate elements is invariably found to be the same. All kinds of coal are, essentially, composed of carbon, hydrogen, and oxygen; but, besides yielding a certain portion of silicious and earthy residue and of sulphur, they usually afford traces of nitrogen, arising from the multitude of organic bodies, of which they contain the remains.

Among the specimens of coal exhibited, there was anthracite, from Tenby, South Wales; from the county of Tipperary, Ireland; and from the western side of the Vale of Neath, near Swansea. This substance is the oldest of all kinds of fossil fuel, and is chiefly found in the transition formation; its structure is perfectly homogeneous; its fracture, conchoidal; and its color of a jet black, with a vitreous lustre, which frequently shows a powerful play of colors. This coal contains an extremely large proportion of carbon, with but a small amount of volatile constituents, and is consequently totally unfit for the manufacture of gas, although well adapted for many purposes requiring intensity of heat and durability in the furnace. From the composition of this fossil, being more nearly allied to that of coke than to that of ordinary coal, it is frequently employed in lieu of the former, and is extensively used in iron furnaces where the hot blast has been adopted.

The per centage composition of two of the above-mentioned specimens, as stated by Sir H. T. De la Beche and Dr. Lyon Playfair, in their first report on coals suited to the steam navy, is as follows: Anthracite from the Vale of Neath: carbon, 91.69; hydrogen, 0.79; and ash, 1.50. Anthracite from Tipperary, Ireland: carbon, 80.18; hydrogen, 2.21; oxygen, traces nitrogen, 0.23; sulphur, 6.76; and ash, 10.71. The specific gravity of the former specimen was found to be 1.357, and that of the latter, 1.590.

Among the specimens from the Welsh coal fields will be observed the Powell's Duffryn, the Aberdare Company's, Merthyr Nixon's, Merthyr and the Risca black vein, together with coal from the Llangenneck Company, whose mines are situated at a short distance from the port of Llanelly. The coals from the above districts are usually characterized by an irregular brilliant fracture, and many portions will be observed to possess a peculiar radiated appearance, seldom noticed in coals coming from other parts of the country. When used under a steam boiler, they are found to light easily and to blow off steam readily, with the production of but little smoke or soot. This variety of coal, which has also a very high evaporating value, is well adapted for the generation of steam, and is largely employed for this purpose in the navy, where its smokeless properties are evidently most useful.

The specific gravity of this class of coals usually varies from 1.29 to 1.35. In order to afford a general idea of the chemical constitution of the coals from this part of South Wales, we will select, as an example, from the report already quoted, the analysis of the Birch Grove Graigola, which, although one of the best varieties belonging to this class, very fairly represents the average per-centage composition of good Welsh coals.

The results obtained by the analysis of a fair sample of this product are as follow: Carbon, 90.94; hydrogen, 4.28; oxygen, 0 94; nitrogen, 1.25; sulphur, 1.18; and ash, 1.41.

From the Lancashire districts there were coal, cannel coal, and coke, the produce of the different seams worked by the Moss Hall Coal Company, at Ince, near Wigan. The coals from this part of England are of good quality, but are harder, and possess a more cubical fracture, than those from the South Wales coal fields; they likewise contain a larger proportion of ash, and give off considerable quantities of smoke when first lighted. The per-centage of hydrogen is, moreover, greater in these coals than in the Welsh varieties, and they are therefore used more frequently for the manufacture of gas. Cannel coal is a smooth, almost vitreous substance, with a conchoidal fracture, and brown, black color, and is chiefly employed for gas-making, for which its composition eminently adapts it. The cannel coal raised from the above mines is of good quality, and produces an extremely pure and highly illuminating gas. The composition of an average sample of cannel coal is as follows: Carbon, 80.21; hydrogen, 6.30; oxygen, sulphur, and nitrogen, 8.54; and ash, 4.95.

One ton of coal having the above composition will, on being carefully heated in proper retorts, yield 11,000 cubic feet of gas, capable of affording, during its combustion, an amount of light equal to that obtained from 1,150 best spermaceti candles. Coal of this description would be still more largely employed in our gas houses if the coke obtained from it were of good quality; but this is of such a crumbling nature, and possesses so little durability, as to be of no value except for the burning of lime, or similar purposes. The coals from the Derbyshire district are distinguished by a peculiar hackly structure, and a tendency to split into long prismatic fragments. They likewise contain a rather large per-centage of ash, and frequently iron pyrites and white shale. Among the specimens exhibited from this district are samples from the Butterly Iron Works near Alfreton, which very fairly represent the fossil fuel of the neighborhood, and of which the composition is, according to the official report, as follows: Butterly Company's Portland coal—carbon, 80.41; hydrogen, 4.65; nitrogen, 1.59; oxygen, 11.26; sulphur, 0.36; and ash, 1.23. This coal has a specific gravity of 1.301, and affords 60.90 per-cent. of friable coke.

The coals of Yorkshire have in general a more schistose appearance than those of the last-mentioned county, but they are nearly similar in point of composition and evaporative value. From the Staffordshire district some immense pieces were sent to the Exhibition. This variety affords, from the nature of its structure, great facilities for removal in large masses, as was seen from the block raised from the Denbigh Hall Colliery, near Tipton, and was found at the western entrance of the building.

In this department of the Exhibition were also found coals from the Scotch coal fields, and particularly from those in the neighborhood of Edinburg. Among these were samples from the Dalkeith Colliery, worked on the Midlothian coal seams. This coal is of the variety called "splint," and burns with a long flame and much smoke. It is also good for the purpose of gas-making, as may be inferred from the following analysis: Dalkeith coronation seam—carbon, 76.94; hydrogen, 5.20; nitrogen, trace of sulphur, 0.38; oxygen, 14.37; ash, 3.10.

Tin.—In Cornwall most of the valleys in the tin districts produce sands containing the peroxide of that metal, which is extracted by subjecting them to a stream of water, where the greater density of the ore causes it to remain, while the lighter substances are carried away. The great proportion of tin raised, however, is procured from the mines; and as the process adopted with the best success in the oldest mining region in Europe cannot fail to be of use in the United States, it needs no apology for giving a detailed account of it here.

In order to ascertain the existence and direction of the mineral veins, what is called "shoding," or "costeaning," is adopted. When the general direction of the lodes of a neighborhood has been determined from other mines, a series of pits are sunk at right angles to the assumed run of these lodes. These pits are about three feet in width, six feet in length, and extend in depth through the alluvial deposit a few feet into the underlying well. In order to avoid the chance of missing any lode, the pits are sunk at regular distances, and are united by galleries from one to the other. Where the direction of the lodes is *not* known, two series of pits are arranged at right angles to each other.

When a lode has been discovered, the first operation is to drive what is called an *adit* level. This is a gallery cut a little above the level of the nearest valley, in such a way as to intersect the lode at a certain distance from the surface, and draw off the water from the higher portions of the vein. Should the appearance of the lode then prove favorable, a shaft is sunk to intersect the mineral deposit, to serve as the means of descending into the mine, and of removing the ore. Other shafts are then sunk, as occasion requires, and other levels are driven. Galleries are also excavated in the substance of the ore itself, for the purpose of extracting its contents. In the Cornish mines these galleries are at 10 fathoms distance.

The tools employed in tin-mining vary according to the nature of the ground. If the well be moderately soft, nothing more than an ordinary pick and shovel are used; but if it be hard, and is either stratified or contains numerous fissures, recourse is had to steel gads, or wedges, by driving which into the crevices of the rocks the miner is enabled to split off large portions. Gunpowder is also often used.

Copper.—It was much to be regretted that the rich copper ore of the United States should not have been more fully represented at the Great Exhibition. There were, indeed, a few specimens, two of which, both for size and richness, were remarkable in comparison with all other samples of copper ore exhibited. But as an example of what our inexhaustible mines of copper are—as a fair exponent of what we are every year excavating from the earth, and what we are destined to excavate in years to come—these were, in fact, nothing.

The English collection of copper ores was very great. The owners and proprietors of the copper mines meant to convey a forcible idea of the source from whence the great mass of their commercial copper was obtained, and they succeeded. These specimens, however, consisted almost exclusively of what miners call yellow ore or copper pyrites. In this mineral, the copper is combined with iron and sulphur, which latter seldom reaches to less than 30 per cent. of the entire weight. In extracting copper from copper pyrites, it is customary to burn off the whole of this sulphur, and permit the resulting sulphurous acid to pass away with the products of combustion from the furnace. This is the plan at present adopted, both in our own country and in all others where the metal is produced from this kind of raw material.

To say nothing of the intolerable nuisance thus created, it seems to involve also a great loss. English chemists are asking why this sulphurous acid should not be devoted to some use; and the question is certainly equally applicable to the United States. Estimates have been made, by which it was shown that at the mines of Swansea alone not less than 1,000 tons per week were thrown away. This amount, if converted into sulphuric acid, (an extremely marketable commodity,) would yield 2,700 tons of that substance; worth at least £2,500 sterling. Hence, the sulphur, equivalent to £1,800,000 worth of oil of vitriol, is every year converted into "thin air," and lost, at one English mine, through want of knowledge or skill to devise a means of securing or arresting sulphurous acid. It is true that sulphurous acid cannot be condensed. It is equally true, however, that it can be easily and cheaply converted into sulphuric acid; which last, as is known to all chemists, readily admits of condensation by steam or water alone. The mode of working sulphuret of iron is everywhere known, and it affords an exact analogy for guidance in the case of sulphuret of copper. When a small quantity of nitric oxide is added to sulphurous acid, in contact with water and air, sulphuric acid is the result; for this, in fact, constitutes the ordinary mode of making oil of vitriol. Moreover, as in the manufacture of oxalic acid this nitric oxide is itself a waste product, it surely would be worth while to try the effect of mixing these two valuable gases in a horizontal flue, containing a thin stratum of water, or filled with pieces of pumice stone or coke, moistened with water. Suppose, for example, that the waste nitric oxide of an oxalic-acid maker were admitted into the sulphurous flue of copper works, is it not extremely probable that such an amount of condensation would ensue as to indemnify the trifling outlay of labor and expense consequent upon so simple a process? It may be urged, perhaps, that the sulphuric acid so obtained must always contain arsenic, and, therefore, prove inadmissible for some purposes; but is not this already the case with sulphuric acid made from sulphuret of iron, which invariably contains arsenic?

Various plans have been devised for decomposing the sulphurous acid of copper works, by heating it in contact with hydrogen, or carbonic oxide gas, so as to deoxidize or reduce the sulphur it contains. But these have been unsuccessful, and are rather theoretical or retrogade movements made in the study than the practical experiments of business men.

Cobalt.—The specimens of this metal from Great Britain were few. The richness, also, of those which were exhibited fell far below those which were to be found from the continent. Northern Germany exhibited many rich samples of that which has become to her free towns and States a great source of commerce. Norway also exhibited a good number of samples, arranging them side by side with the results of their fusion, zaffre and speiss. The following remarks upon this subject, from Newton's London Journal and Repertory of Arts, are so well expressed, and bear so directly upon what may become a branch of industry in the United States, that we venture to insert them entire:

"Mingled with the beautiful samples of copper pyrites and argentiferous galena displayed in class No. 1 of the Great Exhibition, there are to be found several specimens of cobalt and nickel ores. These valuable articles lie buried beneath the huge bulk of their better-known compeers, and, unless sought for, will fail to arrest the attention even of a scientific observer; thus singularly illustrating, in the Crystal Palace, the obscure position they occupy in the manufacturing industry of the nation. The art of working the ores of cobalt and nickel seems unknown in Great Britain, if we may judge by the fact that, though found in sufficient abundance, they are nowhere, in this country, converted into zaffre and speiss, the two primary marketable products elsewhere obtained from these ores. Although, therefore, no nation in the world consumes, in its manufactures, more cobalt and nickel than Great Britain, yet, for these metals, it is entirely dependent upon Norway, northern Germany, and the Netherlands, from whence we import annually not less than 400 tons of zaffre and smalts, and nearly the same quantity of nickel and speiss, to the conjoint value of about £150,000 sterling. As these substances serve very different purposes in the arts, we propose to speak of them separately, merely premising that cobalt forms the basis of all the blue colors seen on earthenware, whilst nickel is an indispensable ingredient in the various metallic alloys known under the terms albata, German silver, &c. The specimens of ore previously alluded to as existing in the Great Exhibition have been derived from Cornwall, and contain, as is generally the case, both nickel and cobalt, thus far being precisely similar to the ores worked in Norway and northern Germany. The foreign ores are, however, much richer than the Cornish, since these latter seldom contain more than from two to seven per cent. of available metallic matter, whilst the former not unfrequently yield 12 or 15 per cent.; consequently, a process which answers quite well with the one may fail altogether, or prove profitless, with the other; and this is exactly the whole secret of our national failure in working cobalt ore.

"The Swedish method has been tried in several parts of Cornwall, and has not, in any one instance, given a satisfactory result; hence the Crystal Palace contains no specimen of British zaffre; and our potteries, glass works, and paper manufactories procure from abroad that which ignorance and apathy deny them at home. In the German ore the quantity of metallic ingredients is not only larger than in the Cornish, but also of a more fusible character; consequently, when simply subjected to heat in a reverberatory furnace, the earthy and metallic elements separate of themselves by the mere disparity of their specific weights, and the silicious gangue, with a portion of oxide of iron, rises to the top, leaving a metallic compound of arsenic, cobalt, nickel, copper, and perhaps iron, beneath. This latter, when carefully roasted in an oxidizing furnace, in contact with sand or ground flint, affords at once an impure silicate of cobalt and arseniuret of nickel—two marketable products. The Cornish ores, from their metallic poverty, will not undergo the first fusion necessary to separate the silicious matrix of the mineral. And this trifling impediment seems actually to have benumbed the energy of that indomitable spirit of enterprise for which Britain is, in most things, justly celebrated. In the manufacture of iron, limestone is used to render the alumina and silica of the ore fusible; and, without this, no iron can be procured by the ordinary process. In roasting lead ore, lime cannot be dispensed with. In copper-making not only lime, but also fluor spar, is frequently needed; and the commonest cobalt ores of Cornwall clearly require nothing but a proper flux to afford a compound of arsenic, cobalt, and nickel, perfectly analogous to that procured from the German ore by mere fusion without a flux. The whole question, therefore, really resolves itself into the discovery of a cheap material, capable of easy vitrification with the granitic matrix of the Cornish ore, and which is nevertheless devoid of action upon the arseniurets of cobalt and nickel. The common fixed alkalies, though answering the first indication admirably, would not comply with the second condition; hence potash and soda—these great helpmates of industrial skill—are unfortunately excluded from the list of agents, as they act powerfully upon all the arseniurets, and would merely produce a worthless frit with the ore. Similar objections attach more or less to the alkaline earths, and therefore lime requires to be looked upon with suspicion. Borax would, and does yield a satisfactory result; but its high price is an insurmountable obstacle. Fluor spar is of no avail; and bottle glass requires too strong a temperature, and to be used in too great a quantity, for economical application to a mineral already surcharged with extraneous matters.

"These facts serve in some measure to explain, though we cannot allow that they in any way justify, the present condition of the zaffre market, since these very difficulties are daily overcome in one of the largest metallurgical operations carried on amongst us. Many of the ores of copper, when first received by the manufacturer, are in a state quite parallel to that of the Cornish ores of cobalt, even in regard to poverty of metal: there is the same excess of granitic matrix, the same necessity for avoiding the use of any agent capable of attacking sulphuret of copper—a substance possessing very similar chemical affinities to those of the arseniurets of nickel and cobalt. What, then, is the flux employed by the copper manufacturer in such cases? We reply at once, it is the protoxide of iron, which is formed from these poor copper ores by the action of heat, and combines with the silica of the matrix, so as to produce an extremely fusible silicate of iron, which permits the sulphuret of copper to fall down to the lower part of the reverberatory furnace, whilst the vitrified impurities of the ore are raked from its surface. Oxide of iron would most probably, therefore, enable a manufacturer accustomed to furnace operations to send into the market an arsenical compound of cobalt containing more than 50 per cent. of this metal, even if his interest failed to convince him of the great advantage resulting from its subsequent conversion into zaffre. Thus, then, the conditions of this seemingly difficult problem are answered, in a commercial sense; for oxide of iron is plentiful and cheap, its combination with silica is sufficiently fusible, and it has no action whatever upon metallic arseniurets. No doubt many other substances might be found equally applicable with the one we have mentioned; and, indeed, our object in thus dilating upon this and analogous topics, is rather to stimulate inquiry than lay down specific rules for practical guidance; consequently, our remarks must be regarded, at best, as but a shadowy outline, the manufacturing details of which require careful filling in to render the whole intelligible and useful.

"Before quitting the subject of cobalt, it may be as well to advert to a peculiar ore of that metal found near Keswick, in Cumberland. This

ore contains from two to three per cent. of cobalt, but is quite free from nickel, though this last metal not unfrequently exists without cobalt. As a coloring material, oxide of cobalt is seriously damaged by the presence of oxide of nickel; for these oxides produce colors almost complementary to each other, and therefore tending, by their admixture, to yield a neutral tint, as is observable when their saline solutions are united. The great advantage of working an ore of cobalt free from nickel must consequently be obvious to all. The Keswick mine is, nevertheless, almost abandoned at the present moment, through sheer inability to find a market for its produce; though for the finer kinds of porcelain, and for enamel painting, the oxide of cobalt procured from it is worth fully a guinea per pound.

"In the hope of drawing attention to a raw material at once so unique and valuable, we give the following original process for extracting pure oxide of cobalt from the Keswick cobalt ore: Having carefully roasted a quantity of this ore, at a full red heat, in a muffle furnace, for two or three hours, it is next to be reduced to a fine powder, and then digested in muriatic acid of the specific gravity 1.10, or thereabouts; and for this use the waste acid of the soda maker is well adapted, even though it may happen to contain arsenic and iron. After a few hours' digestion, the acidulous solution may be poured off and fresh acid added, so as completely to exhaust the roasted ore, and dissolve all the metallic matter in it; then mix the solutions thus procured; and, having thrown in a portion of powdered hematite, or other form of peroxide of iron, evaporate the whole to dryness; next pour boiling water on the dried mass, and stir in an excess of chalk, whiting, or finely-powdered marble, and preserve the whole at a temperature of about 180 degrees Fahrenheit, until all evolution of carbonic acid ceases; then add a quantity of sulphate of soda, and throw the mixture on a filter, when a solution of chloride of cobalt will pass through, containing a small quantity of the sulphates of lime and soda, but altogether free from metallic contamination. This solution must now be supersaturated with a caustic lye of soda, and the mixture boiled for a few minutes, in order to insure the rapid precipitation of the oxide of cobalt, which, after careful washing with hot water, is to be dried and heated red hot, in a crucible, to give it the character suitable for the English market. One pound of Keswick ore will require about eight ounces of muriatic acid, of the kind alluded to, with two ounces of hematite, three ounces of chalk, and the same quantity of salt cake or dry sulphate of soda. The explanation of this process is very simple: in the first instance, the metallic matters of the ore—consisting of iron, cobalt, arsenic, copper, and perhaps, also, lead—are dissolved by the muriatic acid; and, as all of these are precipitated by carbonate of lime, except cobalt, the chalk might now be added at once, but for the fact that the Keswick ore contains an excess of arsenic, which carries down a portion of cobalt in the state of arsenite of cobalt. To remedy this evil, peroxide of iron or hematite must be added, so as to insure the existence of an excess of peroxide of iron in the solution, as this, on the introduction of the chalk, will unite to the arsenic, and thus prevent the precipitation of any cobalt at this stage of the operation. The cessation of all effervescence indicates that the chalk has ceased to act, and that the iron, arsenic, copper, and lead are no longer in solution, but have been displaced by the lime of the chalk. To remove this lime, sulphate of soda is employed, since this throws down nearly the whole of the lime in the state of sulphate; after which caustic soda, or potash, will precipitate nothing from the filtered solution but pure oxide of cobalt. Although apparently somewhat complex in detail, this process is extremely simple and efficient in practice, and possesses, moreover, the advantage of being equally applicable to the treatment of speiss or arseniurets of nickel, from which pure oxide of nickel may easily be procured; using, however, much more hematite than the quantity indicated above, in consequence of the absence of iron in speiss. From this latter circumstance, it must be obvious that cobalt and nickel cannot be separated in the way just described; for, as has been stated, they both remain in solution after the employment of the chalk; and, indeed, no process has yet been published by which a perfect separation of these two metals can be effected. Ordinary Swedish zaffre contains, on an average, fifteen per cent. of oxide of cobalt, mixed with about three per cent. of oxide of nickel—which latter seriously impairs the coloring power of the zaffre. Hence it is that we have entered thus fully into this question; for, as it is almost impossible to purify cobalt when contaminated with nickel, it is a kind of national disgrace to Great Britain that, having a pure ore of cobalt in the very centre of the island, our manufacturers are unable either to compete with, or so much as contest for the palm of superiority in the formation of zaffre."

Iron Ores.—England is so justly celebrated for the manufacture of iron and steel, that it seems not inappropriate to the present report to dwell somewhat at large upon the character of her iron ores and the products of her furnaces, noticing at the same time such iron ores from other countries as seem peculiar or remarkable.

The mean richness of the ores of iron in the South Wales coal basin is estimated at 33 per cent. These are the richest ores of England, the average in the Staffordshire district being less than 30 per cent, and those in other districts rarely rising above 25 per cent. This, it will be perceived by all who are familiar with the ore beds in our country, falls far below us, some of our ore yielding as high as 70 per cent of pure iron. In England every ferruginous clay stone is considered an ore of iron when it contains more than 20 per cent of that metal, and the loss of weight experienced during the process of roasting varies from one-fourth to one-third of that of the original crude ore.

To effect the calcination of the mineral, it is piled up in long heaps over a strature formed of large lumps of coal. The fire is afterwards applied to the windward end of the pile, and after it has advanced a certain distance the pile is prolonged with the same material in the opposite direction. The ordinary height of such a heap is from six to seven feet, whilst its breadth at the bottom may be about fifteen or twenty feet. When the ore treated, as is not unfrequently the case, contains a large proportion of bituminous matter, it will, when once ignited, readily burn without the addition of any other material; but when it is not naturally combined with a sufficient amount of combustible ingredients, its place is supplied by the addition of a sparing mixture of small coal.

Instead of this method of effecting the calcination of the ore in open heaps, it is in many localities roasted in a sort of furnace or kiln, similar to that employed for burning lime. In this case, if bituminous, the addition of any other fuel to the mineral is unnecessary; but if not in itself

combustible, it is interstratified, at certain regular distances, with layers, either of coal or anthracite.

The preparation of metallic iron from its various ores depends on the reduction of its oxides by carbonic acid gas, when exposed to its action at a high temperature. With us, especially in the rich ore of the northern and eastern States, and where charcoal is readily procured, metallic iron, in its malleable form, is procured at one operation. In England, however, where charcoal is never cheap, and where the problem sought is to obtain the largest possible per-centage of metal from the ore treated, several distinct processes are resorted to, so similar, however, to those in use by the iron-masters of Pennsylvania that they need not be described.

Among the numerous models exhibited in the mining and mineral department, there was a beautiful representation in miniature of the furnaces and other apparatus employed in the Ebbw Vale Works, near Abergavenny, in South Wales. At this establishment, the gases evolved from the furnaces—and which, from the amount of hydrogen, carburetted hydrogen, and carbonic oxide gases which they contain, are highly inflammable, and capable of developing a considerable degree of heat by their combustion—are conducted by proper pipes and channels to the various places where heat is required, and, being then ignited with a due admixture of atmospheric air, they afford a part, by the use of which the amount of solid combustible employed is considerably diminished. The model exhibited not only afforded an illustration of the way in which these gases were applied to the generation of steam for the blowing engine, but also showed the details of the arrangement by which, at the Ebbw Vale Works, the same agent is made to supply the amount of caloric necessary to heat the blast forced into the apparatus to the temperature of about 400° Fahrenheit—which is that at which the air furnished to hot blast furnaces is commonly supplied.

The model further showed the blowing machine itself, and the engine by which it was set in motion, together with its various appurtenances—such as a large air vessel for regulating the blast, and the nozzles by which it was admitted into the hearth.

Mr. J. James, of Abergavenny, exhibited a model of his invention, the purpose of which is to facilitate the processes of drawing off of the waste gases, with a view to their subsequent employment for heating purposes. It had, however, never been tried, and great doubts were expressed in regard to its practical working utility.

To return to the main subject before us, it is well known that the principal sources of the iron of commerce are the oxides and carbonates of the metal; which, mixed with variable quantities of silicious and earthy matters, are abundantly met with all over Great Britain. The anhydrous peroxide of iron, or red hot hematite, which also frequently receives the name of specular iron-ore, is very abundant. It occurs both in crystalline and stratified rocks, as with us; but the purer varieties are always found in the older formations. There were some five specimens of the red hematite, crystallized, exhibited from the island of Elba, from mines worked by the Romans. Very beautiful crystals of it were shown from Stromboli, as also from Elba, Vesuvius, and Ætna, formed by sublimation from the fissures in those volcanic regions. Some of the raw ore was exhibited in the Saxonian department, ground fine for a pigment, and for the purposes of polishing As a source—perhaps the greatest source—of the metal, this ore is of importance. Some of the varieties—the specular, for example—have the disadvantage of being somewhat refractory in the furnace; but this inconvenience is entirely obviated by a judicious admixture of other ores. At Newcastle-upon-Tyne it is used to mix with poorer ores; at Ulverstone, the same; while, from the furnaces at Cleaton, there were specimens of iron made from the pure hematite of the specular variety.

Brown hematite, a peroxide, also, is found abundantly in Great Britain; it differs from the red hematite in containing a certain quantity of combined water, and possessing a darker color. This ore frequently occurs here in a friable state; and, when naturally mixed with a considerable quantity of earthy matter, it acquires a peculiar softness of texture, and is known by the name of yellow ochre.

Granular iron ore was exhibited in some fine amorphous masses from Cornwall, and from Sutton county, Ireland. It is not common, nor much employed as an ore, in Great Britain. In Normandy, however, (from which specimens were sent,) in Burgundy, Lorraine, and Berry, it yields an excellent iron when washed, for the purpose of separating the lighter impurities. In what is called the oolitic form, it supplies the greater number of the French iron works. It is said, however, that when the beds of oolitic iron are found to alternate with calcareous deposits, the metal produced is very brittle, (cold short,) and consequently unfit for many purposes. This peculiarity is attributed to the presence of phosphorous, derived from the organic bodies of which chalk is principally composed, and which has the property of rendering iron extremely brittle, even when present in very minute quantities.

The octahedral oxide, or magnetic iron ore, is not used in England, though one fine specimen of it was shown from the Roche Rock Mine, Cornwall. In Sweden, however, it is the common ore in use, and from it the most approved Swede iron is manufactured. It occurs in large quantities in our country, furnishing the basis of much of the best iron from our forges.

The iron ore most in use in England, and indeed throughout the three kingdoms, is spathose iron, or the carbonate of iron. It is found in rocks of very different ages, and is frequently observed to accompany other metallic ores—such as those of lead or copper. Carbonate of iron is, however, most common in gneiss, greywacke, and the coal formations. The extensive beds of Styria and Carinthia occur in gneiss—that of the Hartz is found in greywacke; whilst the English deposits, from which the greater portion of iron manufacture in that country is obtained, are almost exclusively confined to the coal formations.

This mineral is frequently extracted from the same pit by which the coal is raised to the surface; and it either occurs in reniform lenticular septaria, embedded in clay found in the vicinity of the veins, or forms distinct seams, alternating with those from which the coal itself is extracted. The facility thus afforded to the manufacturer by the presence, in the same locality, of the ores, and the fuel required for their extraction, is evidently one great cause of the number of iron works in Great Britain and the extremely low prices at which iron is exported. The principal deposits of this mineral in the United Kingdom are those of Dudley, the products of which are chiefly sent to Liverpool; those of the neighborhood of Glasgow, on the banks of the Great Northern Canal; and those of Wales, on the seacoast.

All coal formations in Great Britain, however, do not produce iron ores. The Newcastle district, which is perhaps the richest in the world in fossil fuel, yields so little iron that the furnaces which are worked in that neighborhood are principally supplied by ores brought by sea from a considerable distance. The French coal-fields do not yield, generally, a sufficient amount of carbonate of iron to render its extraction a matter of much profit, with the exception of the iron works of Decazenville, in the basin of Aveyron.

In relation to this ore is a fact worth the attention of our iron masters: that ore which contains a small proportion of manganese—say from eight to twelve per cent.—is found to produce the best iron for making steel, while the presence of a larger per-centage of manganese is regarded as unfavorable. That a small proportion of manganese tends to liquify the slag is undoubtedly true; but what further use it can form it is hard to say.

The bisulphuret of iron, or iron pyrites, although never treated metallurgically for the metal it contains, and consequently, properly speaking, not an iron ore, is, nevertheless, an important mineral on account of the sulphur which it yields. Its component parts are 45.74 of iron and 54.26 of sulphur. It occurs in cubical crystals in slate-rocks and coal-fields. It frequently also accompanies the ores of other metals. Some crystals from the Isle of Elba, extremely large and beautiful, and presenting pentagonal dodecahedrons of four inches in diameter, were exhibited. From the Cornish mines and from Sweden some gigantic octahedrons were exhibited.

Antimony.—The ores of this metal, so far as their products become an article of commerce, are obtained from Schemnitz and Kremnitz, in Lower Hungary, and from the island of Borneo. Antimony in the market is obtained from the native sulphuret of antimony, often associated with ores of copper, silver, lead, zinc, and manganese. To obtain it in its crude state, the ore is placed in crucibles, having a hole at the bottom, and these are inserted in other vessels; heat is applied to the crucibles from above, and the ore, which melts from its gangue, flows down, and is collected in the pot beneath, wherever it becomes solid. By this treatment the ore is not altered in composition, but merely purified from the infusible substances with which it is associated.

To obtain pure antimony, the ore is carefully washed in a reverberatory furnace until it has become oxidized, and then this product is fused with some reducing agent—such as crude tartar. Antimony is largely used, when alloyed with lead and a little tin, in the manufacture of printers' type, for which it is eminently adapted, both on account of its fusibility and hardness, and also from the circumstances of its expanding in the mould at the moment of cooling.

Among the illustrations of this metal were some specimens of regulus of antimony from the Bistroers Smelting Works, in Hungary; three varieties of crude antimony from the works at Maegdesprung, in Saxony; sulphuret of antimony from the mines of Saragossa; and specimens of Montanto and Pereta, in the province of Grosseto, Tuscany.

Silver.—The silver produced in England is chiefly obtained by the treatment of the ores of lead. The silver of South America is principally derived from the horn silver, brittle silver, vitreous silver, and arsennuretted ores, as also, to a certain extent, from the native ores. The ores of Mexico are of a similar character.

In Mexico, the mines are most abundant in the back of the Cordilleras, between 18° and 24° north latitude. In Peru, the principal mines are in the districts of Pasco, Chota, and Huantaga.

The celebrated Potosi mines, in Buenos Ayres, occur in a mountain of argillaceous shale, whose summit is covered with a bed of porphyry. The ore is red silver, vitreous ore, and native silver.

In Europe, the principal mines are those of Spain, Norway, Saxony, Austria, and Russia. The silver of Spain is chiefly obtained from galena, and principally in the Sierra Almagrera, in Grenada.

In the Tyrol, the sulphuret of silver, argentiferous, grey copper, and misnickel, occurs in a gangue of quartz in argillaceous schist.

The Hungarian mines at Schemnitz and Kremnitz are in syenite and hornblende porphyry, in a gangue of quartz, often associated with calc spar or sulphate of barytes.

The Russian mines of Kolyvan, in the Davuria mountains, Siberia, are steadily increasing in value, and annually produce about 47,800 pounds of pure silver.

The common methods of reducing silver ore in the large way are two—by smelting and by amalgamation. When argentiferous galena in the mineral is operated upon, it is treated in a reverberatory furnace as an ordinary lead ore. To separate the silver from the lead, it is fused in the same kind of furnace, of which the hearth is composed of bone ash. A current of air is also admitted through a tuyere on one side of the apparatus, which, passing constantly over the surface of the fused metal, oxidizes it and converts it into litharge, which escapes through a proper channel prepared for that purpose. At the end of a certain time the whole of the lead is thus removed, and the silver remains in a state of almost perfect purity. The completion of the process is known by the metal becoming brilliant, and, on cooling, throwing out arborescent sprouts, resembling the branches of some kinds of coral.

According to Pattinson's new method, (now very generally adopted,) the silver is separated by melting the lead in large iron pans, and, as it begins to cool, straining out the crystal with a perforated iron ladle. From the greater fusibility of the alloy of lead and silver, the portion left behind contains nearly all the latter metal. This process being repeated several times in the same portion of alloy, it ultimately becomes very rich; and, when it contains from 300 to 400 ounces of silver to a ton of lead, it is exposed to a bone ash test.

Very beautiful models of a refining furnace, and a set of crystallizing pots, were exhibited by the Duke of Buccleugh. In their immediate vicinity was seen a drawing, together with a series of products, including a large plate of silver, by which Mr. Pattinson illustrated his process of enriching lead by crystallization. When amalgamation by mercury is employed, the silver ore is brought to a state of chloride by a mixture of the powdered ore with about 10 per cent. of common salt; the chloride formed is reduced by means of sulphuret of iron, or by iron filings, and, at the same time, the liberated silver combines with the mercury which has been added to the mixture. The amalgam, separated from the muddy mass by a current of water, or washing, is then filtered from the

excess of mercury, and, as a last step, is subjected to a strong heat in a distilling furnace, by which the silver is left behind, whilst the mercury passes off in the form of vapor, to be condensed in a large receiver, partially filled with water.

There were many rich specimens of argentiferous galena and other silver ores exhibited. Among the most remarkable of these were a large mass of native silver from Chili, and some very beautiful specimens of the same substance from Prince's Location, Lake Superior.

Mercury.—This metal occurs in the native state, alloyed with silver, and in combination with sulphur, chlorine, or iodine. Native mercury is rarely found, yet it is met with in greater or less quantities in various mines of that metal.

Cinnabar, the native sulphuret of mercury, is a dullish mineral of a reddish-brown or brownish-black color, and, when scratched, affords a red streak: when pure, it consists of 86.29 parts of mercury, and 13.71 parts of sulphur. This mineral, from which the principal part of the mercury of commerce is obtained, mostly occurs in connexion with talcose and argillaceous shales, but has also been sparingly found in granite. The principal mines are at Idria, in Austria; Almaden, in Spain; in the Palatinate, on the Rhine; and at Huanca Velica, in Peru. Mercury also occurs in Mexico, Hungary, Sweden, France, and Tuscany. Chloride of mercury, which is a tough, sectile ore, of a grey or yellowish color, is an extremely rare mineral, and does not occur in sufficient quantity to be metallurgically treated for the quicksilver which it contains.

The mines of Idria were discovered in the year 1497. The ore is obtained at the depth of 750 feet from the surface, and is mostly a bituminous cinnabar, disseminated through the well along with native mercury. In some parts of the vein this is so abundant, that when earthy rock is newly broken, large metallic globules flow out, and fall to the bottom of the gallery. After the native mercury has been separated by filtration, through a sieve, the mineral and its adhering gangue is washed and prepared for reduction. For this purpose a large circular building, 40 feet in diameter and 60 feet in height, is employed, which communicates, through numerous small openings, with a range of chambers disposed on either side. The building in the centre of the arrangement is filled with earthern pans, containing the prepared earth, and the whole is afterwards closed up, and the heat is gradually applied. The mercury sublimes and is condensed by the cold air of the smaller chambers, whence it is subsequently removed and packed into iron bottles. The mineral produce of these mines amounts to about 150 tons per annum.

The mines of the Palatinate, on the Rhine, and those of other parts of Germany, are said to yield 7,600 quintals per annum. Those of Almaden, situated near the frontier of Estremadura, in Spain, have been worked from remote antiquity without sensibly diminishing the yield. According to Pliny, they were worked by the Greeks seven hundred years before our era.

The mines at Huanca Velica, in Peru, have afforded a large amount of mercury for amalgamation at the Peruvian silver mines. Between the years 1590 and 1800, they are estimated to have produced 537,000 tons. Their present annual yield amounts to about 1,800 quintals.

The Chinese are stated to have mines in Sheusia, where the ore is reduced by the rude process of burning brushwood in rocks or pits dug out for that purpose, and then collecting the metal after condensation.

Few ores of mercury occur in Great Britain. In the foreign part of the building were several illustrations of the metallurgy of this important mineral. The inspector of mines of the district of Almeria, besides contributing various other minerals, sent some fine specimens of cinnabar. From the imperial mines of Vienna there were specimens of mercury and cinnabar, as well as samples of the same products from the mines of Idria.

Platinum.—This metal is usually found combined with more or less of the rare metals—palladium, rhodium, iridium, and osmium, besides variable quantities of copper and iron. It commonly occurs in flattened grains, and in angular, irregular masses, and was first detected in alluvial deposits in South America, whence it derived its name of platina, a diminutive of the word *plata*—meaning silver. It was discovered by Ulloa, a Spanish traveller in America, in the year 1735, and was made known in Europe in 1748. It has since that time been found in the Urals, in Borneo, in the sands of the Rhine, in St. Domingo, and in our own country. The Ural districts afford the chief portion of the platinum of commerce. It occurs there, as elsewhere, in alluvial beds; but the course of the platiniferous alluvium has been traced for a considerable distance up the mountains, consisting of crystalline rock, the evident origin of the detritus. From one to three pounds of platinum are procured from two tons of sand.

The infusibility of platinum, and its resistance to the action of air and water, and of most other agents, natural or chemical, render it of great value in the construction of chemical and philosophical apparatus. The large vessels employed in the manufacture of sulphuric acid are now made of platinum, which is entirely unaffected by this corrosive substance. It is also employed for crucibles and capsules, used in chemical analysis, for galvanic batteries, and it is worked into foil, drawn into wire, or fashioned into cups, which hold bodies heated in the blow pipe. It alloys readily with silver, lead, and several of the other metals, and it is also attacked by caustic potash and phosphoric acid, in contact with carbon; consequently, care must be taken, when treating it, that it be not exposed to the action of any of these substances. For many years after its discovery, platinum was, on account of the difficulty of obtaining it in masses, an almost useless metal. When strongly treated, the grains are readily welded together; but, from the smallness of the fragments, this causes interminable labor, and besides does not afford a pure metal. The process now generally adopted was first introduced by Dr. Wollaston, and consists in dissolving the native metal in hydrochloric acid, and then throwing down from the solution all orange-colored precipitate by means of muriate of ammonia. This precipitate, which is a double chloride of platinum and ammonia, is then heated and reduced to the metallic state, the platinum being then in an extreme minute state of division. This black powder, which is spongy platinum, is next compressed in steel moulds by the aid of heat and strong pressure, and when sufficiently compact, is forged under a hammer, by which it is ultimately reduced to a solid mass.

Among the illustrations of this metal were some admirably finished dishes and crucibles, exhibited by W. P. Johnson, of Hatton Garden, London; crude and manufactured platinum, by Wolf & Erbslok, Bremen; and a large platinum still, with sundry other articles from the same metal, in the French department.

Malachite.—This ore, called the green carbonate of copper, is remarkable for its fine emerald green color, of which the same specimen often exhibits a great variety of shades. It is sometimes found in a crystallized form, but more often occurs in radiated concretions and manipulated uniform masses, made up of several successive layers, of which the extent and thickness are readily apparent.

Malachite occurs in large quantities in the Ural mountains, and in the mines of Australia; in Cornwall, at Chessy, and at other places; and from its high per-centage of metal it is highly prized as an ore of copper, although such varieties as are sufficiently compact are more valuable for the purpose of being polished for ornament—such as snuff-boxes, broaches, or larger objects.

Russia exhibited in her department of the Exhibition the most wonderful works in malachite that have ever been known. The vases, fire-places, tables, side-boards, and stands made from this article, brought to its highest polish, attracted universal admiration. The ore, in the manufacture, is first sawed into slabs of three-quarters of an inch in thickness, which are ground and polished. These slabs, seldom of a size exceeding three inches in diameter, are then assorted with reference to similarity of color and the running direction of their veins. This done, the workmen then take the model to be veneered, and, arranging the pieces of ore to as near a match as possible, proceed to connect them to each other, and to the frame work which they are to cover. The chief skill of the work consists in an accurate adjustment of one piece with another, so that vein shall meet vein, and color color, in so perfect a manner, that the whole, when completed, may appear as one stone. In the doors of malachite, which were the largest and most costly productions of that material ever manufactured, the adjustment of the different pieces of metal had been accomplished in a manner so perfect that it was difficult to detect the lines of junction. Including bases and capitals, the whole height of these doors was twenty-three feet; their whole width, including mouldings, sixteen and a half feet. They had been first framed of solid oak, and then covered with a coating of brass. The malachite veneering was then cemented upon them, the mouldings being made of the solid ore. After the whole work had been completed, the process of polishing was commenced, and it is, perhaps, the best evidence of the inutility of the metal to any purposes but those of the highest luxury, that the workmen were engaged for three months in perfecting this finishing process. The cost of these doors was stated to have been £8,000 sterling.

Iron Products.

Perhaps the strongest impression made upon the mind of the intelligent observer, in his daily walks among the different nations represented in the Exhibition, was that derived from contrast. No better opportunity was ever afforded to learn how much of the improvement in the arts among mankind has arisen from a knowledge of the physical and chemical character of the materials employed in workmanship than was found here. The department of Sheffield, for example, where the highest perfection to which iron, as nature yields it, has been brought, was but a minute's walk from that of Tunis, in which gold, precious stones, and elaborate carving were lavished upon utensils of the rudest construction. In the one case, inductive science had been long employed to give purity to the material used before it entered the workshops of the artificer; in the other, the vain struggling of rude minds to obtain a conquest over nature, was shown in the unchanged forms of the first combinations of the metal. The keen blade of the penknife or the razor, when compared with the Tunisian sabre, but little in advance (in material used) over the rude arrow-head of the North American Indian, furnished a striking example of what intellectual progress has accomplished for human industry.

With iron, as a metal, every one is familiar. As it is the most useful, so it is, of all the metals, that with which mankind are best acquainted. And yet, even while it is more extensively employed for the supply of human wants than all the other metallic productions of the earth, and while it has been made the subject of scientific investigation from the earliest ages, we are still ignorant of some of its most remarkable properties. Iron, hammered into shape from the pig metal under the intense heat of the forge, becomes fibrous, tough, and susceptible of being bent into almost any shape without breaking or cracking; and yet this same iron, placed as shafting in the cotton or woollen mill, where, in its constant revolution, it shall be subjected to continual jar, or made into the axletree of a railway carriage, and used upon the road, becomes so crystalline and short that it is easily broken, like stove castings, under the blow of the hammer. How many causes, besides vibration, go to produce this change in the structural arrangement of the particles of iron we do not know. The process of cooling iron of the highest quality, undoubtedly has great effect upon its condition, and sometimes renders it valueless as wrought iron. The continued hammering upon the anvil will produce also similar results.

The processes of converting pig into bar iron adopted in England, although bearing much resemblance to those in our own country, have still some points of difference, which cannot be without their importance. The machines adopted for forging and condensing wrought iron vary in form and in principle according to the ideas of the iron-master. The tilt hammer is most commonly employed. The steam-hammer is, however, increasing in use. The blooms are brought under the hammer at a red heat, and beaten out into bars, at the rate of from 70 to 140 blows per minute, the force of the blow being according to the space described by the hammer. The old notion, that rollers would produce as good iron as the hammer, is now generally exploded. The extraneous portions of the metal are driven off by repeated blows; while under the rollers, they are mainly incorporated with the metal.

Railroad bars, of which great numbers were exhibited, may perhaps be regarded as a fair sample of the good bar-iron of England. Coarse, porous iron, of which more than three-quarters of the products of the English forges consist, does not make good bars; and hence the necessity of constant selection from the mass produced. Many bars were exhibited broken, for the purpose of showing their molecular structure, and to impress the importance of a tough and fibrous material.

The subject of mixing various qualities of iron together, and of mixing other metals with iron, has received of late much consideration. A process has recently been patented in Great Britain by which cast iron and wrought iron are associated, producing, it is said, a tougher metal. A rail (broken to show the structure of the bar) of this mixed iron exhibits the fibrous or toughened tops, in cohesion with a crystalline centre. Mr. Morris Sterling, the patentee, exhibits also other metallic alloys, to show the changes which the molecular composition is capable of undergoing. Mr. Sterling considers the fluidity of Berlin iron to be due to arsenic; that phosphorus will produce the same result when mixed with any iron; that the presence of manganese with cast iron closes the grain, and is an improvement both to it and to steel; and that zinc and tin, mixed with iron, are capable of greatly changing and improving its qualities. By the addition of calamine to common iron, a very superior malleable iron is produced. On the character of these, and other alloys, Mr. Sterling writes as follows, viz:

"The wrought iron, made either from the toughened cast or by the admixture of calamine, is particularly useful for tension rods, chain cables, &c. The addition of antimony, and some other metals, to wrought iron in the puddling furnace, gives a hard and crystalline iron, nearly allied to steel in some of its properties, and is adapted, from its hardness and crystalline character, to form the upper part of railway rails, and the outer surface of wheels. When thus united to the iron containing zinc, the best sort of rail results, combining strength, stiffness, and hardness, with anti-laminating properties, and being also cheaper than any other kind of hardened rail or tire.

Compounds of copper, iron, and zinc are found to be much closer in texture, and stronger, than similar compounds of copper and zinc, (the proportion of iron not usually exceeding one and a half per cent.,) and can be advantageously used as substitutes for gun-metal, under all circumstances—for great guns, screws, propellers, mill brasses, and railway bearings. Small additions of tin, and other metals, alter the character of these compounds, and render them extremely manageable as regards hardness and stiffness. The advantages which these compounds possess over gun-metal are cheapness and increased strength, being about one-fourth cheaper, and one-half stronger, and wearing much longer under friction. On many railways the alloys of zinc, copper, tin, &c., have superseded gun-metal for carriage bearings. An alloy equal in tone to bell metal—cheaper, and at the same time stronger—is made from the alloy of copper, zinc, and iron, a certain proportion of tin being added. The addition of iron seems, under most, if not all circumstances, to alter the texture of metallic alloys, rendering it closer, and the alloys, therefore, more susceptible of a high polish, and less liable to corrosion. Other alloys of iron were exhibited—some showing the extreme closeness of texture; others possessing very great hardness, and suitable for tools, cutting instruments, &c.; others possessing a high degree of sonorousness.

The firmness of grain, and compactness of structure, which characterize various samples of iron contained in the Swedish, Spanish, and Austrian department, very strongly resemble the copake iron, made by the Messrs. Pomeroy, of Pittsfield, Massachusetts, which is used by the United States government at the armories. Both, or all these, owe their evenness of texture not to accident or design; for it is the invariable attribute of charcoal iron. It is wanting, however, in all iron made by coke or coal, which just as invariably possesses a rough, hackley grain, and a crystalline structure. In regard to British iron, it has been suggested that this arises from a minute quantity of impurity in the ore. That there is some truth in this cannot be doubted, since no process can ever render iron which is made from certain ores of a superior class. Yet too much weight must not be given to this as the cause of difference in iron, since chemical analysis barely permits, but does not strengthen, the suggestion. Are we not, then, justified in looking for other explanations, especially when the wondrous changes induced by an altered molecular arrangement of particles are duly considered? Some time ago, a patent was secured in England by a Mr. Heath, for the introduction of a small portion of carburet of manganese into the melting pot with cast-steel; and the result of this is, that steel so melted in contact with manganese will weld either to itself or common iron. Yet the most careful chemical investigations have failed to prove the existence of manganese in steel melted after Mr. Heath's method. Again, pure copper from the refinery is highly crystalline, and incapable of being rolled or hammered into plates, unless it has undergone the mysterious process called "polling;" after which, its crystalline character vanishes, and it may be beaten into thin plates or leaves. Now, in all probability, the conditions which lead to the crystallization of copper also tend to produce those of iron; and hence, instead of sitting with folded hands, under a belief that the brittleness of coal-made iron is irremediable, practical men, in Pennsylvania and other coal-iron producing States, should be on the alert to discover a mode which, like the polling of copper, may answer the end, though incapable of scientific explanation. It is said that splendid fibrous iron is occasionally produced in the forges of England as a work of accident; but in nature there is no such thing as chance. Few inventions of modern date would so largely repay a discoverer as this; and there is no doubt that the cure for coal-made iron, when found, will prove an extremely simple and easy affair.

Another subject, closely allied to this, deserves notice, to which we have briefly alluded before: Does the substance of iron which has been for a long time exposed to percussions and vibrations undergo any change in the arrangement of its particles, by which it becomes weakened? A great difference of opinion exists among practical men with respect to this question. Many curious facts have been elicited, which show that pieces of wrought iron that have been exposed to vibration—such as the axles of railway carriages, the chains of cranes, &c., employed in raising heavy weights—frequently break after long use, and exhibit a peculiar crystalline fracture, and loss of tenacity, which is considered by some engineers to be the result of a gradual change, produced in the internal structure of the metal by the vibrations. In confirmation of this, various facts have been adduced—as, for instance, if a good piece of fibrous iron have the thread of a screw cut upon one end of it by the usual process of tapping, which is always accompanied by much vibratory action, and if the bar be then broken across, it will be found that the tapped part is a good deal more crystalline than the other portion of the bar. Others contend that this peculiar structure is the result of an original fault in the process of manufacture, and deny this effect of vibration altogether; whilst some allege that the crystalline structure can be imparted to fibrous iron in various ways—as by repeatedly heating a bar, red hot, and plunging it into cold water, or by continually hammering it, when cold, for half an hour or more.

Mr. Brunell, however, thinks the various appearances of the fracture depend much upon the mode in which the iron is broken. The same piece of iron may be made to exhibit a fibrous fracture when broken by a slow, heavy blow, and a crystalline fracture when broken by a sharp, short blow. Temperature alone has also a decided effect upon the fracture: iron broken in a cold state shows a more crystalline fracture than the same iron warmed a little.

The commissioners appointed to inquire into the application of iron to railway structures examined this question experimentally, in a variety of ways. A bar of cast iron, eight inches square, was placed on supports, about fourteen feet asunder. A heavy ball was suspended by a wire eighteen feet long from the roof, so as to touch the centre of the side of the bar. By drawing this ball out of the vertical position at right angles to the length of the bar, in the manner of a pendulum, to any required distance, and suddenly releasing it, it could be made to strike a horizontal blow upon the bar; the magnitude of which could be regulated at pleasure, either by varying the size of the ball or the distance from which it was released.

Various bars (some of smaller size than the above) were subjected to successions of blows, numbering, in most cases, as many as 4,100; the magnitude of the blow, in each set of experiments, being made greater or smaller, as occasion required. The general result obtained was, that when the blow was powerful enough to bend the bars through one-half of their ultimate deflection, (that is to say, the deflection which corresponds to their fracture by dead pressure,) no bar was able to stand 4,000 of such blows in succession; but all the bars (when sound) resisted the effects of 4,000 blows, each bending them through one third of their ultimate deflection.

Other cast-iron bars, of similar dimensions, were subjected to the action of a revolving cane, driven by a steam engine. By this they were quietly depressed in the centre, and allowed to restore themselves; the process being continued to the extent of a hundred thousand successive periodic depressions for each bar, and at a rate of about four per minute. Another contrivance was tried, by which the whole bar was also, during the depression, thrown into a violent tremor.

The results of these experiments were, that when the depression was equal to one third of the ultimate deflection, the bars were not weakened. This was ascertained by breaking them in the usual manner by stationary loads in the centre. When, however, the depressions produced by the machine were made equal to one-half of the ultimate deflection, the bars were actually broken by less than nine hundred depressions. The result corresponds with and confirms the former.

By other machinery a weight, equal to one-half of the breaking weight, was slowly and continually dragged backwards and forwards from one end to the other of a bar of similar dimensions to the above. A sound bar was not apparently weakened by ninety six thousand transits of the weight.

It may, on the whole, therefore, be said that, as far as the effects of reiterated flexure are concerned, cast-iron beams should be so proportioned as scarcely to suffer a deflection.

In wrought-iron bars no very perceptible effect was produced by 10,100 successive deflections by means of a revolving cane; each deflection being due to half the weight which, when applied statically, produced a large permanent flexure.

Precious Stones.—Among the minerals employed for personal decoration the diamond occupies the first position, both on account of the beauty of the gem itself and from its commercial value. The diamond, like charcoal, is composed of carbon, and, in a chemical point of view, differs from it only in being perfectly free from all traces of the earthy and other impurities with which the other substance, even when most carefully prepared, is to a considerable extent contaminated. This mineral, although principally used in ornamental jewelry, is likewise applicable to many other purposes. In consequence of its extreme hardness, it is now extensively employed for making the pivot holes of the better description of watches; it has also been used in the formation of holes through which very fine metallic wires are made to pass, besides furnishing the only convenient tool which can be employed for cutting glass.

The countries in which this gem has yet been discovered are far from numerous, the only localities in which it has been found being the Indian peninsula, Brazil, the Island of Borneo, and Siberia, on the western side of the Ural mountains. Its geological position appears to be among diluvial gravel and conglomerate rocks, or pudding stone, consisting chiefly of rolled flint pebbles and ferruginous sand.

India has, from the most remote ages, been celebrated for the beauty and magnitude of its diamonds, the largest and most valuable of which are obtained from the mines in the provinces of Golconda and Visapoor. The tract of country producing these gems extends from Cape Comorin to Bengal, and lies at the foot of a chain of mountains called the Orixa, which appear to belong to the Trap Rock formation. The diamonds obtained from even the richest localities are rarely procured by directly searching the strata in which they are found, since they are commonly so coated with an earthy crust on the outside as not to be readily distinguishable from the various other substances with which they are associated. For this reason the stony matter is first broken into fragments, and then washed in basins, for the purpose of separating the loose earth; after which the residual gravel is spread out on a level piece of ground, where it is allowed to dry, and where the diamonds are recognised by their sparkling in the sun—thus enabling the miners readily to discriminate between them and the stony matter with which they are associated.

The chief diamond mines of Brazil were discovered in the year 1728. The ground in which they are embedded exactly resembles that of the diamond districts of India, and, besides containing fragments of colored quartz and ferruginous sand, it produces small quantities of gold in connexion with oligist iron ore. This conglomerate or pudding stone, which is seldom of any great thickness, occurs at considerable heights in the mountainous table lands, and is entirely different from all the other mineral productions which are to be found in the vicinity.

The principal mine of this part of the world is that of Mandagra, north of the Rio Janeiro, where the gems are obtained from the sand taken from the bed of the stream, after laying it nearly dry by drawing off the water, during the dry seasons, into large reservoirs prepared for that purpose. The "cascalho," or diamond gravel, which is then removed, is then afterwards formed into little heaps, or mounds, of 15 or

16 tons each, where it remains until the commencement of the rainy season, when it is carefully washed in large square boxes arranged under large oblong wooden sheds. A negro washer works at each of these boxes, and numerous inspectors are placed at regular distances among the workmen to prevent any abstraction of the diamonds by those who may chance to find them. When a negro finds a diamond he immediately shows it to the inspector, and if its weight amounts to 17½ carats, or 70 grains, he receives his liberty.

The diamond is found crystallized in the octahedron form, or in some other immediately derived from it. Its specific gravity varies from 3.4 to 3.6. It is not acted upon by any solvent; but when strongly heated in air, or in oxygen gas, is consumed with the formation of carbonic acid.

The fracture of this mineral is foliated, its laminæ being parallel to the faces of the regular octahedron. When broken, it divides in the direction of these lines; and this property of the gem is extensively taken advantage of by the lapidary when reducing it to the forms best adapted to ornamental purposes.

Diamonds are usually colorless and transparent, but, when colored, are usually of a yellowish tint. Green diamonds are, next to yellow, the most common. Blue specimens are also occasionally found, and, although they seldom possess much lustre, are in many countries highly valued.

Of all the colored varieties the rose or pink diamond are, however, by far the most esteemed, and sometimes even exceed in value those which are perfectly colorless, although, in general, the most limpid gems will be found to bear the highest price.

The art of cutting and polishing the diamond, although probably known in Asia in remote antiquity, was first introduced into Europe by Louis Bergher, of Bruges, in the year 1456. The object is effected in two different ways, either by taking advantage of the natural laminæ of the gem, and splitting it in directions parallel to the faces of the octahedron, or by sawing it with a very delicate wire covered with diamond powder. By these processes, and more especially by the former, the diamond is so cut away that the weight of the finished gem is rarely more than one-half that of the rough stone from which it is cut; and consequently the weight of the brilliant cut diamond is considered equal in value to that of a similar rough one of twice its weight, exclusive of the cost of labor expended in the workmanship. The weight and value of diamonds are estimated in carats, of which 150 are equal to one ounce troy, or 480 grains.

The difference between the exchangeable value of two diamonds of equal merit is generally estimated in the squares of their weights, so that the value of three diamonds, weighing, respectively, one, two, and three carats, will be as one, four, and nine.

The average price of rough diamonds is estimated at £2 per carat; and consequently, when cut, the cost of the first carat, exclusive of workmanship, will be £8, which is the price of an uncut diamond of two carats.

The rapidly increasing value of diamonds in proportion to their weight in carats will be readily seen by a glance at the following tabular statements:

A wrought diamond	of	3	carats is worth	- - - -	£72
Do	do	4	do	- - - - -	126
Do	do	5	do	- - - - -	200
Do	do	10	do	- - - - -	800
Do	do	20	do	- - - - -	3,200
Do	do	30	do	- - - - -	7,200
Do	do	40	do	- - - - -	12,800
Do	do	50	do	- - - - -	20,000
Do	do	60	do	- - - - -	28,000
Do	do	100	do	- - - - -	80,000

Beyond this weight such a method of calculation is not, however, applicable, in consequence of the difficulty of finding purchasers for the more valuable gems.

Of the numerous diamonds exhibited, by far the largest and most valuable is the Koh-i noor, formerly the property of Runjeet Singh. This jewel, which is the property of her Majesty, is one of the largest in the world, and is valued at £2,000,000 sterling. Besides this magnificent diamond the Exhibition contains a vast collection of jewels of inferior weight and value, among which may be mentioned a unique blue diamond weighing 177 grains, the property of Mr. Hope.

Of the other large diamonds in the world, the following are the most remarkable: That mentioned by Tavernier as belonging to the Emperor of Mogul, a now extinct kingdom, weighing, in the rough state, 900 carats. It was found in the Golconda mine in the year 1550, and is the size of a hen's egg divided through the middle in the direction of its smallest diameter. Among the crown jewels of Russia is a diamond weighing 195 carats. It is the size of a pigeon's egg, and was formerly the eye of the idol Sheringham. Thence it was stolen by a French soldier who deserted in the Malabar service, and who found the means of purloining the gem. He escaped with it to Madras, where he disposed of it for £2,100 to a captain of a ship, who afterwards sold it to a Jew for six times that amount. The Jew subsequently disposed of it to a Greek merchant, who afterwards sold it to the Empress Catharine for £90,000 in ready money and an annuity of £4,000. The most perfect and beautiful diamond hitherto found is probably that brought from India by an English gentleman of the name of Pitt, who sold it to the Duke of Orleans, by whom it was placed among the crown jewels of France. This jewel weighs rather more than 136 carats, and was sold for the sum of £100,000.

A model of a portion of the Nizam diamond—the remainder being unfortunately chipped off—is shown in the Indian department. The manner in which this diamond was found, about 20 years since, in the Nizam's territories, is rather interesting. It was first seen in the hands of a native child, who was playing with it in ignorance of its value. The sum of eight "annas" being offered for it, excited the suspicion of the parents of the child, and led ultimately to the discovery that the bright stone was a real diamond. The diamond, after passing through many hands, was purchased by a native banker for 70,000 rupees, and it is now in the possession of his highness the Nizam. The stone is of an irregular, oval shape. Its length is 2.48, its greatest breadth 1.85, and its average thickness 0.92 inch. The actual weight of the Nizam

diamond is 1,108 grains, being equal to 277 carats of weight for the rough diamond; and as the rough stones are usually taken to give but one-half their weight when cut and polished, we should have 108¾ carats; or a weight between the Pitt or Regent diamond (186¾ carats) and that of the Grand Duke of Tuscany, (139 carats,) and the weight of the Nizam diamond. Had the diamond remained entire, its weight, when cut and polished, would have been 155¾ carats, which would have placed it between the Tuscan and the great Russian diamond of 195 carats.

From the circumstances of the Nizam diamond not being polished, it is not known whether it is likely to prove one of the first water; but there is every probability that it is so, as the natives of India are too good judges of diamonds to mistake a topaz for one. And an additional proof of its value may be learned from the fact that a native gave, for the broken fragment, a sum not less than 75,000 rupees.

The diamonds coming from Brazil are usually smaller than those procured from India. But the mines of the former country annually furnish from 10 pounds to 13 pounds weight of this precious mineral, of which from 800 to 900 carats only are fit for jewelry; the remainder, under the name of "port," being used for other purposes—such as the cutting of glass and the grinding or polishing of precious stones.

Among the other minerals much prized by the jeweller may be mentioned the sapphire, which, when perfectly transparent, and of a good color, is as highly esteemed as the diamond. This gem is almost entirely composed of alumina, the various colors of different individual specimens being occasioned by extremely minute admixtures of the metallic oxides. Those having a blue color are known as oriental sapphires, whilst others not having the same oxides in combination are differently colored, and consequently receive various distinct names When red, they are called oriental rubies; when yellow, oriental topazes; when violet, oriental amethysts; and when they are hair brown, adamantine spar.

The finest blue specimens of this gem have been procured from Ceylon. The most esteemed red varieties come from the Capellan mountains, in the kingdom of Ava; and smaller stones of the same kind are occasionally met with in Saxony, Bohemia, and Auvergne. Amethysts are principally brought from the Carnatic or the Malabar coast, and elsewhere in the East Indies. The adamantine spar is chiefly obtained from the Malabar coast, but is less used than the other varieties for ornamental purposes. Of these several kinds the red is by far the most valuable—a ruby of 3½ carats, and perfect in form and color, having been valued at the same price as brilliants having an equal weight.

The emerald is a precious stone, of a beautifully green color, valued next to the diamond, and in the same rank as the oriental ruby and sapphire. It occurs crystallized in regular six-sided prisms, and has a specific gravity of 2.70. In composition this gem may be considered as a double silicate of alumina and glucina, mixed with variable small portions of iron and a little lime. The most beautiful emeralds are obtained from Peru, where they occur as a kind of grey schist, mixed with greater or less quantities of carbonate of lime. A good stone of this kind, weighing four grains, is valued at from £4 to £5; and one of 24 grains realized, at the sale of M. De Dree's cabinet, 2,400f., or nearly £100.

The garnet is a vitreous mineral, belonging to the cubic system, and of which the predominating form is the rhomboidal dodechaedron. Its constituents are silica, alumina, lime, and protoxide of iron. It is usually found discriminated in the primitive formations, and frequently occurs in gneiss and clay slate. Garnets are abundantly met with in many parts of Europe, particularly in Germany; but those of Peru are the most esteemed.

The crysolite, called the "peridot" by Haug and the French mineralogists, is, probably, the topaz of the ancients. It is the softest of the precious stones, being scratched by a file or a fragment of quartz. Quartz, in a crystalline form, is also frequently cut for ornamental purposes; and when limpid and entirely free from flaws, is a very beautiful stone. When existing in the form of calcedony, and variously colored by metallic oxides, the substance receives the name of cats-eye, plasma, chryscopase, onyx, sardonyx, &c. It has a vitreous lustre, a conchoidal fracture, and a specific gravity of 2.69.

Opal, or uncleavable quartz, has a conchoidal fracture, with a resinous or vitreous lustre, accompanied by a strong play of colors. It occurs in kidney-shaped or stalactitic concretions, and has a specific gravity of 2.091. Hungary was long the only locality of precious opal, where it occurs in connexion with common opal, in a sort of phephyritis formation. Lately, however, some very fine specimens of this substance have been discovered in the Faroe islands; and most beautiful ones, sometimes quite transparent, are obtained near Gracias a Dios, in the province of Honduras, in America.

Electro-Metallurgy.

It is scarcely eleven years since electricity began to be applied successfully to the arts. About the year 1840, electro medals, brittle and friable, but still successful repetitions of the originals, began to pass into circulation. Since that period, the laws regulating the deposition of the metal have been determined, the most appropriate solution for every metal has been learned, and the operation of electrotyping has been dignified into an art. In all electro-decompositions the metal is deposited atom by atom, so that however minute the object is, however fine the workmanship, the difficulty of its application is in no way enhanced. Everything is faithfully copied, and our countryman, Professor Silliman, has actually been enabled to multiply the iridiscent colors which gives its unequalled beauty to mother-of-pearl. In fact, there seems to be no bounds to the power of delicately representing objects by this wonderful process. Bunches of grapes, leaves of the fern, the tiniest spires shooting from a blade of grass, the stamens and pistils of flowers, wings of insects, down of feathers, and even the eyes of the common house-fly, are produced in model without difficulty, and in exquisite perfection.

The mode in which these results are obtained is generally that which is called the battery process; troughs and batteries of such as were employed in the usual *modus operandi* being exhibited at various stands in the Exhibition. In this trough gold and silver have latterly been reduced by the motion of the electric force. During this reduction of metals, various processes are simultaneously conducted. At the negative pole, when the metal is being deposited, the same amount of metal is produced from the solution. But at the same time that the metal is being reduced from the fluid, a similar amount of metal is dissolving at

the positive pole, and thus the precipitating trough is a manufactory for the generation of the metallic salt, and a decomposing apparatus for the reduction of the metal. With regard to gold and silver, which are generally precipitated from cyanides, more metal is apt to be reduced than that which is dissolved; and hence experimenters have thought that electricity has made gold.

In the rear of the Exhibition was placed one most interesting example of electro-metallurgic deposition. It was a complete model of the Britannia bridge, which has rendered the Menai straits so great an object of attraction. Every part of the model was made to scale, every rivet was represented, every smallest portion of iron, steel, casting, or wrought work, was depicted; and the tubes, exact in their reduced proportions, were placed as they were on the day when science achieved their successful fixture over the deep abyss.

The English ordnance department at Southampton exhibited some capital samples of electrotyped plates. After the plates are engraved, the next process is to form a matrix, which is kept for the purpose of producing as many other duplicate plates as may be required. The plan thus carried out is as follows: The battery trough is an immense tank, sufficient to hold enough fluid to charge the batteries for twelve months. The zinc plate is arranged in the middle, and plates of the best Sheffield plated copper are used for the negative pole. The back and cupreous edge are thoroughly coated with varnish, and the silver surface is covered with finely divided platinum. This form of battery answers well in the hands of the highly disciplined and effective corps of sappers and miners, but most other manufacturers find that a platinum silver plate, although much dearer, is still preferable to the platinized plated copper. The precipitating trough is placed upon a truck. The positive pole consists of a thick plate of copper, which is arranged at the bottom of the trough. The plate to be copied is placed at the top of the vessel, to prevent particles of dirt from falling upon it, and the proper diffusion of the newly-made metallic salts is obtained by a mechanical arrangement which agitates the whole vessel. The plates exhibited were seven in number—the first three being an original, duplicate, and matrix, to illustrate the manner in which corrections, surveys, new lines of railroad, or new buildings, were inserted without injury or alteration to the original. An impression on paper accompanies the original, showing its state before the matrix was taken.

In the department of the Austrian Imperial Printing Office was an electro deposit thirty feet long, to demonstrate the extent to which these deposits may be made. This was, a short time since, described in the *Philosophical Magazine*, and was afterwards carried out in England. In another department of Austria an invention was shown called chemitypy, said to have been discovered by Püll, of Copenhagen. A zinc plate is taken and covered with etching ground; it is then etched, and the surface covered with an easy fusible metal. The plate is then scraped, so as to leave the metal in the hollow parts produced by the etching. The surface is then again etched to revise the part of the zinc plate for the elevation of the design; it is then, like a wood cut, fit for printing.

In the Denmark department was an example of electro-stylography. A cast is made in a black compound, which is silvered over. This is drawn upon by cutting through the silver. An electro *reverse* is then made, and an electro-plate from this reverse, which is ready for printing. This is called electro-stylography.

It is a singular fact that the first idea of electro gilding was given by Brugnatelli nearly fifty years ago; and he states in a letter to Van Mons, which was published at the same time in most of the countries of Europe, that he had gilded two vessels by making them the negative pole of a voltaic circuit. Notwithstanding this publication, the old mercury gilding was carried out till the first idea of electro-metallurgy had been given. To Elkington is due the merit of employing the compound of metal with the cyanide of potassium, which has afforded to the electro-gilder and the electro-plater such facilities that these processes can be employed by any person. The gilding or silvering solutions can be easily made by boiling the acids of the metals in a solution of the cyanide of potassium, or by a process which is more used by some manufacturers—that of making a large plate of pure metal the positive pole of the solution. In comparing the results which have been obtained by different manufacturers, it appears that a very thin layer will give as good an appearance to the eye as a very thick coating. Hence in buying these articles the purchaser must rely entirely upon the honesty of the manufacturer.

Electro-plating is undoubtedly made to subserve the purposes of false coinage. We ourselves have seen electro-plated sixpences, shillings, and half crowns in England which rung as clear as silver. They may always be detected, however, by the bitter taste of the cyanide which is always left in small quantities on the coin; by their lightness, nearly one-third less in weight than the original metal; and by being much more easily bent.

Electro statues were well represented in the Exhibition. The electro deposition of the head of Baron Macketti's horse was, perhaps, the best example. The electro statue of the Duke of Gloucester, modelled by Westmacott for the English House of Lords, by Elkington, was a most excellent electro-cast, and was by many considered the best thing in its way in the Exhibition. The Death of a Welch prince, supported by a female figure, a bust of Jupiter, a side-board with electro-bronze panels, and figures of Ariadne and the Fawn, all exhibited by Elkington, were very fine. In the hands of this firm (Messrs. Elkington) the manufacture of electro-plated goods promises to form a very important branch of industry. They are employing 750 hands in the production of these goods, have two large factories at work in Birmingham, and another in the process of erection, and are bringing steam power to bear upon their extended processes.

Prussia exhibited one small electro statue, admirably well done. The process of making electro statues, however, is expensive. We must first have the cost of the copper, to which must be added the cost of the zinc dissolved in the battery, and to these the cost of the sulphuric acid to dissolve it. Further, the moulds are expensive, and the labor difficult. In spite of all these charges, electro-metallurgy is increasing, even for electro statues. Some of the zinc statues of Kiss, the great artist of the age, are electro-coppered; but the plan he adopts he has not made known.

Electro bas-reliefs are said to be less difficult. They are well represented now in the bazaars and toy-shops of our country. Electro copper

tubes have also been produced, but they are said to fail in the purposes for which they were designed. Well represented as were electro-metallurgic specimens in the Exhibition, and extensively as the process has been introduced in the arts, there are many modes and applications known to the scientific which have not yet been adopted by the manufacturer. In the machinery department was exhibited a wood electro-magnetic engine, invented by M. J. Hjorth, of which a word should be said. The improvements consist in using only one hollow electric magnet, the respective poles of which are divided into three or more square rings, inside slightly conical, and outside connected with the bows of the magnet, which form the communication between the respective poles. Plates with ribs, connected in the centre with corresponding magnetic plates and ribs, are applied for guiding the motion of the piston, serving at the same time as a means by which metallic contact may, during each stroke, be established and broken between the piston and one of the respective poles. Whilst the engine makes a down stroke, magnetic contact is established between the north pole and piston; and the latter, obtaining thereby the same polarity as the north pole, will, of course, attract the south pole. By means of these and other arrangements, Mr. Hjorth is enabled to obtain a stroke of any length with only one electro magnet, the piston being a movable extension of either of the poles, and attracted by a succession of polarities, the acting surfaces of which extend to the whole periphery; and also to arrange the piston in such a manner that it may be extended to any size, and at the same time not be heavier than a piston in a low pressure engine of the same diameter.

Substances used as Food, and in Manufactures.

Food.—Among the most interesting and valuable of the series of articles exhibited under the head of substances used as food, not one surpassed the very fine collection of the Messrs. Lawson, of Edinburgh. It might be described as being a complete encyclopædia of the agricultural produce of Great Britain. The specimens were numerous, well selected, and admirably arranged, and they richly repaid a careful and minute examination. They were divided into six series, well arranged in cases, and were briefly described by labels. The first division included wheat and all the common cereals; in fact, all those plants which are cultivated for the sake of their farinaceous seeds. The seeds, in most cases, were accompanied with portions of the flour, both in the raw state and also manufactured into biscuits. The straw of each plant was also shown. The several divisions contained grass of all sorts, herbage, and forage plants. The third included all the plants which are cultivated for the sake of their roots—such as turnips, beets, carrots, &c. Of these the seeds, dried beans, and excellent models in wax, as well as colored drawings of the roots, were shown. The fourth and fifth divisions consisted of plants cultivated for the use of manufactures and for medicines, including, of course, the various fibre-yielding plants, and also those which yield dyes. In the case of the latter, not only were the seed and dry plant shown, but also the part used as a dye, together with good specimens of cloth and other fabrics dyed with it, giving, therefore, a most complete illustration of its practical use. In the last division were placed characteristic specimens of a great number of timber trees, consisting of woods, leaves, fruits, and seeds. The specimens of leaves were especially beautiful and well selected, being for the most part sections of large trees, cut either horizontally or longitudinally, and in part polished, so as to show the grain.

Next in extent to the collection of the Messrs. Lawson was a collection of seeds exhibited by the Messrs. Gibbs. Part of this series consisted of fodder grasses, the dried plant being shown in each division of the cases by the size of the seed. A very valuable and complete series of wheat was contributed by Colonel Le Conteur, of Jersey. Near these were also samples of hybridized wheats, exhibited by Mr. Maund, of Bromsgrove.

Almost every country exhibited samples of wheat, barley, oats, and the ordinary cereals which are cultivated as articles of food. To attempt to specify these would lead us into too minute details for this Report. Many samples of new kinds of wheat were taken from the specimens shown in France, England, Russia, Spain, North Germany, &c., &c., to be tried in our own soil.

As a whole, the seeds (especially of wheat) from the United States were deemed superior to all others, and were greatly sought after. Mr. T. Bell, of Morrisania, New York, prepared and packed large samples of all his farm products—spring wheat, Soule wheat, Mediterranean wheat, bald white flint wheat, barley, rye, buckwheat, oats, maize, broom-corn, flax, millet, clover, and timothy seeds, which he freely distributed to the agriculturists of all nations. Of the new kinds of wheat exhibited, I doubt if many will be found useful to introduce upon our lands. The black wheat of the Burmese, and the soft white wheat of India, have each their own share of interest, though, from their being greatly subject to the weevil, I doubt if they would prove of any advantage to us. Col. B. P. Johnson, commissioner from the State of New York to the Exhibition, gave the subject of grains particular attention, and his report upon that and kindred subjects will not fail to be interesting and useful to our farmers.

Wools.—The collection of wools was by no means large. England, Scotland, and some of the northern islands, exhibited specimens of the South Down, merino, and Cheviot. Most of them were of a second-rate character, harsh, weak, and coarse. It must not be forgotten, however, that in England the rage for fine wool has never, as in the United States, depreciated the size and mutton of the flocks. The *fine* wools are not the produce of England. The farmer raises sheep for mutton, and the wool he takes from his flock is the gain upon which he counts. Still, there are crosses of breeds of sheep in England—such, for example, as the Leicester with the South Down—which produce good wool without deteriorating the market value of the carcass. Many of our agriculturists are now turning their attention to the English breeds of sheep. Fine ewes and bucks, purchased at a high price, have been imported during the summer, and many more have been ordered for another season.

In the departments devoted to the colonies of Great Britain many samples of wool were shown. From the Cape of Good Hope there were capital samples of Saxony; from Australia a clean wool, under the name of white skin wool, seemingly a cross between the merino and some native breed; from the East, Thibet wools, Hindostan wools,

Malay wools, and others; and from Port Philip a wool recently introduced into England, fine, strong, clean, with a long curling staple, and a weight of nearly four pounds to the fleece. There were wools shown, also, from South America; from Hungary—fine, but very greasy; from Vienna the best—whether in quality, strength, weight, or condition—of any in the Exhibition; from Bohemia—a pure merino; and from Silesia. The wool, however, most deserving the attention of our growers came from Prussia, contributed by M. Thaer, Moeglin, all native fleeces, and combining the desirable qualities for our western States. The sheep is represented to be large, hardy, easily fatted, and producing good mutton; not subject to disease, and yielding a long staple, strong and fine, wool, in weight to each fleece of over four pounds. Another very good quality of these native Prussian sheep is that the wool, uniformly good over all the skin, is equally covered upon it; thus, doubtless, accounting for the great average weight of the fleece.

The specimens of wool from our own country were confined to some three or four samples. Through the influence of Judge Duncan, of Virginia, these samples received the full attention of the jury, of which he was a member, and in the verdict were favorably noticed. Spain has become so associated with good wools that one expected, upon entering her division, to find a large collection. It was, therefore, disappointing to find but few, and those, for the most part, decidedly inferior. It would appear that, during the present century, when great improvements in the breeds of sheep have taken place over all the world, Spain alone has stood still, if, indeed, she has not sensibly retrograded. I may here state, with reference to this subject, that in former times the Castilian monarchs granted very peculiar privileges to the great sheep farmers, who were, in fact, the chief nobles of the land, and the heads of the principal religious establishment, and who were united together into a society which met at Madrid, from time to time, under the name of *Consejo de Mesta.* This society had supreme power in all matters relating to sheep, pastures, shepherds, and wool; and, amongst other important privileges, they had the right of pasturing their sheep on the lands of any farmer on payment of a small fine, or tribute; they were, in short, allowed to feed their sheep at the public expense. All this, however, has been long since done away with.

The French collection of wool was not numerous; but some of the fleeces shown were highly curious and interesting. The ordinary French wools of commerce are not at all peculiar, and, for the most part—including a small number of rather indifferent specimens from Algeria—there was little in them to deserve notice. It will, therefore, be enough to indicate those which possessed more than common interest. The most curious fleece exhibited in that division was unquestionably a variety of merino from the farm of M. Graux, at Hauchamp. This was an improved modification of the old Spanish stock, which, by careful selection and judicious care in breeding, has become a permanent variety, exhibiting no tendency to degenerate. The wool was thick upon the skin, long, remarkably brilliant, and very strong. It was a very fine and beautiful fibre, and one which is, as yet, unknown to our woollen manufacturers. Close by this fleece, and contrasting very curiously with it, were some fleeces of pure old merino breeds, which had been bred in and in, without any change or variation, for a long series of years. They showed to what extent a good breed may be impoverished, though doubtless sent for a very different purpose. There were also fleeces from the national establishment at Rambouillet, fine, but of a short staple, and not well grown over the whole skin.

Cotton.—Perhaps one of the most important questions necessarily arising out of the Exhibition was, as to what extent any one country was to continue in the future to enjoy the monopoly in producing certain staple commodities. This question—of no inconsiderable interest when it concerned the articles of tea, sugar, tobacco, opium, rice, and cochineal—became of exceeding importance when applied to the future production of cotton, at the same time, when regarded in all its bearings, perhaps the most intrinsically valuable raw material in the world. To Great Britain, and all the other manufacturing countries of Europe, this question was of hardly less importance than to the United States, since, while to us the rise and fall of prices in cotton become the index of all other trade, to them it is the source from which a great portion of their industry derives its life. Those who are not in the habit of reading trade lists will have some idea of the importance of the cotton crops to the English manufacturers alone, from the fact that we export to England every year a quantity of cotton varying from a million and a quarter to a million and a half of bales, each bale weighing not far from 380 pounds; consequently, even at the lowest estimate, the annual business between us in cotton alone exceeds the enormous quantity of 470,000,000 pounds. As this export is constantly increasing, and every year making Europe more dependent upon us as producers, and we more dependent upon Europe as our great market, the question in regard to the continuity of this trade becomes one of vital importance both to us and to our purchasers. To show what relation the cotton of other countries bears to ours, and what prospects were apparent at the Exhibition in regard to any successful competition on their part with us, was one purpose in view in the examination made in this department of raw material.

The samples of cotton from the United States were thirteen, embracing specimens from five different States, viz: South Carolina, Georgia, Alabama, Mississippi, and Tennessee. The exhibitors were J. Pope, Memphis, Tennessee; S. Bond, Memphis, Tennessee; Wade Hampton, South Carolina; W. Seabrook, South Carolina; J. B. Merriweather, Montgomery, Alabama; J. Nailor, Vicksburg, Mississippi; G. L. Holmes, Memphis, Tennessee; Daniel Lake, Memphis, Tennessee; J. R. Jones, Columbus, Georgia; J. V. Jones, Six Oaks, Georgia; Eli Raynor and J. L. Morgan, Alabama; Truesdale, Jacobs, & Co., (a case exhibiting several samples of various grades,) New York; and J. L. Mitchell, Vicksburg, Mississippi. Of these, eleven were full bales, exhibiting the style of bagging and the manner of packing the cotton for market. They were all, without exception, first rate specimens of the various kinds of cotton raised in the States, and showed, not what could be carefully culled and prepared as a museum sample, but just what was the article raised on the plantation.

In distinguishing the actual value of the several bales, it was next to impossible for the most experienced broker to determine exactly the grade which each should occupy, since, while every kind of these cottons was known in market, the quality in the bale was superior to the same quality in the market. The cotton of J. R. Jones, of Columbia, Georgia—a cotton raised on his plantation in Alabama—was beautifully fine, soft, and silky. It had been prepared with great care, and told well for the process of cultivation he had adopted. The same may be said of Mr. Merriweather's cotton, of Montgomery, Alabama. It was soft, strong, fine, of good color, well handled, and in excellent condition. That of Hon. Wade Hampton, of Charleston, South Carolina, was very similar to Mr. Merriweather's, bearing so strong resemblances in silkiness, softness, fineness of staple, and pure color to that, that it was believed by many brokers who examined it to have been raised in the same neighborhood.

W. Seabrook, esq., of South Carolina, exhibited Sea Island cotton in bale, and a small sample unginned. The character of his cotton is well known in the European market; and his exports are largely in demand. The bale shown at the Exhibition fully sustained the reputation of this unsurpassed production. The seed, I may here remark, was an object of much inquiry. There have been such experiments made upon the island cotton seed within the last year—in extracting its oil and using the residium for fodder—as to show that, if it can be afforded at a price low enough, the whole seed of the crop, now mainly useless, will come into consumption for these purposes. I directed several letters to South Carolina, calling the attention of growers of the Sea Island crop to this subject.

The specimens from Tennessee were all highly creditable to the exhibitors. The cotton of Mr. D. Lake was of a beautiful color, and carefully prepared; that of Mr. Samuel Bond, soft, strong in staple, and well ginned; that of Mr. J. Pope, fine, silky, and judiciously handled; that of Mr. G. L. Holmes, perfectly ripe, white, soft, and even. Indeed, all these cottons were as good as could be desired, both as regards the quality of the staple or its mode of preparation.

The cotton of J. Nailor, of Vicksburg, was of a very superior quality, combining, with a fine and soft, an unsually long staple, and prepared most perfectly for the market. The cotton of Eli Raynor, though delayed long in arriving at the Exhibition, and thus losing the first examination of the jury, was of a pure white color, silky, and admirably ginned. J. V. Jones, of Six Oaks, Georgia, exhibited a sample of a new kind of upland cotton, called the Jethro cotton, which excited much attention. It has many of the characteristics of the finest Sea Island cotton—soft, silky, long staple, fine, pure, and of a rich color. Should this cotton become generally grown, it will become a favorite article with the manufacturers of the higher class of goods.

When looking at the other samples of cotton in the Exhibition, one impression never left the mind, and that was, that the culture of all cottons other than ours is slovenly conducted. Wherever the specimens came from—India, Egypt, South America, or Spain, even when the cotton looked well—there had evidently been a lack of care, either in planting, gathering, ginning, packing, or finishing, which was of material injury to its character. There was an excellent little series contributed from British Guiana, showing that good cotton might be produced there, but it lacked quantity, from which alone a fair estimate can be made. From Jamaica a good Sea Island cotton was exhibited, which was badly cut in ginning; and from Barbadoes a New Orleans cotton, strong, fine, and silky, but badly colored. The postnatal cottons were specimens of how a good article can be utterly ruined in preparation. As a whole, the African cottons resemble ours in staple, color, and feeling far more than the Asiatic; but they were, without exception, badly managed and carelessly packed. The Egyptian cottons did not appear to much advantage; two or three bales were shown below the ordinary average, the fibre is good, the staple fine and long, and the color fair; but it is in most cases very badly handled, and far from being clean. The series from Turkey was tolerably extensive, but it included no great variety; the samples were small, and the character was of that short, crispy, and irregular fibre, which rendered it useless for any but the poorest fabrics.

Peru sent one sample of upland cotton, very nearly resembling the Mississippi. It is said to be easily cultivated there, and that, with proper attention, the whole quantity raised may be as good as this. China showed several small bales of a most indifferent quality, though the preparation, like everything from the hands of that pains-taking people, was admirable. Spain sent samples from her irrigated lands, and Algiers some of the same kind—the seed having been obtained from Barcelona; but both were harsh, unfit for the spinner, and good for nothing in the market, unless it might be twisted into candle wicking. Some specimens from Portugal were inferior to those of Spain.

The series of cottons in the East India collection were, in fact, the only cottons in the Exhibition which an American would be likely to examine with any degree of interest. From no other part of the world is it probable that any amount of cotton will ever be supplied to the European market sufficiently to come sensibly into competition with the produce of our southern States; and after the conflicting statements which have been made in reference to the growth of market cotton in the English East India possessions, I was anxious to witness for myself—first, what progress had been made up to the present time, and what prospects were fairly opened for the future. This I was enabled to do at the Exhibition better even than by a personal inspection of the Indian plantations themselves, since it has been the purpose of the East India Company, as I very well knew, to exhibit in a great variety of specimens a fair exponent of the cotton industry of the East.

The East India samples might have been divided into three series—namely, the indigenous cottons, the introduced or foreign cottons, and the improved cottons. The last were evidently a cross between the first two, bearing strong resemblance to each, and forming the best results of innumerable experiments and extraordinary care.

The indigenous cottons are all short staple. They lack the silkiness, lustre, and softness of the Barbadoes or Sea Island variety, and the purity, color, and elasticity of the upland cotton. The series of these indigenous cottons was very large. They presented every variety of appearance—from the style in which they were brought to the Calcutta market, fifty years ago, to the most improved manner of cleaning, ginning, and packing introduced by the company. In all of them, in each particular sample, when examined with care, one impression was made upon the mind, and that was of *carelessness in its preparation.* I do not now recall the number of samples presented, but there was not one among them all which furnished an exception to this impression. There was injury to one sample from over ripeness; to another from careless picking; to a third from exposure to the weather; to a fourth from bad packing; and so to the end of the series. In fact everything would seem to be done which is likely to injure the fibre and depreciate its value; and, after observing the wretched condition of these cottons, I could not but turn with wonder to the beautiful products of the looms of Deccan, and ask whether it was possible that the people who were able to manufacture from cotton such beautifully fine fabrics—to which the name of "woven air" seems to be hardly inappropriate—can also be so marvellously careless and slovenly in the preparation of the cotton itself. There are quite a number of varieties of this indigenous cotton, some, of course, greatly surpassing others in natural qualities; but there were none which were presented for exhibition whose merits, under any kind of cultivation or any extent of care, would ever demand for them a good price or a ready sale in the market.

The introduced cottons formed the second series of the East India Exhibition. By these I mean those cottons which have been introduced into India from the United States and other countries, not only with the object of encouraging the production of so important a substance in the British empire, but with the view of rendering them less dependent upon us for so necessary a commodity. It is nearly thirty years since the company first had this subject in view, and it is quite twelve years during which they have given to it a degree of attention, energy, and capital that few articles of natural production have ever received. The samples of this introduced cotton exhibited were, of course, the very best that could be produced. The object was to show to all doubters and inquirers that as good cotton could be grown in India, and furnished to the English market, as that which is imported thence from the United States; and, of course, nothing of pains or expense was spared to produce the desired end. That an entirely different one *was* produced, it was necessary only to consult the opinion of any experienced cotton broker to know. In the first place, and according to the statements of the company itself, the attempt to introduce the long staple or Sea Island cotton into India has resulted in a total failure. It will not grow there in any perfection. Its silky qualities disappear after two or three successive crops, and that which renders it the choice material for the most beautiful fabrics of Brussels and Paris—its susceptibility to being drawn into the minutest thread—is entirely lost. In the second place, the short staple cotton of the New Orleans and upland varieties, though retaining its original constituents in a greater degree, still seems to me to be a very dubious crop for India. Evidently all of these samples had been judiciously cultivated, carefully picked, and attentively packed; and, to a cursory observer, they presented points of full equality to the American. But such they do not sustain either to the sample broker or the manufacturer. The staple is of fair length, but it is coarse, crispy, and seems to lack vitality. It would spin badly in mules used for other cotton, and is, in short, entirely another thing in nature by its change of soil.

The improved cottons of India are entirely the result of careful experiment. They include the best varieties of Java and Borneo cottons, and the Arabian and Chinese. They have been selected with a view to the improvement of native cottons by the most careful management and upon the richest soils. In this case the samples in the Exhibition did not consist of mere experimental products, but of the regular crops from the government farms, sent over during the last four years—portions taken as the best specimens from some hundreds of bales lately received and manufactured in Manchester. This cotton was of a good sound fibre, but very short in staple. It had been well cultivated, carefully picked, thoroughly cleaned, and looked like a marketable article. For many purposes it will answer well, and will meet with a ready sale. It is now the favorite cotton of the East India Company, and their endeavors to supply the market will probably be directed towards this alone for the future. It is not a cotton, however, to take the place of any of ours. It will never enter into competition with them. It is an article so widely different, especially in that most important element—the length of staple—that it must forever occupy by itself a distinct and independent ground.

From what I have said, my convictions must be apparent to the reader, that the cottons raised in the East can never successfully rival those which are the great staple of the South. The reasons for this are undoubtedly to be found in the differences of the soil of the two parts of the world. To the effects produced by climate, although they are doubtless considerable, I do not attach so much weight. But to the total unlikeness of soil, shown not in appearance, but by chemical analysis, the unlikeness of the United States and the East India cottons is to be attributed. The soil in the former—especially the soil in which the finest long staple cotton is grown—is black, sandy, but rich in decaying organic matter; the soil of the latter is also black, but it is a calcareous, clayey soil, the *debris* of volcanic rocks. Though both black in color, the two soils are entirely different in chemical and physical characters. The one is rich in organic decayed matter; the other almost sterile from its want. The climates, indeed, widely differ, and by that difference produce their appropriate effects. But the soils, were the climates the same—the black soil of India and the black soil of the United States, so long supposed to be identical—are too widely different to produce the same results, and by their opposite natures sufficiently account for the deterioration of the transplanted cotton plant.

Ceramics.

Necessity early taught mankind the art of pottery. Long before cloth was woven, or the skins of animals tanned, or wood wrought into articles of utility, or iron hammered, men had been compelled to mould clay into various useful shapes. The art everywhere, in every age and every nation, marks the social progress of the race. As civilization advances among a people, we find a corresponding improvement in its earthenware; and in studying the history of ceramic manufacture, we constantly discover advances and retrogressions in the material employed and the taste displayed, parallel to the condition of the age to which the manufacture belongs. The British Museum has placed in continuous order within its walls the early and later productions of many ancient nations in pottery, and nothing can be more curious than the story of civilization which they record.

Probably at no former time were so many specimens of the ceramic manufacture ever brought together from different nations as were classified in the great Exhibition.

Central Africa furnished specimens of pottery used by the natives in cookery; the Bey of Tunis ranged the rough drinking cups of the country among splendid articles of attire and gilded horse trappings; Burmah and India, beyond the Ganges, sent plates and dishes of the same coarse ware which Strabo described them as manufacturing two thousand years ago; and the Kurch earth potteries of Egypt illustrated by its products both the stationary condition of that wonderful people and the earliest forms into which man had moulded clay to suit his varied purposes.

The establishment of porcelain manufacture in China was of ancient date. Many centuries before the finer materials of ceramic products were at all understood in Europe—before the soils were analyzed or the coarsest compositions made—Canton furnished the boudoirs and drawing rooms of the wealthy, all over the world, with an article the fineness and clearness of which all that science has done for the arts to this day has not enabled the most enlightened nations to surpass.

The great porcelain works of King Tih' Chin sent a complete collection of their materials used, and products made, to the Exhibition—for once, opening and explaining to the world that which they have held a secret for ages. In this connexion it may be well to remark that the two principal materials they have always used in the manufacture of porcelain, the kaolin and the soap-stone, differ in no degree from the China clay of Cornwall (elsewhere described) and the magnesian rocks of the Lizard, the two components of the best ware of Great Britain.

Japan, too, closely resembling China, however, contributed her beautiful red ware, remarkable for the fineness of its structure.

The examples of the ceramic art from the European States were numerous. Among the roughest of these were the wine jars of Spain, manufactured in Toboso, immense in size and uncouth in shape. The royal porcelain manufactory at Copenhagen, celebrated for its reproduction of the classic works of Thorwaldsen, was well represented. By the side of these, and in striking contrast, were the black pots of Jutland. These are an example of primitive manufacture. They are made by the peasants, and are blackened, during the process of burning, by the smoke generated in the kiln, and which appears to form, with the silica and alkali of the clay employed, a very perfect glaze. A beautiful principle is developed in these two products, (of Copenhagen and Jutland,) of the perfection which will result from the influences of a rational mind imbued with the poetic element. That guiding principle of correct taste has produced in the former choice designs and elegant results, while in the latter the useful only has been studied, without the slightest attempt to combine it with the ornamental.

The States of the Zoll-Verein afforded the means of studying the raw material, the rudest ware, and the highest degree of manufacture. There were clays, bottles, drain-pipes, tiles, and terra cotta ornaments; and in addition and striking contrast to these, specimens of that beautiful porcelain which owes its origin to the famous works for which Dresden has been long in high repute. Frankfort-on-the-Oder, Luxemburg, and Altwasser, in Silesia, each contributed of its most perfect works.

The royal Saxon manufactory at Meissen exhibited its hardware for chemical purposes. The imperial porcelain works at Vienna presented a series of vases, dinner and dessert services, flower-baskets, and figures In these last the paintings are of the highest finish, and, as works of art, deserve the first place. Antwerp and Brussels contributed excellent examples of pottery, especially in the biscuit moulding. Russia sent but two specimens, and these below mediocrity. The national manufactory of France, at Sevres, of porcelain and stained glass, has a world-wide reputation for the beauty of its productions. It should never be forgotten that the results obtained at Sevres are due to a strict attention to the chemical composition of the clays employed, to their physical character, and to an exactitude in the proportions in which the materials are combined. Alexander Brongniart, so well known for his admirable history of the ceramic art, has the direction of the works at Sevres; and Malaguti, with other eminent chemists, is attached to the establishment.

The English manufactories in this branch owe what of perfection they possess to private enterprise. Whilst the great establishments of the continental countries are maintained by the government, and many of them are employed only in producing works of a highly ornamental character—such as the wealthy only can obtain—the art in England has grown to its present condition unaided by patronage, and stimulated only by the hope of gain.

Under these circumstances, the exhibition of English ceramics was highly creditable to British industry and skill; and though in that higher class of artistic merit, which has made the china of Sevres and the porcelain of Berlin world-wide in renown, there was great room for improvement in the more useful class of practical merit, there was much that deserved commendation.

It is deserving of attention in the United States, that the highest success in the ceramic art, in all countries, has been intimately connected with the discovery of the proper material from which its best ware is manufactured. That even so ordinary a production as clay is of great value to a country, might be shown from the results that have followed its study, careful analysis, and use in China, Germany, the Zoll-Verein, and France. It is a very striking fact, that, until Mr. Cookworthy, of Plymouth, discovered the deposit of kaolin, on the southern side of the Tregonning hill, near Helston, in Cornwall, no porcelain was made in England. Cookworthy had obtained possession of some kaolin, sent from China by M. D'Entrecolles, and of some from Limoges, through the celebrated Reaumur, and industriously examined the decomposed granites—granon, as they are provincially called—which occurred in the neighborhood of some property belonging to his family. He ascertained that the clay, which could be artificially separated from this substance, possessed all the chemical and physical properties of the clays of France and of China, and he accordingly patented its application for that purpose, established porcelain works at Plymouth, and eventually sold his patent. This was in the year 1750, since which time the manufacture of porcelain in England has been gradually increasing.

Of the exhibitions of clay there were some twenty-four or twenty-five varieties. In all, the adhesive base was alumina silica, other ingredients existing in very variable proportions. The following analysis of a few of these clays will convey some general idea of their composition:

	Silica.	Alumina.	Lime.	Iron.
Common pottery clay - -	60	33	3	3
Blue ball clay - - -	64	35	–	1
Cracking clay - - -	68	31	–	1

These clays are usually found united with the coal measures.

	Silica.	Alumina.	Lithia.	Iron.
Cornish China stone - -	68	16	14	2
Do. clay - -	71	27	2	

The ordinary potters' clay is employed for common earthenware, and always burns either yellow or red, according to the quantity of iron it may contain. The blue clay owes its color to the admixture of carbonaceous matter, and is always very white after burning. This clay varies very much in composition, another sample having given, upon analysis—silica, 46; alumina, 38. Cracking clay was first used by the Wedgewoods, and from the peculiarity to which it owes its name it could be used in combination with a large quantity of flint only, as in the Wedgewood stone ware.

The mode of preparation adopted both by the French and English establishments for the China clay is the same. The decomposed granite, which contains much quartz, and usually some mica, is exposed on an inclined plane to a fall of water which washes it down a trench, whence it is conducted to "catch-pits." The quartz and mica are principally retained in the first pit, the water flowing over it into the second, carrying with it only the lighter particles. There is usually a third "catch-pit," which receives the water charged with the fine clay only, the result of the decomposition of the feldspar in the granite. The clay sediment is allowed to settle; the water, as it becomes clear, being drawn off from time to time. By repeating this process many times the receiver becomes full of clay. This is allowed to dry, so as to admit of being cut out into cubical or prismatic masses of sides of about one foot, which are carried to a sheltered position and placed on frames to dry. When considered to be sufficiently void of moisture, the masses are carefully scraped, packed in casks, and sent off to the potteries. The process of preparing and cutting out the clay is usually performed by men and boys; women and girls employed to scrape the dry masses and prepare them for packing.

It appears from parliamentary statistics that about 1,757 tons of this clay were exported from Charlestown, a port near St. Austel, to the potteries in 1809. In 1826 the export had increased to 7,090 tons. Of late years the demand has greatly increased, and China clay is not now used in the manufacture of porcelain alone; but many thousand tons are annually employed in calico bleaching establishments, to give the cloth an artificial whiteness.

There is a particular class of ceramic manufacture which is deserving of notice here, both from its intrinsic value and from the great popularity it has attained—we refer to the parian statuettes, or the statuary porcelain. However doubtful it may be whether the imperfections which must always exist in a material which shrinks one-fourth in the process of manufacture will not have an unfavorable effect upon the production of superior china, no one can doubt that copies of the best productions of art, rendered accessible to the less wealthy classes of society, must tend to the improvement of taste and the advancement of civilization. The first idea of imitating marble in ceramic manufacture is said to have originated in 1842, with Mr. Thomas Battam, the artist directing a large porcelain manufactory in England. The Duke of Sutherland saw the first specimen produced, and became the purchaser of it. Since that time, both in England and on the continent, Parian statuettes have become a favorite article of manufacture, so that not only have we become familiar through their means with the most celebrated antique statues, but the *chef-d'œuvres* of Thorwaldsen, Daneker, Cellini, Foley, Gibson, Westmacott, Bell, Powers, and Greenough, have been everywhere known through these copies.

According to the English classification in the Exhibition, the material of which the biscuit figures and forms are made is divided into three kinds, viz: Statuary porcelain, parian, and Carzara. This is a factitious and perfectly unnecessary refinement, the materials differing only in the proportions of the ingredient used in the manufacture. The composition, according to the analysis, is, silica, 40.35; alumina, 32; soda, 4.16; potash, 2.51; with traces of lime, magnesia, and iron. The material is used in a liquid state, technically called "slip," about the consistence of thick cream. It is poured into moulds forming the figure or group, which, being made of plaster, rapidly absorb a portion of the moisture, and the coating immediately next the moulds soon becomes of sufficient thickness for the cast, when the superfluous "slip" is poured back. The cast remains in the mould for some time at a high temperature, by which means it is, through the evaporation that takes place, reduced to a state of clay sufficiently firm to be on its own weight when relieved of the moulds, which are then opened and the different portions of the subject taken out. Each figure requires many moulds—the head, arms, and hands, legs, body, and parts of drapery, (when introduced,) and the other details of the subject, are moulded separately. The parts, being removed from the moulds, have to be repaired, the seams cleaned off, and the whole put together. This is, of course, a delicate process, requiring much artistic skill; for, though all the parts should even be from the same mould, it by no means follows that all the casts will be of equal merit, so much, in fact, depending upon the taste and skill of the finisher. In the process of drying, as alluded to before, the figure contracts *one-fourth*, so that a model, which, when moist, was two feet high, becomes, when completed, not more than eighteen inches. This necessarily requires many nice adjustments on the part of the figure maker; and, notwithstanding every precaution, a great many of the statuettes exhibit distortions of the limbs and other parts, which arise from the unequal contraction of the clay.

We have said that the first figure was made in 1842, and yet that ought not strictly to be deemed its origin, since, for many years, the works at Chelsea, England, supplied chimney ornaments not altogether unlike these. Many of the old Chelsea porcelain figures were very finely executed, but by far the larger number were grotesque imitations of humanity. Dresden was also celebrated for producing figures, and these were not unfrequently of a fair character as works of art. After this, Wedgewood, of Etruria, England, introduced a stone ware—a vitrified body of a highly silicious character—which has been largely sold in our country. This material was exceedingly valuable for giving permanence to many of the most choice relics which time has spared us of the vases of antiquity. Flaxman aided Wedgewood by his genius, and the result was a high elevation of the character of pottery manufacture. Still the idea of imitating marble in ceramic manufacture did not occur to them, and its real origin is with Mr. Battam, as before mentioned, in the year 1842. Since that time a trade of large commercial importance

to the potteries has arisen, and the introduction of this manufacture has already advanced, and is destined to advance still more, the artistic taste of ceramic wares.

Numerous examples of this manufacture were found in the Exhibition. Messrs. Minton & Co. exhibited statuettes and busts from designs by Daneker, Cellini, Thorwaldsen, Westmacott, Towresned, and Bell. In the Victoria dessert service, which was purchased by the Queen for one thousand guineas, and presented to the Emperor of Austria, was the combination of Parian and fine porcelain, effected with great skill and considerable taste. The service was a full one, consisting of 72 dessert plates, 20 compotiers, and 24 other articles; it is white, turquoise, and gold. In the wine cooler, which stands in the centre, the union of high art with manufacture is finely exemplified. Round the outside it has, in bas-relief, a bear hunt represented, and hunters, with their dogs, form a series of statuette groups round the pedestal. A streak of gold runs in and out through the design, and the whole had a most pleasing effect, the parian contrasting admirably with the glazed porcelain. The whole was crowned with an infant Bacchus pulling grapes. The expense of designing, modelling, and decorating this service, which took twelve months of labor, would have been but little less than the amount for which it has been sold.

Another article worthy of notice was the Parnassus vase, which, like the Victoria service, was a combination of parian and porcelain. The china was in nazarine, richly gilt; while the parian *bas-relief* represented Apollo and the Muses. The modellings of the festoons on this vase are considered equal to Sevres.

There was also a dessert centre, with parian figure supporter. It was in turquoise and gold, with delicately-painted flowers; and the cross S., beautifully brought out before it, marks it as part of a service manufactured for the Marquis of Stafford.

In addition to these, we may enumerate, as objects of especial interest, the Cellini Ewer, by Minton & Co.; Dorothea, Clorinda, Miranda, Una, and the Lion and the Babes in the Wood, by John Bell; the Distressed Mother, after Sir R. Westmacott's Statue, in Westminster Abbey; Love restraining Wrath, an original group, by Beattie; and the Greek Slave, by Powers.

It would be difficult to over-estimate the value of this material, to the manufacture of which it has become so prominent a feature. The successful position taken by the English potters in the Exhibition was due mainly to its introduction, and its prompt adoption by the public.

The increased love of art, which has been created by the multiplication of examples of statues of a high order through this process, is one of the most pleasing of the results which have attended it. Of the salutary influence of the popular cultivation of art, in a moral and social point of view, there can be no doubt; and on this ground, among others, especially in our own country, where works of art must necessarily be for many years to come confined to copies, we desire to see the fine examples in statuary porcelain largely multiplied.

Furniture.

It was not to be expected, in the matter of furniture and decorations, that the United States could contest upon equal ground with the nations of Europe. Even had we been fairly represented in these productions, had the workshops of our cities sent the products of their handiwork across the ocean, and had the division which we occupied showed a fair exponent of the skill and taste of our cabinet artisans, we must have fallen far below the older countries in the comparison. We have not the wealth (and Heaven grant we may never have!) in the hands of the few, which can find only in the result of years of toil a return adequate to its demands; nor have we such poverty among the many as will render labor, at mere living wages, a god-send thankfully received and readily embraced. Our mission is other than to equal or excel the world in the products of taste. We have lessons to teach in the *capacity* of man, rather than lessons to learn in his handicraft. It is folly to expect that we have reached already, or that we can ever reach, that which is alone attainable where classes in society continue from age to age as the feudal system left them. England might regret, with as much reason, that she could not rear a pyramid to stand for centuries, as we of the United States that it is beyond our power to carve the Kenilworth buffet. Compared with the starving slaves of old Egypt, Europe is as far advanced as we beyond the miserable system that confines the lace-worker to his perpetual dungeon, or ekes out to the Manchester weaver his miserable dole.

And yet there is that in the result of ill-paid toil which, by other means, we may seek to attain. The high standard which the taste of the cultivated minds in monarchical governments has demanded and realized is to be aimed for in a republic where men are born free and equal—not, indeed, to be at once attained, never, in fact, to be reached by the same road, but to be sought as a good to be enjoyed, and even increased, by the only means through which man must hereafter reach all highest excellence.

It is no unimportant indication of the signs of the times, that the mere perfection of a laborious process no longer claims, even in Europe, the highest reward. The rule announced at the Exhibition confined the great medals which should be given to the introduction of a new principle into the useful arts; and though attempted to be passed over by the juries in several instances, the rule was invariably held inviolate in the last decision. Wood carvings of the greatest labor, lace textures of the most wonderful skill, diamond bracelets and jewelled coronets of the rarest beauty, gave place, in the rank of merit, to the reaper and the plough—and this, too, when the one attracted the attention of thousands, and was daily chronicled through the public prints; while the other was passed by unnoticed and almost unknown.

In furniture, upholstery fittings, and general decoration of interiors, England has of late years occupied a place of marked inferiority as compared with her continental neighbors. The furniture of England has ever been in good repute for its sterling qualities, but in forms and ornament, it has been of the worst. The paper hangings of England, for example, have furnished specimens of as bad combined forms and colors as could possibly have been met with in the same amount of space. The reason for this state of things was similar to that in our own country. The decorator, cabinet-maker, and upholsterer were without training in ornament and its application to their purposes. They were without guides. No schools of design existed, no books fitted to instruct them

were known. They were left to pick up the necessary knowledge of form and ornament as they best could.

With these reasons existing, it is not strange that excellence in workmanship and beauty in material should be combined with arrangements of ornament exceedingly unclassical, and questionable in taste.

That a change, greatly for the better, has taken place in England, and that it will not be without good effect in our own country, there can be no doubt. The mere fact alone, that works of merit have been written as guides to artisans, and that they are afforded at a price which will bring them within the reach of all, will produce this result.

Perhaps the most important and highly ornamental piece of furniture, of which a large number was exhibited, was the sideboard, or, as it is termed in England, the "buffet." The largest of the various specimens was found in the French division, exhibited by Tourdrinier. The wood was walnut. The style of ornament, that which is denominated *Renaissance*. Four wood-carved figures in the back, the anatomical detail of which was exceedingly correct, symbolized Europe, Asia, Africa, and America. Dead game and fish, fruit and grain, all of wood carving, were grouped around with admirable skill, and it was only when one remembered that fitness of purpose is the first element of design, that its unusually large dimensions became a drawback on its beauty.

As an offset to this greatly admired specimen of French taste, Jackson and Graham, in the English department, exhibited a sideboard of oak. Perhaps there was no piece of furniture in the Exhibition that more entirely fulfilled all the conditions of good design, fitness of purpose, purity of style, fine execution, even to the smallest detail, and carefully-selected material, than this. No ornament appeared to be introduced but what had a purpose to fulfil, the best evidence of which was that its removal would leave a disagreeable blank. Careful finish characterized the whole; and there was abundant evidence that from the groupings on the panels, typifying the chase, fishing, agriculture, and vintage, down to the smallest ornament, there had been the hand of an artist in the work. If models of what true taste in furniture is could be brought within the reach of our people, we are convinced that, without additional expense, they would prove the best aids to cultivation. A work like this of which we are speaking would be a source of improvement to the young, as well as an object of admiration to the cultivated; and to the practical cabinet-maker, as a piece of work where sections of mouldings are well preserved, and their intersections carefully attended to—where, in fact, the mechanic has shown himself all that the true workman is proud to be, and has done the most to render a fine design imperishable—the whole thing would be invaluable.

The two articles of which we have spoken were in the *Renaissance* style. Near by the last were a sideboard in walnut, and a cabinet in oak, inviting special attention as models of the *classic* style, marked "Sheffield School of Design." If these were really models of classic furniture, we trust that the *classic* will never extend its influence across the water; for our people would say, as Falstaff said of honor, "We'll none of it." The execution of the work was as admirable as the conception was wretched. The sideboard was, in fact, the model of an indifferent *façade* to a building, and the cabinet suggested the form of a tomb. Both designs were evidently from the merest tyro in art, as applied to manufactures.

Amid an almost endless variety of articles of furniture in the *Renaissance*, *Louis Quatorze*, *Gothic*, and *Elizabethan* styles, the specimens of classic furniture were exceedingly scarce. The cabinet manufacturers of all countries appeared to shrink from the task of producing a piece of furniture of a purely classic character; probably because the initiated knew the difficulties of attempting to place such designs in the positions suited to them. There was, however, one article—a sideboard, by Poole & Co.—where these difficulties were mainly overcome, and where every line, form, moulding, and ornament would have satisfied the most fastidious. The winged chimeras, combined with chaste Italian trusses, enriched with tastefully carved ornaments, support pedestals in front; whilst finely proportioned and characteristic pilasters give support to the back. The raising of the pedestals from the plinths imparts lightness, and is an acceptable novelty, whilst a graceful "sway" of foliage and fruits links each with the other, and gives a pleasing variety to the outline. The back is a study, as graceful in form as it is novel in character. The oaken wreath—the most honorable of the Roman crowns—is an excellent frame to the bronze satyr, and the two combined form a fine subject and centre ornament for the back. The four columns which carry the lamps are beautifully outlined, and, whilst architecturally correct, are subservient to the happy introduction of a novelty; and the lamps have a place receiving special consideration, and forming an essential portion of the design of a piece of furniture which was chiefly used by artificial light. No portion of detail escaped attention. The upper portion of the lamps is removed at pleasure, leaving the lower—a neat glass vessel—to be dressed, if need be, when the sun is above the horizon, with the originals of the natural products luxuriantly grouped, and finely carved, in the panels of the back. The bronzes on the doors of the two pedestals represent the fable of "Baucis and Philemon."

The Austrian furniture, by Leistler & Son, received much merited attention through the whole time of the Exhibition. A parlor, dining-room, bed-room, and ante-room had been fitted up in this division, specially to show the style of furniture and decoration in an Austrian house of the first class. The most remarkable feature of these apartments to an American was the parquetrie work of the floors, walls, and ceilings. This parquetrie, in geometrical forms and a Greek border, was made of solid oak, of an inch in thickness, the squares secured to each other by grooves and tongues cut in the solid wood. It is largely used upon the continent, and, being made by machinery, is furnished at a comparatively low price.

The furniture exhibited in these rooms was remarkable for many reasons. It was of great size. A kind of palatial grandeur was apparent in every article. The wood, of Brazilian growth, very closely resembling zebra wood, was carefully selected. In design, and in carving, it claimed a position that was not reached by any other articles exhibited. Without purity of ornament there were novel conceptions, happy thoughts, brilliant imaginings, and touches of humor that well-nigh confused the beholder. In the oak book-case—a specimen of the florid Gothic—strictly architectural forms were nicely adapted to the purposes of the article, so that the whole effect was original and pleasing. The groined centre was a capital beauty. Portions of the detail in ornamentation were criticized as being out of style; but they were so unimportant as to be unworthy of notice. This book-case consisted of two, in fact, enclosed in friezes, forming two wings, the centre between the two being canopied with a looking-glass beneath. The space between the two wings might be used as a writing desk. There were wide pilasters at the ends, with reeded columns, capitals, and bases at the angles, playful and happy looking figures around the cornice of the canopied centre, and much florid ornament over the whole.

In the drawing-room were a round table of locust wood, eight feet in diameter; a novel piece of furniture, called a picture stand, for displaying paintings in the centre of the room; and a pair of doors leading to the dining room, of solid oak, twice veneered. The top of the dining-table was also twice veneered—within of lime-wood, without of mahogany. In the ante-room was a centre table elaborately inlaid with boule ornaments, and other articles of furniture equally beautiful. In regard to all this furniture it may be remarked, that only in an old country, where feudal customs still obtain, where labor toils without adequate remuneration, and where wealth is unequally distributed, could it be manufactured or patronized.

Furs.

The exhibition of articles of this class, always a subject of general interest, so far as quantity was concerned, was by no means remarkable. The day has been—perhaps is now—when any large depot of furs in New York could show, in its stock on hand, an amount exceeding in value by ten times all that was arrayed in the Crystal Palace. In variety, however, it was worthy of its place. Through the extraordinary exertions of the parties who had this class in control, the furs of nearly every country on the globe were represented; so that a better field for studying the comparative excellencies of the various kinds, or a more interesting one for inquiry into the habits and character of that order of the animal creation which, more than any other, has ever excited the cupidity of mankind, was, perhaps, never presented. Many articles of this class always have been of very high value. Rich furs were for many ages the friendly offerings of princes to each other, and the tokens of regard to their favorites. In later days, the use of furs, as well as their variety and richness, has greatly extended. The sumptuary laws, which once confined their use to particular persons, were stringent and severe; but these have long been in abeyance, and taste, fashion, and utility have become the sole arbiters in such matters. That such is the fact, let the following curious table, compiled from recently published documents in England, witness:

Imports and Exports of Furs, 1850.

	Importation.	Exportation.	Consumption.
Raccoon	525,000	525,000	
Beaver	60,000	12,000	48,000
Chinchilla	85,000	30,000	55,000
Bear	9,500	8,000	1,500
Fisher	11,000	11,000	
Fox, red	50,000	50,000	
" cross	4,000	4,500	
" silver and black	1,000	1,000	
" white	1,500	1,000	500
" gray	20,000	18,000	2,000
Lynx	55,000	50,000	5,000
Martin or Sable	120,000	15,000	105,500
Mink	245,000	75,000	170,000
Musquash	1,000,000	150,000	850,000
Otter	17,500	17,500	
Fur Seal	15,000	12,500	2,500
Wolf	15,000	18,000	
Martin	120,000	5,000	165,000
Squirrel	2,271,000	77,160	2,194,098
Ermine	187,104	-	104

The value of this table, elucidating curious facts in reference to the taste of the different nations of the world, will appear in the course of our remarks.

The great amount of furs which supply the European market still proceed from our own continent. Russia, indeed, is no small contributor from the boundless wastes of Kamschatka and Siberia; the islands of the Northern and Southern seas furnish tributaries, and both Asia and Africa bring certain quotas, to swell the total trade. But it is from those immense tracts of country over which the Hudson's Bay Company has control, and which are great preserves for Europe, that the varied and exhaustless supply proceeds. The wild and inhospitable character of that Northern region would offer no inducement to human enterprise, had not nature bountifully diffused there a race of rare and curious animals, eminently subservient both to the comfort and elegance of civilized life. It is a striking illustration of the imperfection of geographical knowledge, after all our researches, that so little is known of these territorial possessions of the Hudson's Bay Company, lying but a few degrees of latitude above us, whose object of association is the acquisition of furs. Their possessions cover one seventh of the habitable globe. It is here, in these immense hunting grounds—mountainous, sterile, and snow-covered for nine or ten months in the year—that the richest furs of the world are found. As warmer latitudes are approached, the rich, fine silkiness of the covering of animals of colder regions disappears; and furs,

still splendid in appearance, indeed, but neither adapted for warmth, comfort, or general use, are met with in its stead.

As it will be impossible to specify within due limits all the different kinds of furs which are exhibited, we will only comment upon the more curious, stating such facts of interest in regard to them as we are able to command.

Her Majesty's furriers, Messrs. J. A. Nicholay & Son, agents of the Hudson's Bay Company, selected from the importation of 1851 such furs as characterized their general trade. This selection was of great value, beauty, and interest. The groups of the varieties of foxes included the black, silver, cross, red, blue, white, and kite. The black and silver fox skins are the most valuable of this tribe—a single skin bringing from $50 to $200. They are generally purchased for the Russian and Chinese markets, being highly prized in those countries. The cross and red fox are used by the Chinese, Greeks, and Persians for cloak linings and for trimming their dresses. The white and blue fox are used in England and other countries for ladies' wear. In the English sumptuary laws, passed in the reign of Henry III, the fox is named, with other furs, as being then in use. It has been stated that the fox in the Arctic regions changes color with the changes of the seasons. Such, however, it is now stated by the hunters, is not the case, with the exception of the white fox, which is in winter a pure white and in summer a grayish tint. The otter skins exhibited were exceedingly beautiful. None of these, as will be seen by reference to the table, are used in England; the Russians, Chinese, and Greeks offering a greater price for them for caps, collars, robes, and trimmings.

The day of the beaver has, in a great measure, gone by. In the manufacture of hats it has been entirely superseded, and its present value, when compared with twenty years ago, is almost nothing. It is said, however, to be rising in the market, by a new process of preparing it for ladies' wear having been just discovered, and by the fur being manufactured in France into a costly and beautiful bonnet. In color the skin of the beaver is of a rich brown, similar in appearance to that of the costly sea otter. It is exceedingly light and very durable.

The furs of the lynx and lynx cat have gone entirely out of use in Europe—why, except from the caprice of fashion, it is difficult to say; for their rich, silky, and glossy appearance ought to cause them to be great favorites. I learned from the Messrs. Nicholay, however, that they are now dyed and prepared solely for the United States markets. The lynx fur of the present day is the same as that which used to be called "lucern."

The wolf skins are all exported to Russia, where they are manufactured into sleigh robes. The tail of the wolf is a separate trade, and very valuable; the demand by the Jews for them all over the continent being in advance of the supply.

The North American and European badger, when shown side by side, strongly resemble each other. The quality of the fur of the former greatly surpasses the latter. The European badger's fur is stiff, bristly, and coarse, and is used for shaving brushes alone; while the soft, fine fur of the American renders it valuable and suitable for general wear.

The heraldic associations connected with the sable render it highly interesting to the historian and antiquary. In every age it has been highly prized in England. The lining of a mantle made of black sables, with white spots, was presented by the Bishops of Lincoln to Henry I at a cost of £100—a great sum at that day. In Henry VIII's time a sumptuary law confined the use of the sable fur to the nobility above the rank of viscount. This fur is still highly valued in England, France, and Germany, and is mostly confined to ladies' wear. The darkest colors are most valuable, and the lighter shades are frequently colored to resemble the darker varieties.

The mink is exclusively a North American animal, and its fur is one of the most admired in Europe. It is durable, reasonably low in price, and, from its rich and glossy appearance, is a more favorite article of ladies' wear than any other in common use. The small, fine, dark mink is this season the rage of fashion in Paris, inducing the exportation of nearly all the last arrivals, and commanding a high price. Almost its rival is the fur of the musquash, or musk rat, now the largest article of import among furs into England. The great use to which it was formerly appropriated—the manufacture of hats—has been entirely superseded by silk plush; but it is now dressed in such a manner as to be cheap, durable and beautiful for female wear, though it is almost invariably sold under another than its real name.

The resemblance between the North American and Russian white hare is perfect. No difference is known to exist between the habits, character, or color of the two animals; both being taken in the same way, and both changing from a pure white in winter to a grayish tint as warm weather approaches. It was formerly much used in its white state for ladies' cloak linings, and other similar purposes, and as a substitute for the white fox; but the skin being exceedingly tender, it has given place to the white Polish rabbit. This fur is also often palmed off, when dyed, for something other than it really is. The same is true of the Hudson's Bay rabbit—perhaps the least valuable of all skins which are imported. The fur is fine, long, and thick; but the skin is so fragile and tender as to render the fur nearly useless.

The black bear skins are valuable. It receives the name of the army bear from the appropriation of its fur into caps, pistol-holsters, and other military accoutrements. The fine black cub-skins are much desired in Russia for shoe-linings, coat-linings, trimmings, and facings. The skin of the white Polar bear, the supply of which is very limited, is generally made into rugs, which are often bordered by those of the black and gray bear. The brown Isabella bear skin is reserved exclusively for sale in the Canadas and the United States. Forty years ago they were the *ton* of the Hudson Bay furs in England, and on the continent; but the caprice of fashion has now reduced the price of a single skin from forty guineas to five, and, in some instances, as low even as one.

The sea otter is the royal fur of China, confined to the reigning family, the mandarins, and great officers of State. It will now command from from $150 to $200 in the English market for export to the East. It is also in great esteem in Russia; being worn by the wealthy nobles for collars, cuffs, facings, and trimmings. It is very heavy, and thus becomes unsuited for ladies' wear; but its fur is of the thickest, softest, and richest kind, and it is more durable than any other fur in wear.

The fur of the raccoon is greatly admired in Germany; Leipsic is the headquarter of its sale; an annual fair being held there principally to

promote its sale. The skins are appropriate to all sorts of uses in gentlemen's wear, and, when of the darker shades, bring a large price. The cat-lynx, distinct from the lynx, is also a favorite fur at the same fair.

These—with the exception of the swan's-down, of which there were several specimens, most of which is used for ornamental and fancy purposes, and for military plumes—constituted the exhibition of North American furs. The European furs were exhibited by themselves, and deserve a distinct notice.

The Russian sable is, perhaps, the most interesting, and it is the most costly of the furs of Europe. The best skins are worth $50 at wholesale price in the market. It is usually manufactured into linings, which are generally used as presents by the Emperor of Russia, the Sultan, and other great potentates, at a value sometimes of $5,000. It is also manufactured into the wearing apparel of the wealthy. Its use in England is mainly confined to the city of London, which city comprises about one-eighteenth of the metropolis called London, where municipal law and custom enjoin its wear by the lord mayor, the alderman, and sheriffs, each having their robes and gowns furred with sable upon all state occasions, according to their rank. It is generally known that the *livery* of London constitutes the free-holders of the corporation. To be free from certain taxes, to buy and sell certain goods as trades-people, to vote for city officers, and to possess certain other privileges, one must belong to the livery—that is, he must be a member of one of some eighty companies, such as the Goldsmiths, Drapers, Pewterers, Ironmongers, Tailors, &c., which have been in existence from five hundred years and more back, paying his annual fees in order to enjoy the freedom of the city. These companies are generally very rich, and have what is called a court, composed of masters, wardens, deputy wardens, &c., whose chief duties appear to be the appropriation of the income of the company they represent towards weekly and monthly public dinners for themselves and wives. These members of the court are obliged to wear a certain dress, lined and faced with Russian sable fur, upon all public occasions; and as these occasions, where the funds of the company are well vested, require observance some fifty times in the year, the market for the sable fur is not likely to be soon dull—certainly not so long as Parliament allows London to retain its privileges as a close corporation. The tail of the sable is universally used in the manufacture of artists' pencils and brushes; it being preferable to all other fur. It is also used for muffs and boas. Russia produces about 25,000 of these beautiful and admired skins annually. Naturalists have not yet decided whether this species is identical with that from North America; the fur of the former being much finer, softer, and longer than that of the latter.

The stone-martin, of which several groups were exhibited, is widely spread over Europe, and derives its name from the fact of the animal selecting rocks, ruined castles, &c., as its haunts. The fur, in its natural state, is soft and fine, and shades from a light to a dark bluish-gray, taking the color of the rocks among which it is found. The throat is invariably a pure white. The French excel in dyeing this fur, and it is thence termed the French sable. It is extensively used in England,

and being a permanent color, much like the true sable, it is a great favorite.

The groups of ermine—a fur little known in reality in our country—were very attractive. For more than a thousand years the fur of the ermine has been associated with the dignity of the throne and the bench. In England, at the coronation of the sovereign, the "minever," as the ermine is styled in heraldic language, is used, being "powdered"—that is, studded with black spots; the spots, or "powdered bars," on the "minever" capes of the peers and peeresses being in rows, and the number of rows, or bars, denoting the degrees of rank. The sovereign and the members of the royal family have the "minever" of the coronation robes powdered all over, a black spot being inserted in about every square inch of the fur. The crown is also adorned with a band of "minever" with a single row of spots. The coronets of the peers and peeresses have also a similar decoration. The black spots are made of the skin of the black Astracan lamb. On state occasions, in the House of Lords, the peers are arrayed in their robes of state, of scarlet cloth and gold lace, with bars, or rows, of pure "minever," more or less, according to their degree of rank—the sovereign alone wearing the pure "minever" "powdered" all over. The judges, in their robes of office, are clad in scarlet and pure ermine. The ermine, with the tail of the animal inserted therein, is used as articles of dress for ladies, in every variety of form and shape, according to the dictates of fashion. The "minever" can only be worn on state occasions by those who, by their rank, are entitled to its use. In the reign of Edward III, furs of ermine were strictly forbidden to be worn by any but the royal family; and its general use is prohibited in Austria at the present time. The ermine is obtained in most countries; but those of the purest white are found in Russia. It is the same animal with the weasel of more southern climes. The animal is killed in the winter, when the fur is pure white, (except the tail, with its jet-black tip,) it being, in that season, in the greatest perfection. In spring and summer it is gray, and of little value. In mercantile transactions the ermine is always sold by the "timber," which consists of forty skins. The "minever" fur of olden time was always taken from the belly of the gray squirrel.

The squirrel has, in fact, always furnished an article of fur that has been highly prized in England. At the time just alluded to, during the reign of the third Henry, its fur was included in the sumptuary laws of that period. Even now the amount of squirrel fur used in the kingdom exceeds nearly three-fold that from all other animals. The greatest importation of this fur is from Russia, though vast quantities come from North America. The importation for 1850 exceeded two millions of skins from Russia alone. The fur of the Russia gray-squirrel is esteemed more highly for its glossy surface than any other. It is manufactured entirely for ladies' and children's wear. For cloak and mantle linings it is particularly suitable, its moderate cost adapting it to general use. The celebrated Weisenfels linings are manufactured from the belly of the dark-blue squirrel. The exquisite workmanship and lightness of these linings are without parallel—a full-sized cloak lining weighing only twenty-five ounces. This favorite commodity is known as the *petit gris*. For colder climates the linings are made from the back, or plain gray part of the squirrel, (the belly part being white,) the best qualities having the

tail left upon the skin. The lighter colors of squirrel-skins have lately been dyed to resemble sable, and are successfully palmed off upon the public as that article.

Some forty years ago, the fitch, or polecat, furnished one of the most popular kinds of furs. Its color was rich—the top hairs a jet-black, the ground a rich yellow—and its durability surpassed all other furs. As it could be never entirely rid of its odor, it was gradually banished from use in personal wear, and is now a drug, comparatively, in the market.

Various specimens of lamb skins were shown at different stalls in the Exhibition. Among these, the best were from the Crimea and Astracan, though beautiful color and exquisite softness characterized many that were brought from Persia, Hungary, and Spain. The Russian department also exhibited some lamb skins, dressed in a peculiar style, for gentlemen's coat linings, and for many purposes. The Astracan lamb possesses a rich, wavy, glossy, black skin, extremely short in the fur, and having the appearance of watered silk. Upon inquiry as to how this appearance was produced, it was ascertained that, in order to obtain the perfection of lamb skins, the mother sheep is killed before the birth of her offspring. Hardly less beautiful than the Astracan is the Persian gray and black lamb fur, covered as it is by the minutest curls possible. This, too, is produced not by natural means, but by a method of sewing the lamb up tightly in a skin as soon as it is born, and not removing it until the desired curl is produced. Both these furs are costly, but they are very much desired for military cloaks upon the continent. The national coat, called *Juhasz Bunda*, of Hungary, is made from lamb skin; and the short jacket of Spain, adorned with silver filigree buttons, is from the same material. In the reign of Richard II the sergeant-at-law wore a robe furred inside with white lamb skin, and a cape of the same.

The cat skin, whether of the wild cat of our northern forests or of the "tabby" of the fireside, is again coming into favor. The Hungarian wild cat, from its greater size, longer fur, gray color, spotted with black, and its peculiar strength, is most esteemed; but all furs of the cat are now in requisition; and so great was the demand during the fall months of the present year for the article that hundreds of thousands of domestic cats in England were stolen and bagged for the market.

The show of seal skins was perhaps the best in the way of furs. With the history of this animal, so far as its skin furnishes commercial employment, we are far more familiar than our English cousins.

The seal is found in the cold climates of the North and South, and is procured by our whalers both for the value of its oil and the demand for its skin. The skins, when taken from the animal, are salted and packed in casks. When opened, they are assorted: those suitable for leather pass into the tanner's hands, making a beautiful material for ladies' shoes; those suitable for the furrier—the blue-black, the hair, and the silver seal—are dressed and sold. The manufacture of the seal fur is brought to a high state of perfection. When the skin is divested of the long coarse hair, which protects the animal in its native element, there remains the rich, curly, silky, yellowish down, in which state it was long used for travelling caps in our northern and eastern States. These having now been proscribed by fashion, the fur is dyed a beautiful vandyke brown, giving it the appearance of rich velvet; and it is made into every variety of shape and form for the wardrobe.

The chinchilla is exclusively obtained from South America. It is about 40 years since it was first introduced into the European market. Of all other furs it has held its ground, having had nearly the same demand, and selling for the same price, since it was first used. Its extreme softness and delicacy confine it to ladies' wear.

Leaving the torrid zone, we will say a word upon the skins which were exhibited from the tropics. There were fine specimens of the skins of a lion, tiger, leopard, and panther exhibited in the Indian department—that is, in the department devoted to products from the East India Company's possessions. There is little of interest connected with tropical furs or skins, excepting as connected with the uses they subserve in various countries. In China, the mandarins cover the seat of justice with the skin of the tiger. In Austria, the small fine leopard skin is worn as a mantle by the Hungarian noblemen of the Imperial Hussar Body Guard. In England, the use of the leopard's skin as housing for the saddle is forbidden to officers below a certain rank.

The Angora goat of Asia Minor is remarkable as producing a long, curly, rich, white, silky coat. It was formerly a most costly and fashionable article of female wear, but has now gone into disuse. When dyed, it takes some of the most beautiful and brilliant colors. It is also woven into rugs for drawing-rooms, halls, carriages, &c.

There is an aquatic bird found in the large lakes of northern Europe called the Grebe, (*Podiceps cristata.*) It is also killed in the forests of Germany. The feathers taken from it are of the purest white, having the appearance of polished silver, the plumage on the outer edge of the skin being a rich dark brown. It is one of the most durable of feathers, the smoothness of the surface preventing its soiling in wear, and is at the present time in great favor for the dresses at court.

Of the universally used downs—the swan, goose, and eider—nothing new can be said. In the neighborhood of the specimens of these was exhibited the duck bill platibus, a native of Australia—a bird whose existence was long denied by naturalists. It is certainly one of the most extraordinary animals in nature, supplying a sort of connecting link between the bird and the beast, having the claw and body of the latter, with the bill and web-foot of the duck. The male is furnished with two powerful spurs on each hind-leg, similar to the game cock. The female lays eggs, which she hatches, and then suckles her young brood. The skin strongly resembles that of the otter, but seldom exceeds twelve inches in length. Many attempts have been made to take them alive, but without success.

Passing from the raw skins and furs to the articles manufactured from them, but little need be said. There is probably no article of commerce in which so much deception is practised as in furs—and this not upon the wearers only, but also upon all buyers after the skins have left first hands. Among the great exhibitors, after the Messrs. Nicholay, were Messrs. Robert Clarke & Son, Mr. Ellis, the Messrs. Pawson, Mr. Sampson, and Messrs. Lutge & Co., all furriers of London. The manufactures of the Messrs. Nicholay, however, far surpassed the others, and it is said that so great is their skill and influence, that the prevailing style of furs for the London season depends upon their decision. The seal

fur has been upon the decline in trade for several years, while imports to the market have increased. Among their display were to be seen dresses of seal fur, colored a vandyke brown, for her Majesty the Queen, and for the princesses, whereupon, for the present winter, the demand for seal dresses has so far outrun the supply that the price of the article has greatly increased.

M. Rea, of Paris, exhibited a muff and boa made of the down which forms the military and state plume known as the aigrette, procured from a bird called the eigret, which ought not to pass unnoticed. This material is far more costly than even the most choice of the eider down. Its rarity is so great, that three other sets only have been made during the present century, viz: one for the Empress of Russia, one for the Duchess of Berri on her marriage, and one for the Princess Adelaide, sister of Louis Philippe. The articles are beautiful beyond all description, as the reader will judge they ought to be at a price of 500 guineas.

Carpets.

The use of carpets is far more universal in the United States than in any part of Europe. The floors of concrete, which are almost universal in houses of the middle and humble class upon the continent, are nearly unknown in our country; while the polished deal and oak, universal in the baronial halls and palaces, with or without the addition of parquetrie, have never to any extent been introduced across the water. Of course upon the subject of carpets little can be written that would be useful or interesting in a Report like this, and the subject is referred to more for the reason that several very important improvements have of late been introduced into carpet-manufacturing abroad, the knowledge of which may be serviceable to our own carpet-makers, than for anything else. With a few words of preface in reference to the past history and present condition of this branch of industry, we will immediately proceed to describe what those improvements are.

Carpets are entirely a modern luxury. It was not until the seventeenth century was somewhat advanced that carpets were considered a necessary article of furniture by the wealthy; and up to so late as the beginning of the nineteenth century, whether in the United States or Europe, the use of carpets was exclusively confined to the independent in means of living, if not to the wealthy. The first carpets used in England were brought from Persia. In after years, for the space of nearly half a century, the greatest importation of them was from Flanders. The former country still furnishes its small quota of supply for the European demand; but France has for many years past supplanted Flanders in supplying the richer classes with the best specimens of design and coloring. Persian carpets are now what they always were in manufacture and design. Like the manufacturers of China, India, Turkey, and Tunis, they show no improvement; and it is evident that the day is not far distant when their manufacture will become as extinct as the manufacture of cottons, for which India was once so famous.

Contrary to universal belief, there are but few *kinds* of carpets. The mode of operation pursued in producing tapestry and Tournay, Axminster and Wilton—names given at the caprice of the maker, and in most instances neither indicating the locality of the manufacture nor the quality of the carpet—is precisely similar. In fact, Axminster no longer produces carpets, the business there being utterly extinct. Tapestry carpets are those produced by the needle; they are, in fact, needle-work carpets, in which machinery has very limited duties to perform, and those of a simple character. Tournay and Axminster carpets are produced by hand also; a machine, if such it may be called, which is nothing more than a frame, such as ladies use for stretching their canvas for needle work, is set up perpendicularly, and the woman occupied in the production is seated in front, and works horizontally. Each thread is knotted to the foundation or back, and is not in any other way connected with any other thread. Velvet pile, royal pile, and Saxony carpets are all the same kind; the names being given at the caprice of the manufacturer, and conveying no definite idea of the quality. They are each and all manufactured in the same loom; are all, in different degrees, the same fabric, and often the same pattern, as Brussels carpet. In fact, the *worsted loops* is the distinguishing characteristic of the Brussels carpet. When cut open by a razor, the tool used by the weaver for the purpose, passing across the carpet, and guided in its course by a grooved wire, over which the loops have been formed, it becomes a "Saxony;" a wire of larger dimensions produces a larger loop, and this, laid open by the same primitive process, produces a "velvet pile."

Here, again, we may notice that names are capricious. Brussels supplies but few of the carpets that bear the name, and Kidderminster manufactures altogether a different article from those which it gives appellation to in the market.

No single article in the way of carpeting—in fact, perhaps no single article of any kind—attracted more attention throughout the time of the Exhibition than the tapestry carpet from the Gobelins. The date of this world-renowned national establishment of France is very remote. From the 14th century dyers in wool have been established in the Faubourg St. Marceau. One of them, Jean Gobelin, who lived in 1450, acquired considerable property in the neighborhood. His descendants continued his trade with success, and, having become extremely rich, gave great renown to their manufactures. Louis XIV purchased the premises and erected there a national manufactory. From that day, what of genius, taste, science, and wealth could be devoted by the patronage of the French government to the production of Gobelin's tapestries, has been done. In the tapestry work, the workman stands at the back of the canvas on which he is employed, with the model behind him, to which he occasionally refers, in order to adjust the color of his woollen or silken thread to that part of the picture he is copying. The object of the process being to present as smooth and delicate a surface as possible, all cuttings and fastenings are performed at the back. Hence the necessity of his working on the wrong side. Some of these carpets take as long as ten years to finish, and cost 150,000 francs. They are never sold. The closeness with which the painter's art is imitated is wonderful. In the battle scene represented in the large piece sent to the Exhibition, it was impossible to detect a shade of difference from the real picture—the drawings, the colors, the perspective, all being precisely similar to the model.

In the patented processes by which English carpets are just now being made, there is much that looks like an entire revolution in the old way of manufacture. To understand the results, the means by which they are arrived at being kept secret, it is necessary to go back to the first improvement in the manufacture of Brussels carpets, patented by Mr. Whytock. In the old method of this manufacture, about two-fifths of the worsted is used in the *back* of the carpet, and seven colors are the greatest number which can be introduced by the weaver; in consequence, the carpet is more costly than is necessary for wear, good material being consumed in a part never used; and the designer finds himself shackled by the limits to his coloring. By Mr. Whytock's invention, each individual thread is dyed with all the requisite colors of the carpet, and in the precise quantities required for its position in the pattern. The objection to this improvement was, that while it gave no limits to the colors required, it demanded a nicety of calculation that subjected the whole product to the risk of ruin upon a single mistake in the weaver: neither did it affect the price of the kind of carpets to which it was applied, since all that was gained in the saving of worsted from the back was lost in the enhanced difficulty of the manufacture.

Another patent was obtained, and is worked by Messrs. Templeton & Co., of Glasgow. It is used only for producing carpets of a superior quality, which are expected to find consumers among those who would otherwise be purchasers of tapestry or Axminster. It is sufficient for our present purpose to say that by this patent *chenille* is dyed and woven in pattern as *worsted* is dyed and woven by Whytock's patent. In the method of working, some differences exist between the two, but the general result is the same.

But the patent which we have now reached, and to which we beg to call the attention of our carpet manufacturers, is that of Messrs. Bright & Co. By this process the carpet is woven, without colors, simply in white worsted, by the ordinary power looms. The wires used in the ordinary process are entirely dispensed with, and the loop is formed by an arrangement in the machinery. The pattern is then printed on the carpet by a process that strikes the colors quite through the fabric, and, at the same time, prevents the possibility of their running into and mixing with each other; thus a Brussels carpet is produced by a simple mode of operation, and by machinery that is admirably and ingeniously adapted for the purpose. By this process an immense saving in cost must be effected, while the designer is left free to indulge his taste or fancy to the utmost. Instead of the razor, heretofore used to cut the threads in producing the "velvet pile" carpets, the whole process is accomplished by mechanism. While the process of weaving is going on in the loom, an instrument is put in motion that cuts the loop with perfect accuracy. The process is far from what it may become, but it suggests an idea in the manufacture of carpetings which will certainly be shortly realized.

Towards the close of the Exhibition, Mr. Bigelow, of Boston, exhibited several specimens of Brussels carpetings woven by the power-loom, which excited much attention. This process, invented and patented by Mr. Bigelow, and now in general use in the United States, is altogether unknown here, the owner of the English patent objecting to its use here, as likely to be detrimental to the business at home. It is, perhaps, one of the greatest improvements yet made in weaving, and accomplishes what has heretofore been deemed an impossibility, viz: the use of all varieties of colors in the power-loom.

Part III.—MACHINERY.

There was no department in the Exhibition which presented to the spectator so much to attract his observation and occupy his thoughts as that of machinery.

The great influence which machinery is destined to exercise over the fortunes of mankind can scarcely yet be understood even by the most enlightened; for there is no limit to its power, no boundary to its application. Here it is that we discover how mechanism is extending her dominion over the whole empire of labor; how she rises in textile fabrics to the manufacture of the most delicate and intricate lace; how, from wood, she aspires to fashion iron into the most exact proportions; how, with steam as her handmaid, she works the printing press and navigates the ocean, and outruns the swiftest animal in her course. Turn into the agricultural implement department, and we find everything now done by machinery. By it the farmer not only sows and reaps, but he manures and hoes; by it he threshes out and grinds his corn and prepares the food for his cattle. He can even drain by machinery, and it is difficult now to find a branch of his business into which it does not largely enter.

The space allotted to machinery was divided into six classes, commencing with—

Class 1.—*Machines for direct use, including Carriages, Railway, and Marine Mechanism.*

In this class the number and interest of the objects displayed were very great; more particularly as regards the steam engines, of which the show was on a scale commensurate with their importance, many exhibiting admirable specimens of workmanship and new adaptations of mechanism to increase the power of the engines and to add to their safety.

The "Liverpool," locomotive engine; built by Messrs. Curtis, Burry, & Kennedy for the London and Northwestern Railway.

This gigantic machine is constructed on the principle of the Crampton patent, the peculiarity of which is that the driving wheels are placed at the rear of the engine, immediately under the fire box.

It was built when the "battle of the gauge was raging at its fiercest," and when it was one of the favorite boasts of the broad gauge champions that an engine equal in force with the largest in use on their gauge could not be made to run on a 4-feet 8½-inch gauge. To prove the contrary of this was the object of the "Liverpool."

This great machine is supported on eight wheels, the driving wheels being eight feet, and the supported wheels four feet, in diameter. The cylinders are eighteen inches diameter, and twenty four inches stroke.

The evaporating power of the boiler must be enormous, since the heating surface exposed to the direct action of the fire is 156 square feet, and the total surface of the tubes which traverse longitudinally the boiler, and by which the gaseous products of combustion are conducted from the fire-box to the chimney, and strained of their heat *en route*, is not less than 2,099 square feet.

It contains, therefore, 2,090 feet of heating surface, being 270 feet more than the largest engine on the broad gauge. The weight of the engine, when supplied with its full complement of coke and water, is 37 tons. Its length is 32 feet. It is stated to have attained a speed of 100 miles an hour with a train of 39 loaded carriages.

The "Lord of the Isle."—Sent by the Great Western Railway Company.

This is one of the ordinary class of engines constructed by the above company since 1847. It is one of the largest yet built by them for their broad gauge line. It is capable of taking a passenger train of 120 tons at an average speed of sixty miles an hour upon easy gradients. The evaporation of the boiler, when in full work, is equal to 1,000-horse power, of 33,000 pounds per horse; the effective power, as measured by a dynamometer, is equal to 743-horse power. The weight of the engine in working order is 35 tons, which does not include the tender, which, under similar circumstances, weighs 17 tons 13 cwt. The diameter of cylinder is 18 inches; length of stroke, 24 inches; diameter of driving wheel, 8 feet; and the maximum pressure of steam, 120 pounds on the square inch. The actual consumption of fuel in practice, with an average load of 90 tons, and an average speed of 29 miles, including stoppages, (ordinary mail train,) has averaged 20.8 pounds of coke per mile. The tender is capable of containing 1,000 gallons of water and 1½ ton of coke.

Ariel's Girdle.—A locomotive, invented by Mr. Adams, of Adam St., Adelphi, London.

This engine is on four wheels, and contains its supply of water and coke without requiring a tender. It is called a tank engine, and exhib its several improvements, the chief of which consists in its mode of connexion with the passenger carriages. Long iron arms project beyond the buffers, and are inserted into the frame work of the adjoining carriages in such a manner as to give mutual support should the axles of either the engine or of the carriage break.

This engine may be readily detached from the carriages by means of a handle at the back, within reach of the engineer. The weight of this combined engine and tender, capable of containing a supply of water and coke to serve for 50 miles, is only eight tons. It is calculated to propel three loaded carriages at the ordinary speed.

A light Locomotive.—By Messrs. Wilson & Co., Westminster.

The peculiarity of this engine consists in its having two boilers heated by the same furnace, by which arrangement a larger heating surface is obtained, with the important advantage of lowering the centre of gravity, thereby increasing the steadiness of motion and diminishing the risk of running off the rails. This is also a tank engine, and will carry 520 gallons of water, its weight 16 tons, and 40-horse power.

Hydraulic Press.—The Bank Quay Foundry Company, Warrington.

This hydraulic machine is the one by which the memorable engineering power of raising the tubes of the Britannia bridge from the level of the water to their permanent position—a height of 120 feet—was executed, and cannot fail to attract the attention of all who are capable of appreciating the wondrous expedients supplied by science to art.

Let us imagine two strong cylinders of cast iron, one of a large the other of small capacity, having a pipe of communication between them, in which a valve is placed opening from the small towards the larger cylinder.

At the top of each of these cylinders is a water-tight collar, in which is inserted a cylindrical rod, turned exactly to fit the collar, and which, moving in the collar so as to be water-tight, descends into the cylinder. These rods are each a little less in diameter and in length than the cylinders, so that, when they have descended in them, a space will remain around and below them. The larger of these rods, which moves in the great cylinder, is called the "ram," and the smaller, which moves in the lesser cylinder, is called the "plunger."

We will then suppose that the ram is let down in the great cylinder, and the plunger raised to the top of the small cylinder, and let the two cylinders and the communicating pipe be imagined to be completely filled with water.

If the plunger be then pressed down in the small cylinder, it will drive so much water as it displaces from that cylinder through the communicating pipe and valve into the large cylinder, where the ram will be compelled to rise to give space for it. The height through which the ram will be thus raised will depend on the proportion which its magnitude bears to that of the plunger; thus if the bulk of an inch of the ram be 500 times greater than the bulk of an inch of the plunger, it is evident that the 500th parth of an inch of the ram will occupy a space equal to and will displace as much water as would an inch of the plunger. To raise the ram, therefore, in such case through the height of one foot, the plunger should be moved through 500 feet.

Each time that the plunger is raised to repeat the stroke, water is drawn in the lesser cylinder, so as to refill it from a reservoir, on the principle of the common pump; and during this process the water which had been driven into the large cylinder cannot return, being stopped by the valve of the communicating pipe, which only opens towards the larger cylinder.

To estimate the force with which the ram will be pressed upwards by the water driven under it, we must consider that the pressure produced on each square inch of the section of the plunger will produce an equal pressure on each square inch of the ram. This is an immediate consequence of the fluidity of the water which is interposed between the plunger and the ram. If, then, as we have supposed, the section of the ram be 500 times greater than the section of the plunger, it will follow that a pressure of one ton exerted by the plunger will produce an upward pressure of 500 tons upon the ram.

Such is the general principle and such the essential parts of the hydraulic press, of which so stupendous a specimen is presented to the visitor in the machine which raised the Britannia tubular bridge from the surface of the water and placed it on the piers at a height of 120 feet.

The weight and bulk of this cyclopean engine are in accordance with its vast mechanical power. The great cylinder is 9 feet long, 22 inches internal diameter, 10 inches thick, and weighs 15 tons. It is a perfect mass of cast iron. Allowing for waste, 22 tons of fluid incandescent iron were required for this enormous casting. After being left for 72 hours in the mould in which it was cast, the mould was detached from it. It was still red hot. It was then left to cool, and it was ten days before it was sufficiently cool to be approached by operatives, well inured to heat, for the purpose of detaching from it the part of the sand of the mould which still adhered to it.

The ram, which is the immediate object that receives and transmits the pressure, is also cast iron, measuring 20 inches diameter, and weighing 3 tons 13 cwt.

When the weight and bulk of these working parts of the engine, and the vast force exerted by them, are considered, it will be easily understood that corresponding strength must be provided in the framing and moulding it. The cylinder is enclosed in a cast-iron jacket, bound round by wrought-iron slabs, which being placed around it when red hot, were allowed to cool, and in cooling contracted so as to grasp the casting with irresistible force. The weight of this compound jacket of cast and wrought iron is eight tons.

The cylinder and ram thus enclosed in the jacket rest upon horizontal beams of cast iron, each of which weighs five tons. These beams themselves rest upon compound girders of curious construction, which form the basis and bear the entire incumbent weight of this immense piece of machinery. These girders are composed of plates of wrought iron $\frac{6}{16}$ of an inch thick, alternated with boards of American elm $2\frac{1}{8}$ inches thick, the timber and the iron being united after the fashion of a sandwich, and the entire girder being composed of six plates of iron alternated with six interposed boards of elm. This compound beam of wood and iron—the plates and boards being placed with their planes vertical, their edges being presented upwards and downwards—is secured at top and bottom by twelve wrought-iron bars extending the whole length of the beam. The weight of each of these sandwiches is twelve tons.

The means by which the ram is made to elevate the bridge is as follows: to the top of the ram is attached a cross-head of cast iron; the ram, being, as we have stated, a cylindrical rod twenty inches in diameter, is let into a hole of corresponding size made in this cross-head, on which it is securely fastened. The weight of this cross-head is thirteen tons.

To prevent the ram from suffering any lateral strain during its action, the cross-head is made to work on vertical guide rods of wrought-iron, each six inches in diameter, which are fixed in sockets on top of the press. To the cross-head were attached the chains which descend to the level of the water and embrace the tube to be raised.

The greatest weight lifted by the press was 1,144 tons, but it was capable of raising 2,000 tons. The quantity of water injected into the great cylinder in order to raise the ram six feet was $81\frac{1}{2}$ gallons. When a lift of six feet was effected, the lifting chains were seized by a set of clamps under the lowest point to which the cross-head descended, and, while they were thus held suspended, the water was discharged from the great cylinder. Meanwhile the lengths of the chains above the clamps were removed, and the chains thus shortened attached to the cross-heads by other clamps connected with the cross-head, and all was prepared for another lift. In the practical operation of the machine each lift occupied from thirty-five to forty minutes.

Planks of cold iron, of different thicknesses, have been punched by this machine, and it has been found that for the thickness of one and-a-half inch a pressure is required of 700 tons, and for three and a-half inches' thickness, a pressure of 2,050 tons. This being a single press is the largest one yet made.

Model of Patent Locomotive Machinery for working up or down steep inclines from or to Wharfs, &c.—G. D. B. Beaumont, London.

This model only shows the principle of bite for steep inclines; the same principle, with different construction of leverage, is adapted to common roads, and has lately been worked successfully by locomotive steam engines.

Railway Carriage.—Exhibited by the London and Northwestern Railroad Company.

One of the great disadvantages under which the management of the passenger traffic on the railways of the United Kingdom has labored hitherto, is the disproportionate ratio of the dead weight to the profitable weight in the passenger carriages, as commonly constructed. Thus first-class passenger carriages, which will weigh, empty, from four to five tons, will generally be incapable of transporting, when full, more than eighteen passengers, without luggage; while, in our own country, it is well known that railway carriages are worked which transport eighty passengers, with very little more dead weight. An attempt is made to obviate this great waste of power in the form of this new style of carriage. This vehicle, which was constructed at the company's works at Wolverton, besides economizing the dead weight, is also so constructed as to have greater durability and safety in consequence of introducing the use of iron, instead of wood, into the framing and body of the carriage. The sheet-iron which is used for the panelling is corrugated, which, while it increases the strength, gives greater external beauty to the outline and appearance of the vehicle. The carriage is supported by six wheels of peculiar construction, each wheel being formed of wrought iron in one solid piece, tire included—an arrangement which obviously gives greater security against fracture than the common mode of constructing the wheels in parts. The length of the carriage is forty feet, by eight feet in width, and is divided into two first-class bodies, each capable of accommodating eight passengers, and so lofty that a person of ordinary stature can stand erect with his hat on. There are five compartments, each of which accommodates 12 second-class passengers, besides compartments of sufficient magnitude for the luggage of the passengers and accommodation of the guard. Thus this carriage may be regarded as a train in itself, capable of conveying 76 passengers, with their luggage and guard; the total weight of the carriage, without its load, being eight and a half tons. To convey the same number of passengers with the carriage at present in use would require a dead weight of 17 or 18 tons. There are other features worthy of observation in this vehicle. One of these is the contrivance for facilitating the motion of the carriage through curves.

The Locomotive "England."—Built by G. England, New-cross, London.

The great feature in this engine is its great lightness in proportion to its power, and the combination of the engine and tender upon the same wheel; and the purpose in view is to work trains of light weight. Its constructors affirm that it has sufficient power to impel a train of six first-class carriages at a speed of 60 miles an hour, and, if their expectations be realized, it will accomplish this at half the working expenses of the engines now used for such trains. Although it has no tender, it is stated to be capable of carrying a stock of fuel and water sufficient for a stage of 50 miles, so that it would be capable of taking a train from London to York by a feed of fuel and water at three intermediate stations.

Small working model of a Locomotive Engine for common roads.—Made by W. Murdock, Birmingham, as far back as the year 1785.

A spirit lamp constitutes the furnace of this machine. The cylinder is attached directly to the boiler, and the piston rod works a horizontal beam, that communicates motion, by means of a crank, to the driving wheels. It is worthy of notice that the once favorite project of travelling on common roads, propelled by steam, has no other representative than this diminutive and original specimen.

Marine Engines, of collective power of 700 horses, designed for driving the screw propeller by direct action.—Messrs. J. Watt & Co., London, and Soho, Birmingham.

These engines are arranged to act almost directly on the crank that turns the shaft of the propeller, and the cumbrous beam and connecting rods are dispensed with. The direct action engines seem now to be generally superseding the beam; and in the engines exhibited the great point of competition seems to be the best means by which the action can be directly communicated from the piston rod to the crank. In these large engines of Messrs. Watt & Co. the piston rods work in guiding grooves on the plan which we believe was originally introduced by Messrs. Mandsly & Field, and a short connecting arm communicates the motion to the crank. The cylinders are of large diameter, and short, to adapt them to the direct communication of motion which is facilitated by a small crank. These engines, in construction and workmanship, present an excellent specimen of the perfection Great Britain has obtained in the manufacture of marine engines of great power. The advantage of direct action seems to have been understood in the earliest construction of steam engines, and the plan of applying it was then similar to the arrangement we have been wont to consider new.

Sectional models of Steam Engines.—Watkins & Hill, Charing Cross.

By means of these admirable instruments of instruction all the internal parts of the engine may be seen, each part being animated with its proper motion. The engine is supposed to be cut through by a longitudinal vertical plane; one side of the model exhibits the real form of the engine, and the other side exhibits the section showing its internal mechanism. All the pistons, valves, slides, levers, and other moving parts, move with exactly those motions which they have in the real machine; the motion which in the machine itself is produced by the action of the circulating fluids, such as water and steam, being produced in the model by mechanical contrivance.

One of these models represents a marine engine, another a locomotive, and the principal one, constructed in brass, and kept in motion by means of a small working model near it, represents a stationary condensing low-pressure engine, with all its appendages, as commonly used in the arts and manufactures.

If the visitor examined carefully the movement of the parts, beginning at the piston, he observed that when that piston begins to descend, the slide which admits steam from the boiler to the top of the piston is open, as are also the passages which communicate between the bottom of the cylinder and the condenser, so that the steam urges the piston downwards against a vacuum. When it arrives at the bottom of the cylinder, he observed the slide, governing the admission and the escape of the steam, to shift its position, the bottom of the cylinder being now put in communication with the boiler and the top with the condenser, and thus the piston will be driven upwards by the pressure of the steam under it. If he then followed with his eye the passages leading to the condenser, he saw the air pump working, and its valves opening and closing, by which the water and air are drawn from the condenser and thrown into the hot cistern. He saw, in like manner, the action of the hot and cold water pumps, the parallel motion, the governor, and, in a word, all the parts of the machine.

An intelligent and attractive observer, having some slight previous knowledge of the mechanical properties of steam, will, by a mere inspection of this model, obtain a more perfect knowledge of the steam-engine than could be acquired by days of study in books. For schools and colleges such a model in series would be invaluable.

Patent Safety Apparatus for preventing accidents in descending or ascending Mines.—Messrs. Fourdrinier, Sunderland.

This machine consists of a cage or basket, which can be employed in every way precisely as any arrangement now in use. The cage or basket is attached to guide rods or chains in the shaft, and upon the rope or chain being broken, arms forming powerful levers are liberated, and these are wedged most securely upon the guide rods. The apparatus has no chance of falling more than a few inches after the rope or chain is broken. The stop is most perfect, and so free from any violent action that no danger is to be apprehended from recoil. Another arrangement has been made by which the casualties arising from being drawn over the pullies are entirely prevented.

Self-inking Press.—Messrs. Ransome & May, Ipswich.

This machine has a stationary table for the types. The "tympan," as it is called, which keeps the paper in its place and folds over the types, is withdrawn by turning a winch, and as the paper is removed, the inking roller advances. In this method the types are passed over once by the roller as the tympan is withdrawn, and again when it is run in with a fresh sheet of paper. All that the pressman has to do is to put in the paper, turn the winch till it is in the proper position over the types, and pull down the handle of the press; by then reversing the direction of the winch the tympan is drawn out, and throws itself back, that the printed paper may be taken away.

Oscillating Engines.—Messrs. Penn & Son, Greenwich.

These manufacturers and engineers have obtained great celebrity for their oscillating engines. The ones here exhibited are of 12-horse power, and are contrived to act directly on the crank without the intervention of a connecting rod. The cylinders, being balanced on pivots, oscillate as the shaft revolves, and thus apply the power to turn the cranks at all points of bearing. This form of engine is not confined to the size of those exhibited, for the same makers are now constructing a pair of engines of 500-horse power for the Great Britain. There is also a feed engine for pumping water into the boilers of steam vessels when the large engines are not at work. The cylinder and pump of this machine are placed opposite each other, the piston rods being connected to the same cross head, which works in a guide, and has a vertical slot in which the crank revolves without being connected. The force of steam in the piston of the small auxiliary cylinder acts directly on the piston of the pump, and communicates rotary motion to the crank in the slot. When the pump is worked by hand, the turning of the crank gives a direct reciprocating movement to the piston without the intervention of any connecting rod.

Model of a Submerged Paddle Wheel to work wholly or partially under water.—J. Pym, 52 Threadneedle street, London.

This paddle wheel consists of a number of double blades, each resembling a flat oar radiating from the centre, the upper and lower parts being placed at right angles to each other. A screw in the axle of the wheel *takes into threads* in the centres of the blades, by which they have a rotary motion imparted to them independently of the revolution of the wheel. When resistance is required, the flat sides of the oars are turned to strike against the water; and when resistance would check propulsion, the blades are turned edgeways. This propeller, therefore, would act entirely under water; though, when partially above the surface, the resistance to the ship's motion would be less.

Self-acting feathering Paddle Wheel.—Mr. Jones.

This paddle wheel deserves notice from the simplicity of the arrangement and the effective way in which it prevents retarding resistance. The floats turn on pivots, and have stays at the back to prevent them from turning round when they are required to act against the water; but as soon as they have passed that point, and their further resistance would be detrimental, they turn and meet the water edgeways.

Model Railway Carriage, with Self-acting Collision and Railway Breaks. Model of Buildings, with Self-acting Fire Extinguisher.—W. Macbay, royal artillery, Woolwich.

The first of these inventions consists of an atmospheric buffer, or air-tight compartment of vulcanized India rubber, or other air-tight cloth, to prevent damage by collision. This is fitted into the exact space between the carriages, thus to interpose an elastic body of about 250 cubic feet, (of air,) so that, when a collision takes place, it must be displaced before the carriages can come in contact with each other. The method of conveying the air into these rubber compartments is by two tubes, carried longitudinally on the top and near the edge, the front apertures for admitting the air being bell-shaped, to admit a larger quantity. These tubes conduct the air into the compartments at the back, lifting up two valves placed on a small projection, or box, with an inclined surface of one and a half foot deep. On any compression of the air compartment, these valves shut by the reaction of air, and are forced tight on the back apertures. A valve, acting in a contrary direction, then gives immediate escape to a portion of compressed air. The more rapidly the concussion, the greater elasticity will it present, and the momentum thus expends itself in the air. If the compartment bursts, the injury will have passed off with no other damage, and this can soon be repaired.

The India rubber compartment will, however, resist a great pressure, being itself very elastic; and if there should be any doubt about that, a continuous collateral vulcanized rubber piping, of about three feet diameter, could be substituted; thus dividing the same pressure to a greater surface of resistance. The application of this invention is not intended to displace the ordinary buffers, which are still useful as secondary agents and for general purposes.

The second invention is a self-acting collision break, intended to be applied to the front and rear of every train, on the luggage car at one end, and the engine or tender on the other. The ordinary breaks act on the wheels, and cannot, therefore, be instantly applied; they can only be gradually put into action, and even then the danger must be foreseen. This break, on the contrary, is intended to act only by the violence of the collision, and against the rails, by which means a greater and more instantaneous amount of friction is applied.

By means of two wedges, the breaks are forced down, the momentum to a great extent checked, and driven vertically, instead of horizontally. The greater the weight of the car, the greater will be the resistance and efficiency of the breaks; for by means of the wedge, the weight is brought to bear against the force employed. The following is the mode of application: The buffer rods in the inside of the frame, being projected 1½ foot beyond the point where they are connected to the plate springs, terminate with a buffer head, nearly similar to the one outside. When, from the violence of a collision, the springs are forced beyond their ordinary point of action, the inside buffers then come in contact with the two powerful wedges, as stated before, placed on each side of the centre of the frames, in the direction of the buffers; these wedges force down a shaft, which acts as a break, on both rails; so that the tendency is to wedge down the car, and thus prevent it from coming into violent collision with the next carriage. The momentum becoming vertical, renders it necessary that additional security should be given to the break car; for which purpose it is strengthened by a strong band of iron passing over the frame, and down each side, forming a box for the axletree of the shaft, which rests in it on a spiral spring; so that when the wedges are released, the shaft recovers its original position. Contusions may be guarded against inside by a lining of hair felt, of an inch in thickness. The other invention is a self-acting fire extinguisher. This consists of two gutta percha pipes, carried along the length of building—one on each side of the shafting roof, constantly charged with water, and of five inches diameter or upwards, having a covering of hair felt over the upper surface, and another of zinc over that, to protect it from the solar heat. Branch pipes of about one-third diameter, of iron, connected with the main pipes, are then carried down vertically along the party or partition wall of each house, or one between two houses, from whence, running horizontally, branch pipes are again conveyed to each room, about the centre of the ceiling, where it spreads out into four arms, or more, as necessary for the length or size of the room. These projecting arms terminate with an aperture, over which is screwed a gutta percha cap; this cap having a brass ring at bottom, with screw thread inside, to screw over the aperture of pipe. The object of the gutta percha caps being that they may, when a fire breaks out in any room, immediately liberate the water contained in the pipes, so that the fire may be confined to the room, and extinguished at once. Should it reach the roof, the pipes then give way, and a body of water is brought to bear on it, which must soon overpower the flames, and prevent their reaching the next houses.

The Printing Key Frame.—Invented by Foucault, Paris.

This machine is one of the most useful adaptations of mechanical science to the wants of the afflicted—an invention by which the blind are enabled to communicate their ideas by writing, or rather printing. It was shown at the Parisian exposition of 1849, and such was the appreciation in which it was held, that the inventor had the honor of receiving a gold medal at the hands of the central jury. The following extract from their report will explain the nature of this valuable invention:

"In order fully to estimate the importance of this invention, we must consider, first, the time elapsed since the want of it has been felt; and secondly, the number of experiments which have proved incapable of overcoming the difficulties to be encountered. Beheld in this double light, the writing machine for the blind, invented by M. Foucault, himself a blind man, is one of the most remarkable in the exposition.

"The praiseworthy efforts made to enable the blind to correspond with the clear-sighted, have been extremely numerous. The dependence—sometimes dangerous, and always embarrassing—on a strange hand, has ceased for them—thanks to M. Foucault; for the acknowledgment of this emancipation, consecrated by several years' experience, is no longer an object of doubt. Of all means calculated to give the graphic expression to the ideas of the blind, the inventor has selected that which may be considered the simplest and most perfect. The blind who make use of this invention are placed in circumstances perhaps even more favorable than the clear sighted, since they are enabled to write without having ever learned how to form a single letter. It is sufficient to know how to read by the touch to be capable of expressing their ideas in an eminently legible manner, inasmuch as the letters are in typographic characters. The following is the process employed to obtain this curious result: all letters of the alphabet, executed in relief, and of considerable dimensions, are fixed on the upper extremity of a metallic rod, made to slide longitudinally in a proper contiguous canal; they are placed on the same plane and in the form of a fan, each of them exhibiting on its lower part the same letter as on its upper. This letter, of a small size, is exactly a printing character. The mechanism is so disposed that all the letters converge towards the same point, and, on being successively pressed by the fingers, their impresses become superposed, forming only a black mass; but whenever a letter is touched, the paper, by the same impulsion, changes its place, and then is produced the writing—clear, well ranged, and properly spaced. The line terminated, the paper changes place in a perpendicular direction to the former, and the operation is renewed.

"Besides this a series of types, forming ciphers and all the complimental marks of writing, is placed in the same way, and in a plane convergent with the former; for the general principle of this machine is, that all the types, whatever their order may have been at first, set their impress on the same point. Of all the methods known for the obtaining of graphic characters, M. Foucault has preferred the use of tracing-paper, such as is employed in copying-machines. The whole of this valuable machine consists of a construction perfectly portable, and an extremely simple though rapid manipulation."

It appears that the inventor was a long time perfecting his machine, and that the present is the latest improvement on a series of similar inventions, the whole of which were intended to promote the same philanthropic object—teaching the blind to write. In 1850, the Board of Encouragement in Paris awarded the inventor, who was a pupil of the Institution for the Blind in that city, a second gold medal; and there is little doubt, such is the intrinsic worth and simplicity of the machine, that it will speedily come into use among the blind of all countries. Its cost is, we believe, about £20.

Model of Patent Railway Junction Semaphore Signals, and Double Station Signal.—Stevens & Son, London.

The semaphores, constructed on English railways, consist of an upright mast, varying in altitude according to circumstances, with fan-like arms attached, which, in the day time, convey the desired information to the engine drivers. At night, and in foggy weather, lamps are used, having red, green, and white glasses, to signify, respectively, danger, caution, and "all right."

The model forming the double station signal consists of two semaphores, and is employed at junctions where it is obviously necessary that special precautions should be observed to prevent collisions. By the side of the semaphores there is a wooden cottage for the policeman on duty, and a platform, with apparatus, for working the signals and for shifting the points. The ladders and gallery on top of the mast are for conveniently lighting and trimming the lamps. In order better to comprehend the value of this invention, let us suppose, on each of two railways which form a junction, that a train is advancing. If the arms, or fans, in each of the posts are stretched out, forming right-angles with the posts, both trains would be immediately stopped; but by the policeman putting his foot into a kind of stirrup, four of which are arranged side by side, one of the arms is lowered, and the train, thus signalled, would proceed, while the policeman, by means of the handles in front of him, shifts the points, if necessary. Through the agency of the entire mechanism a person, with perfect ease, can regulate the movements of four trains advancing simultaneously.

Sorrup's patent Passengers' Railway and Steamboat Time Signal.—Manufactured by R. Sidmarch, London.

This signal consists of a copper ball, 18 inches in diameter, descending down a pole or pillar, 16 feet high, (at night lit up with lamps, according to locality,) and occupying ten minutes in its descent. It is wound up to the top by clock-work immediately a train has passed, thus showing to the engine driver of the next train, at one view, how far the train preceding him had gone on, by the distance the ball had travelled down the pole. The signal is thus an unmistakeable guide to engine drivers, instructing them to shut off the steam, or otherwise, according to circumstances.

The very great superiority of this signal over all others in present use, for the purpose referred to, is very apparent, for it is of the utmost consequence that the engine driver should not only be made aware when a train is in proximity to his own, but how far it is from him; and this signal is, so far, the only method by which both these important points can at once be attained—and that in a way which cannot be mistaken. Even when passing this signal at full speed, the action of the apparatus is quite apparent; and from its construction is not likely to get out of order. It has attracted much attention from scientific men, and has been approved of by the Scotch Society of Arts, who, at their last annual meeting, on the recommendation of a committee, consisting of the most eminent engineers in Edinburgh, awarded their silver medal to the inventor, in testimony of their high sense of its merits.

It is undoubtedly one of the most complete instruments yet invented for effecting the object desired, and as a means of preventing those serious accidents—far more freqently occurring in Great Britain than with us—by the collision of railway trains.

The time of the descent of the ball or light having been uniformly fixed on all railways at ten minutes, engine drivers, removing from one line to another, would always be guided by one and the same rule of time. The signal may be easily placed on the highest elevation of a building, bridge, &c.

Model of a Colliery, with Engine, &c., representing the Coal Mines of Durham and Northumberland.—Messrs. Bradley, Wakefield, Yorkshire.

No one, even amongst those who have themselves practically explored coal mines, can fail to be struck with the clearness of perception which is obtained of such works from this model. Thus we have, first, those parts of the works which are above ground exhibited—such as the mouths of the shafts, and the engines which work them. There is, first, the shaft by which the coal is raised; next, that by which the mine is drained; and, third, that by which it is ventilated. This latter process is usually accomplished by a furnace, which creates a draught of air up one of the shafts; which is necessarily followed by currents of air down the others.

In the lower part of the model is exhibited the state of the workings. The beds of unworked coal are represented by a black stratum, the workings being exhibited by cuttings through it; the railways being shown upon which the wagons move, in which the coal is brought to the bottom of the shaft, through which it is elevated by the power of the steam engine erected at the top.

The partitions, and other contrivances to regulate the ventilation of the works, are represented by brick-work. The timber supports used for sustaining the roof of the workings are also shown.

Coal mines, or coal fields, as they are sometimes called, differ in the thickness of the bed of coal, and in the position in which it lies. In some, the thickness does not exceed 18 inches; in others, it amounts to many feet. In the coal fields of Durham and Northumberland the average thickness is 12 feet; and consequently each acre contains 19,360 cubic yards of coal, each cubic yard weighing on an average one ton.

The extent of the coal area in Northumberland and Durham is, in round numbers, 500,000 acres, and, consequently, its total contents amount to not less than 10,000,000,000 tons of coal; of which 1,500,000,000 only have been worked.

The present annual consumption of coal in the Kingdom is estimated at 10,000,000 tons, including the waste; it therefore follows that, at this rate, it would take above 800 years to exhaust this single field.

Not the least remarkable circumstance suggested by this model is the prodigious depth at which this subterranean industry is carried on. In some cases the depth of the workings is 1,800 perpendicular feet, or one-third of a mile.

The apparatus for the ventilation of the mine is extremely important, inasmuch as upon its efficiency the safety of the men engaged in working the mine mainly depends. The gas, which, by artificial processes, is extracted from the coal for the purpose of illumination, is found to issue spontaneously from the coal in the mine in more or less quantity; so much so, that by holding a candle against the walls of the workings, jets of flame may be often produced. When the gas is mixed in a certain proportion with atmospheric air, which fills the workings, a mixture highly explosive is produced; and if a flame or spark comes in contact with it, a destructive catastrophe ensues. Good ventilation prevents this evil. The current of air kept continually flowing through the workings, descending at one shaft and rising at another, is a safeguard against this evil; but as this ventilation sometimes fails, a further security is afforded in the safety lamp, which, as is generally known, is a lantern surrounded with fine wire gauze, instead of glass or horn. This wire gauze has the property of preventing the passage of flame through it. Flame is nothing more or less than gas rendered luminous by intense heat. In passing through the wire gauze it parts with so much of its heat to the metal of

the wire, that when it has issued from the meshes, it loses the character of flame and is incapable of producing explosion.

The object of the contributors is to exhibit the most practical and safe method of working, raising, and preparing coal, combining those improvements which are the most economical and efficient. It will be observed that instead of having two engines, one to raise coal and the other to pump water, the whole is concentrated in one double acting horizontal high pressure steam engine, which continually moves one way, the alternating motion of the pulling apparatus being obtained by the operation of a pair of conical drums, which screw one into the other, alternately.

By this arrangement the disadvantage of reserving the water pumping machinery is obviated, securing to it a continuous motion, which is of considerable moment. The advantage of landing the coal at the top of the pit consists in the safety and economy of labor. The cars are run out of the cages, not at the front of the head gear, as is usual, but on each side direct on to the tips, and turned over.

The coal runs down the screens, which are erected on each side of the pit, the train rails being laid below on the surface, over which the wagons run, to receive the coal when prepared for sale. The screens are so constructed that every facility is given to pick out any shale or dross, and render them perfectly clean.

Fire Engine.—Built by Messrs. Perry, Montreal.

This engine differs very materially from those now in use in England, inasmuch as it is erected to work transversely, in place of longitudinally. It is said to combine with lightness and neatness greater power than any similar engine in Europe; whilst the simplicity of its construction enables it to be worked with fewer men and more ease. It is also equally suitable for hot or cold climates, which the English engines are not. These are by the builder said to be the principal merits of this engine, though its capabilities have been as yet but partially tested. Estimating these, however, by other engines, built on a similar principle, and at work in Canada, the following are considered to be within its range: with a cylinder of seven inches, and a stroke of sixteen, it will lift a supply of water thirty feet, and, playing from the extremity of a fifty-feet hose, it will send a jet from a one-inch nozzel from 170 to 180 feet vertically, and 210 feet horizontally, or it will send two streams, each 150 feet vertically, and 170 feet horizontally. In the building of the engine exhibited, every evidence of care has been bestowed, and it is adorned with paintings of the principal edifices in Montreal, and others of minor description. It was with extreme regret that I announced, upon my second arrival from New York, that no fire engine would come from that city. In efficiency, power, adaptation, and general construction, our engines for extinguishing fires are far superior to any which are used in Great Britain or on the continent.

Fire Engine.—Mr. Merryweather, Long-acre, London.

This engine appears to be ingenious. It is called a cabinet fire engine, and notwithstanding the different forms which fire engines have been made to assume since their first invention, (about two hundred years ago,) the appearance of this shows that variety is not exhausted. This engine was produced at the request of the Duke of Norfolk, and is one of the most compact and efficient ever constructed here. In outward appearance it resembles a small cabinet upon castors, and upon removing the mahogany top, a complete fire engine is discovered, worked by a folding handle, with an apparatus capable of being rendered available at a moment's notice. The strength of one woman is sufficient to work it, and the whole does not occupy a space exceeding thirty square inches. There is also another engine by the same maker, called the farmer's engine, a branch pipe of which is furnished with a spreader, by means of which the water can be thrown over a large surface—an invaluable appendage in the event of fire in corn or hay-stacks, &c.

First-class patent Passenger Locomotive Engine.—K. & W. Hawthorn, Newcastle-upon-Tyne.

As this engine embodies three new patent improvements in railway locomotion, which appear to be of great practical value, we shall give these improvements in detail, from the description published by the manufacturers. The cylinders are sixteen inches diameter; stroke of piston, twenty-two inches; driving wheels, six and a half feet diameter; leading and trailing wheels, three feet nine inches diameter; heating surface of fire box above the grate bars, exclusive of tube ends and fire door, 98.6 square feet. Total area of fire box, including tube ends, fire door, and surface, below the upper side of grate bars, 110 square feet, (the fire box has a bridge, with space across the centre;) 158 brass tubes, two inches exterior diameter, having a heating surface of 865.4 feet—the maximum speed, with an average express train, being equal to 80 miles an hour on a good line.

The patent improvements introduced in this engine are: first, the patent double compensating beams. The compensating beams and springs (two beams and two springs on each side) are introduced, instead of the six ordinary springs, one to each axle bearing, by which arrangement all the axle bearings are so connected that whatever action takes place will be directly and simultaneously distributed over the six wheels and axles, by which means a uniform weight is constantly maintained upon all the wheels, no matter what imperfections or irregularities in the line of railway; securing thereby a constant amount of weight upon the driving wheels for adhesion, which is of great importance for a first-class engine, wherein the power is communicated to one pair of wheels; and which, in practice, is often found deficient, and attended with great inconvenience in engines with the ordinary six springs. The mode of connexion between the axles above mentioned gives great stability and easy motion to the engine, which was fully proved in the transit of the engine by rail from Newcastle to London, and particularly when running at high speeds. In addition to the advantages hereby given to the engine itself, considerable saving is effected in maintaining the permanent line of railway. In the "Hawthorn" the axles have all outside bearings, with driving wheels in the centre, and the carrying wheels at each end, (the trailing axle immediately behind the fire box,) which arrangement of wheels and axles has, with a very few exceptions, been adopted by the first engineers and locomotive-engine manufacturers, as being the best in principle for first-class passenger or express engines.

Although the necessity of having, at times, to put an undue weight upon the springs of the driving wheels, in an engine with the ordinary six springs, to secure the required adhesion, operates considerably against the arrangement, by giving to the engine an undulating or pitching motion, which at times renders it unsafe, and particularly so at high velocities, the permanent way is also more or less injured; which would be wholly removed by the double compensating beams. Occasionally, engines have been made with the driving wheels placed behind, and the motion communicated thereto by outside connecting rods, through the medium of a distinct crank axle; but the driving wheels, being so placed, curtail the foot plate, and render it very inconvenient to the engine driver and stoker; and the outside connecting rods have almost invariably been considered objectionable, and attended with less or more danger to passenger engines, particularly when running at high velocities.

Secondly. The patent slide valves, which may be made either of brass or cast iron, are placed vertically between the cylinders in one steam chest, in the usual manner. One slide valve has a plate, cast or bolted upon the back, which is planed parallel with the face of the valve. The other slide valve has a box cast upon the back, into which is fitted a projection or piston. The face of this piston is also planed parallel with the face of the valve, and packed in the most simple manner, and made steam-tight. The slide valves are then put into the steam chest, as in ordinary valves; the plate and piston work against each other steam-tight; and the trifling movement of the piston will insure the packing keeping perfectly tight for a great length of time, and, when required to be renewed, it is only necessary to remove one of the steam chest bonnets and draw out the valves. A passage is formed between the exhaust ports through the slide valves, thus giving a free discharge to the steam. By this arrangement of patent slide valves, they are relieved from one half the pressure of steam, and consequently one-half the friction and power to work them, and also a like proportion of the wear and tear of the faces and gearing.

Thirdly. Their patent link motion is also introduced into this engine. The link, (called the expansion link,) instead of being connected to the ends of the eccentric rods, and moved up and down with them, (which, with the great weight of the link, requires very strong gearing,) is directly connected by an eye-joint to the slide rod, and there suspended; hence its weight is removed from the reversing gear. By the link having thus a fixed centre, less power is required to reverse and regulate the slide valves, and the action of the valves are more correct, particularly when cutting off the steam and working expansively; the link is also much more durable by admitting of what is termed the sliding block; being more than three times the length of the ordinary block; hence a great saving in the wear and tear of the link and gearing. Another important advantage is that the link permits of the boiler being brought down nearer to the axles.

Fourthly. Their patent steam pipe is likewise here introduced, which does away with all domes or cumbrous projections on the top of the boiler. The pipe is fixed into the tube plate of the smoke box by a ferrule, like an ordinary tube, and extends nearly the full length of the boiler near to the top; it is perforated with a series of small apertures or slits along the entire length, so proportioned as to admit the steam into the pipe directly above where it is generated, instead of having to rush from all parts of the boiler to one or two orifices, so that the steam is carried to the cylinders more pure, and *priming*, as technically termed, is prevented to a great extent. Both the inside and outside framing extend the full length of the engine, and are firmly tied together by strong iron double-knee brackets on the cylinders, guide bars, pumps, axles, &c. In short, the whole machinery of the engine is perfectly fitted and fixed entirely independent of the boiler; and when so completed, and the wheels and axles put into their respective places, the boiler is then, but not till then, put in its place and firmly secured by bolts to the double-knee brackets above mentioned and the outside framing.

Portable Machine.—M. Baranowski, Paris.

This machine is for the purpose of printing, numbering, and registering tickets for railways, theatres, &c., at the rate of 5,000 per hour. A number of blank cards are placed in the upper part of this machine, and then, by turning the handle, either by hand or steam power, the cards are delivered, one by one, ready for distribution—namely, printed from an adopted form, and numbering from one to 3,000 or more. At the same time each ticket is registered as it leaves the machine. The printing, as well as the numbering, is done with common type, in different colors. Each ticket is further checked by marks or symbols, which, if necessary, may be transposed.

Model of a State Railway Carriage, with Promenade round the outside.—R. Melling, London.

The length of this carriage is 2 feet 8 inches; the breadth, 1 foot 1 inch; the length of platform round the carriage, 3 feet 9 inches; and the breadth, 1 foot 5 inches. The interior of the carriage consists of three compartments—a centre, or throne room, and a saloon at each end. The thrones and couches are of mahogany, cushioned with light scarlet velvet, and trimmed with lace to match. The doors and compartments are glazed, and have movable sashes. The body is painted a neat brown color, and has circular ends.

The carriage is supported by eight wheels. At first sight, it would appear that a carriage of such length as to require four pairs of wheels would not be calculated to turn curves with safety. This difficulty is overcome by placing two pairs of wheels near to each end of the carriage, having a considerable space in the centre. This arrangement allows it to turn a curve with nearly the same facility as if it had but two pairs of wheels, while it gives the advantage of much less oscillation, and adds greatly to the security; for if any particular wheel should fail—by the tire of the engine wheel breaking—the remaining wheel at that end of the carriage would still support it.

The Fire Annihilator.—Patented by Philips, London.

In remarking upon the efficacy of the fire annihilator for extinguishing fires in houses and buildings, Mr. Philips states: "That the origin and continuance of flame depend on two conditions—first, that the combustible material should be raised to and kept at a temperature high enough to afford a constant supply of inflammable gas; and, second, that it should be constantly fed with pure air. The usual remedy against fire is water. But water is able to interfere with the first of these conditions only. Unless the burning substance be so saturated with water that it cannot give out combustible gas within a very few minutes after it has been set on fire, the heat of the flame first extends and then ignites other inflammable gases and vapors from various parts of the room; the flames are thus dispersed about the apartments, and, by the time the engine arrives, the contents of the house are frequently consumed. We therefore propose to subdue the flame by effectually disturbing the second condition of its continuance—access of pure air. This object will be accomplished by diffusing through the atmosphere (already vitiated by the combustion) of an apartment on fire a quantity of carbonic gas and steam, and thus render the continuance of flame impossible. These gases and vapors are generated in a portable apparatus, which, when intended for the protection of private dwellings, weighs from twenty to thirty pounds; and the construction is such that the æriform fluids can be evolved in less than three seconds on touching a spring.

The great advantages possessed by the gas over water were as follow: The gas was evolved at a temperature of about 160° Fahrenheit, and came in contact with flame having a temperature of about 3,000°, and under which temperature it could not exist. The gas absorbed part of this heat, and not only in proportion to its original volume, but expanded as much as a hundred times more, each part still retaining highly absorbent powers. Now, water thrown into a body of flame only acts on the part immediately in contact with it; and although it might be used at (say) 32° Fah., much lower than the gas, yet it was found that a very small part assumed the form of vapor on coming in contact with flame, and, spread through it, the greater quantity fell down by its superior weight and was wasted.

A public demonstration of this patent took place in the early part of the present year. The fire annihilator used on this occasion was less in size than an upright coal scuttle, and consisted of a machine composed of four tin or thin iron cylindrical cases, within one another, the central case containing a chemical preparation, in the form of a brick, composed of charcoal, nitre, and gypsum, which, whenever occasion requires, will discharge, with the power of steam, a vapor in which flame cannot exist. In the centre of this inner case is a small hole to receive a phial of the chemical compound, which fires the inside substance, and creates the vapor, on a pin being pressed down from the top and the lid screwed down. The first experiment was on a large jet of gas, upon which water was poured, which had no effect; but on applying a machine, not larger than a half-pint tumbler, charged with vapor, the flame was extinguished in about three seconds. A small model of a house was crowded with combustible materials, saturated with turpentine, &c.; the door was closed, and the flames rapidly ascended to the roof. Here Mr. Philips showed that the gas given out by the flame or smoke was such as not to allow a person to breathe, and hence suffocation frequently followed when fires occurred. On applying a light to the windows, &c., whence the smoke issued, it was immediately run out. The same small machine, as we have before described, on the door being opened, was introduced, and the flames were extinguished as if by magic. The whole of the interior was instantly purified, the light was again applied, and burned brilliantly.

At the end of the building in which the experiments were made, a building, of wood, was raised, of the ordinary height, size, and appearance of a four-roomed house, and in the interior were placed planks covered and well paid with tar, turpentine, &c. On being set fire to, the flames ascended with wonderful rapidity, and roared loudly. While the flames were at their height, the annihilator, of the large size we have mentioned, was brought to bear upon them—the party carrying it boldly going into the midst of the smoke. In five seconds the whole was extinguished; and in another second Mr Philips and the man who assisted him were seen on the top of the building—the one holding a light in his hand.

Another demonstration was also made as to the efficiency of the annihilator for extinguishing fires in ships, &c. The vessel on which the experiment was made, the Wear, of 150 tons, was laid close alongside Blackwall pier, and the whole of the arrangements were made in the presence of a numerous concourse of persons. The hold of the vessel was filled with pitch, tar, turpentine, saltpetre, and rosin barrels, plentifully intermixed with shavings and other combustible materials. At a signal from the patentee, this mass of inflammable matter was ignited at the bottom, and the hatchway closed on deck for about five minutes, in order to give the fire time to spread and take a thorough hold. On the removal of the covering, upon the admission of the external atmosphere, the flames immediately made their appearance, and, aided by a brisk wind which was blowing at the time, ascended to a great height. The fire was allowed to burn with great fierceness for some minutes, in order to show the perfect command over it which is conferred by Mr. Philips's invention; though, as he remarked, in the case of fire taking place on board a vessel at sea, no time would be allowed for it to spread, and there need not be any large or continuous admission of external air to feed the flame. This was merely done on board the Wear to prove the capabilities of the invention under the most adverse circumstances. In about ten minutes from the commencement of the fire, and when the flames were about their greatest height, two of the machines were brought to bear upon it, and discharged the gas with which they were filled into the hold with great force. The effect was instantaneous. The flames sank beneath the deck immediately, and, by the application of two more machines, the fire was thoroughly extinguished in about twenty-five minutes from the time it was kindled.

With a proper supply of machines, and the prepared material, it is apparent that the spread of fire on board of vessels, either in dock or at sea, would be rendered all but impossible; and it is stated by the patentee that the cost of both would amount to a comparatively trifling per-centage on the tonnage and cargo of sea going ships, with this advantage—that the material from which the gases are eliminated, being solid, can be easily kept in boxes, or on shelves, and does not deteriorate by exposure to any climate.

Another and most important peculiarity connected with this invention is the rapidity with which persons may enter the hold of a ship, or the interior of a house, immediately after the fire is subdued, without any defence or covering, and without any danger of being suffocated by the smoke arising from the smouldering and charred materials.

CLASS 2.—MANUFACTURING MACHINES AND TOOLS.

Under this head were included manufacturing machines, tools, and implements employed in the production of spun, woven, felted, and laid fabrics, and in the manufacture of vegetable and animal substances—all the varieties of machinery necessary for the production of the fabrics from the following raw materials: cotton, wool, flax, hemp, silk, caoutchouc, gutta percha, and hair, as also those used in paper-making, printing, and book-binding. It also comprised the vast range of manufactures in metals, and the machinery and apparatus used for brewing and distilling.

Machinery for the manufacture of Cotton.

The cotton machinery formed one of the most important and interesting features in this department of the Exhibition, and was represented in a manner commensurate with its importance. The extension of this branch of manufacture has been far more rapid in England than in any other country. Before Arkwright's time, it was the custom for the weavers, who were dispersed in cottages throughout the manufacturing districts, to purchase the material with which they worked, and, having converted it into cloth, to carry their wares into market and sell them on their own account to the dealers; but about 1760 the merchants of Manchester began to employ the weavers, furnishing them with yarn for warp, and with raw cotton, which was spun by the weaver's family for the weft, paying a fixed price for the labor bestowed in weaving.

The fly-shuttle came into general use about 1760. It was invented by John Kay, in 1738, simply consisting in the weaver chucking the shuttle backward and forward through the warp, by means of strings in each hand. This was a decided improvement over the old machines then in use, as one man could then weave cloth of the same width that previously required two.

The impossibility of producing a greater quantity and better quality of yarn formed a serious hindrance to the further progress of the manufacture. One pair of hands being able to spin one thread only, rendered the operation slow and expensive until a machine was invented by which from twenty to a thousand threads could be spun at once.

John Wyath was the inventor of this wonderful machine, generally known as the mode of "spinning by rollers." The first process in the manufacture of cotton, before it is spun, is to clean it, and then pass it through the carding machine. Carding consists in combing the cotton—that is, disentangling and straightening the fibres. When the cotton leaves the carding machine, it is in loose rolls, called slivers. The operation of spinning consists in drawing out the cotton—that is, reducing the sliver and then twisting it into a thread. In the machine which Wyath invented the sliver passed between two rollers, which revolved at a certain speed, and again passed between two other rollers, revolving at four or five times the speed of the first. By this means the sliver was drawn out in proportion to the difference of speed between the two sets of rollers, and, after being thus reduced, the cotton was twisted and wound on a bobbin.

In the year 1770, Hargreaves took out a patent for the spinning jenny. It is said that Hargreaves got the idea from seeing a one-thread machine overturned upon the floor, when both wheel and spindle continued to revolve. This threw the spindle from a horizontal into an upright position. It then struck him that a number of threads might be spun at once by having a number of spindles placed side by side in an upright position. The spinning jenny, therefore, is a machine by which the roving, which is a loosely twisted thread, about the thickness of the wick of a candle, is drawn out and spun into a fine thread, or, as is technically termed, yarn.

In 1776, Samuel Compton invented the mule. This machine is a combination of Arkwright's water frame and Hargreaves's jenny, its distinguishing feature being that the spindles recede from the rollers, so that not only is the cotton drawn out between the rollers, but it is further drawn out when in the act of being spun; a finer quality of yarn being thus obtained. When the threads had been drawn out from four to five feet, the spindles were drawn up to the rollers; the threads being wound up on the spindles.

The throstle, which is merely an improvement on Arkwright's water-frame, is still much used in England among cotton spinners, though at one time it was thought likely to be entirely superseded by the mule. When the power-loom came into use, it was found advantageous to use weft of a stronger and smoother quality—a kind of spinning better suited to the water-frame than the mule. The water-frame, in its improved form, takes the name of throstle; the spindles on each side of the machine form one long cylinder by means of belts passing from the cylinder to the spindles.

Messrs. Hebbert, Platt, & Son, of Oldham, at a very large expenditure of time and money, illustrated the processes of manufacture from the cotton as it is taken out of the bale in its raw state to the time of its completion, in the form of calico, twills, &c. The preparatory process of mixing the contents of different bales, for the purpose of equalizing the quality, was first exhibited. This is done by spreading out their contents, forming separate layers, and resting one upon the other. The cotton, of which this heap is composed, is then torn down by a rake from top to bottom. It is evident that, in its progress, a portion of each horizontal layer will be brought away; and that thus, if the work be skilfully done, the contents of the different bales must be collected together in a mass of uniform quality. The mode of conducting the mixing depends on the quality of yarn required.

The next stage through which the raw material passes is the "scutching machine," which is used to open the lock of cotton, and separate its fabrics; while, at the same time, it separates from it any sand or seeds which it may contain. This machine consists of feeding rollers, made of wood, and placed at a short distance from each other, through which the cotton is made to pass slowly. After passing through the rollers, the cotton is struck by a set of beaters, made to revolve 1,000 or more times in a minute. The cotton is passed through two sets of rollers, and subjected to two sets of beaters.

Up to this stage the fibres of the cotton cross each other in every direction. The use of the "carding engine" is to disentangle them, to draw them out, and to lay them parallel to each other. It is then taken

to the next machine, called a "lap machine." Its object is the drawing of the cotton, or arranging the fibres longitudinally, in a uniform and parallel direction, and to remedy all existing inequalities in the thickness of the sliver. The drawing frame acts with two sets of rollers, moving with unequal velocities. The cotton is drawn several times to attain the utmost regularity.

The next step in the process is "roving," which is a continuation of the drawing, with this only difference: that the cord, now called a "rove," or "club," being so much reduced in thickness that it will not otherwise hold together, a slight twist is given to it by passing it into a conical can, which, while receiving it, is made to revolve with great velocity. The rove, thus slightly twisted, is wound upon bobbins, and is then ready for the spinning frame. The "mule" is the machine next in order. Here the bobbins taken from the roving frame are again passed through three lines of smaller drawing rollers, and then delivered on to the points of the spindles, which, by their rapid revolution at the time the carriage is drawn out, twist the roving into yarn. On the return of the carriage, the twisting operation ceases for a time, and the newly-spun yarn is wound on to the spindles in the well known form of "cops." One of the mules here exhibited is a weft mule, with tin rollers; the other is a warp or twist mule, but with drums, instead of the rollers, to show the variety of mechanism. The twist mule has also a back shaft the whole length of the machine, instead of squaring bands, as in the weft mule, for the same reason. All the bearings are constructed with unusual solidity, on the patent principle of the exhibitors, as also the adjustable spring for "backing off," and the adjustable catch box in the front roller, for preventing "snarls."

The doubling frame is the next machine, and is used to twist two yarns together into one thread for strong warps, as stocking yarns, and also for sewing cotton. The winding machine follows, and is shown with two sorts of arrangement—that for winding twist mule cops on one side, and that for throstle bobbins on the other. Both these are wound on to large bobbins, ready for the next machine, which is called the beaming or warping machine. It is fitted up in the same superior style as the other, and has Kenworth's patent rods. Here the warp is transferred from the large bobbins to the warp beams, or rollers, ready for the dressing machine, which, however, is not shown in this series, as it is a machine requiring a room to itself, to prevent the steam employed from being a detriment to the other mechanism.

The dressing process consists in dressing or coating the warp threads with a paste made from flour, to stiffen the threads for the looms.

The looms are the machines which follow, where the yarns, both weft and warp, are woven into cloth. Four looms were exhibited for making plain cloth or calico, to which the jacquard apparatus can be attached for weaving fancy goods. All the looms have the patent taking up motion of this form, and are all adapted both for plain work or twill.

The development of this extensive branch of industry (the cotton trade) in Great Britain may be estimated from the fact that the quantity of raw cotton consumed by the manufacturers in 1850 was 584,200,000 pounds, or nearly 900 tons per day.

The total number of cotton factories is 1,932, containing 20,977,017 spindles, and 249,627 power looms. The moving power in these factories is supplied by steam, representing 71,005-horse power, and water, 11,550 horse power; the total number of persons employed in these factories amounting to 330,924. If to these we add the persons not employed in factories, such as hand-loom weavers, calico printers, and dyers, makers and repairers of machinery, &c., a total of 700,000 would be obtained.

The total value of the cotton goods and yarn exported in 1850 was £28,252,378; and the capital employed in the cotton manufactures of England is estimated at not less than £45,000,000.

Centrifugal Machines for washing and drying Clothes, for drying Starch, and purifying Sugar.—Messrs. Manlone & Co., Nottingham, inventors.

The patentees of this valuable invention claim for it the property of completely overcoming the disadvantages arising from wringing or squeezing wet garments, and also of effecting the drying of any material much more speedily and effectually than has hitherto been deemed possible. The peculiar advantages possessed by this over all other machines in use by calico printers, bleachers, dyers, &c., are thus adverted to: The goods are not injured in the slightest degree. The only pressure or force to which they are subjected is that of the different folds of the fabrics on each other by virtue of their centrifugal tendency; and this, even in the finest and most delicate material, does not produce the slightest abrasion in the texture, or rupture in the threads; at the same time all creases are entirely avoided, and, in case of very fine yarns of silk or cotton, the difficulty that arises from the adhesion of their fibres, wringing, or other pressure, is completely prevented.

The liquid or moisture is so completely and so uniformly abstracted by this process, however heavy the fabric, that only a very slight degree of heat is required to complete the drying; and, in most cases, the goods are sufficiently dry for the finishing process; and in consequence of less heat being required for drying, the injury so frequently occasioned to the colors, and also to the fabric, is thus avoided.

In the finishing process, when a certain and determinate quantity of moisture, starch, soap, or other article, is desired to be left in the goods, the quantity of such article can be fixed with an equality and exactness not otherwise attainable, the machine being so arranged that the speed, and therefore the effect, can be calculated at pleasure from 200 to 2,000 revolutions per minute.

In some dyeing processes, where expensive materials are employed, a considerable saving has been effected, as a larger quantity of such material can be extracted by this than by any other means; and where fancy or fugitive colors are employed on weaving articles, regularity of color is obtained in the drying that could not be previously had. It is well known that in the domestic operation of drying, the destruction of the clothes, from wringing or squeezing after washing, (the method now generally adopted,) is often greater than even the natural wear of the same. This invention will entirely put an end to such mischief; the clothes being placed, with all the water in them, directly therein, and after five minutes' working taken out nearly dry, without having been subject to the least strain on their fibres; indeed, the finest materials, such as silks, gauzes, crapes, or fine muslins, on being examined, do not show the least displacement in their texture.

The hydro-extractor, as it is called, is made of various sizes, being calculated to hold from 100 pounds to 300 pounds of wet goods. It is most commonly worked by steam power; but hand-machines are constantly in use in hospitals, asylums, and work-houses, domestic and other establishments in which steam or water power cannot be obtained. They are made to hold six pairs of sheets at once, or any quantity of smaller articles of similar bulk, and the time required for the operation is not, in any case, more than five minutes.

Patent Folding Machine for folding Paper, Linen, or Cloth, by means of a series of serrated steel Folders.—J. Black, Edinburgh, inventor.

The appearance of this machine is that of a large box or table, with some few wheels and rollers in front. Its construction is so simple that there is very little to describe beyond the fact that inside the box are a number of knives or folders, which act in a similar manner to the one on the top, taking the sheet of paper and doubling it together, according to the number of pages, till it comes out of the machine, from the four rollers in front of it, a perfectly folded and pressed portion of a book ready for the binder. It is capable of folding any number of sheets, of any size, (which can be laid on by one or two boys,) with the most perfect accuracy. Its advantages consist not only in economizing the expense of labor, but also in space, the machine taking up no more room than would be occupied by two individuals folding by the old method. The machine can be worked by steam power, or one man at the wheel could propel six machines. Besides newspapers, it can be applied to the folding of note and other paper at the mill at the rate of 2,000 or more quires per hour.

Micrometric Apparatus, Self acting Lathes, Planing, Slotting, Drilling, and Boring, &c., Machines.—J. Whitwreth & Co., Manchester.

The first mentioned apparatus has been successfully applied to purposes of the greatest practical utility by affording means for the establishing uniform standard of magnitude for taps, axles, and other important component parts of machinery, among which it is as necessary to maintain uniformity as it is to have a uniform language or a uniform system of numeration. By this instrument magnitudes so minute as even to elude the microscope have been submitted to mechanical measurement, and magnitudes so minute as not to exceed the one-millionth part of an inch are actually estimated.

Two perfectly plane and smooth metallic surfaces are first formed, partly by friction against each other, and partly by abrasion with a peculiar tool. So plain are the surfaces of metal thus formed, that when one is laid upon the other no one part comes in closer contact than another, and there is included between them a stratum of particles of air, which act like infinitely smooth rollers, and the surfaces move in contact with one another with a degree of freedom, owing to the lubricity of the air, which must be felt to be conceived. If, however, the surfaces be so severely pressed against each other as to exclude the air, the contact becomes so complete that it is with great difficulty they can be separated. These surfaces, thus accurately formed, are used as standards to test other plain surfaces, and with these are tested the ends of a standard measure of metal, which is placed in an accurately formed horizontal metallic bed, one end bearing against a metallic pin. Another metallic pin, urged by a screw, presses against the other end; and if this metallic bar, by a change of temperature, or any other cause, suffers a change in its length amounting to the millionth part of an inch, that change is rendered perceptible by the following arrangement:

The pin which bears against its extremity is moved by a screw which has ten threads to the inch. On the head of this screw is a wheel, consisting of 400 teeth, which works in a worm driven by another wheel, the rim of which is divided into 250 visible parts. Now, since each thread of the original corresponds to the one tenth part of an inch, each tooth of the wheel upon its head will correspond to the four thousandth part of an inch, and each division of the wheel attached to the worm will correspond to the millionth part of an inch.

It is found, in the application of this apparatus, that a change in the position of the wheel attached to the worm, through one of the 250 divisions, is rendered sensible at the point of the screw which bears against the standard bar; but, since the motion of the former wheel through one division can produce a motion amounting only to the millionth part of an inch in the point of the screw, this magnitude is thus rendered sensible.

To prove the accuracy of this micrometric apparatus, a standard yard-measure, made of a bar of steel, about three-quarters of an inch square, having both threads rendered perfectly true, was placed in it. One end of the bar was then placed in contact with the face of the machine, and at the other end, between it and the other face of the machine, was interposed a small flat piece of steel, termed, by the experimenter, "the contact piece," whose sides were also rendered perfectly true and parallel. Each division on the micrometer represented the one millionth part of an inch, and each time the micrometer was moved only one division forward, the experimenter raised the contact-piece, allowing it to descend across the end of the bar by its own gravity only. This was repeated until the closer proximation of the surfaces prevented the contact piece from descending when the measure was completed, and the number on the micrometer represented the dead length of the standard bar to the one millionth part of an inch. Eight repetitions of the experiment in a quarter of an hour produced identical results—there not being, in any single case, a variation of one-millionth part of an inch.

This method of operating was termed "the system of proof by the contact of perfectly true surfaces and gravity;" and in connexion with it was shown another interesting experiment: when the micrometer was up within one division of the number where contact would be presumed to occur, the application of the finger to the centre of the steel bar sufficed t expand and lengthen it instantaneously, so as to prevent the descent of the "contact piece."

The other method of proof was by having a small, simple battery, composed of a piece of zinc soldered on to a piece of copper, and plunged into rain water, without the admixture of any acid. This was connected with the two ends of the measuring machine, and also with a delicate galvanometer. On pursuing the same process—of advancing the micrometer one division at a time—no effect was produced until the last millionth of an inch of distance was traversed, and absolute contact occurred with the end of the bar, when the deflection of the needle of the galvanometer instantly betrayed the movement. Repeated experiments showed this to be unerring in the result; and on placing the finger on the middle of the bar, under the same circumstances as before mentioned, the expansion was instantly detected by the deflection of the galvanometric bar.

By the application of this instrument, standard gauges for axles, taps, and other parts of machinery which it is desirable to maintain uniform, are constructed, and have been adopted in large manufactories.

One of the large lathe machines is capable of turning shafts thirty-six feet long. The peculiarity of this machine is the combination of two cutting-tools, at the opposite sides of the shaft to be turned, which bear against each other, and are governed by a common motion. Another pair of similar cutting tools is also placed on the bed of the same lathe. When a long shaft is to be turned, these four tools are brought to its middle point, and commence from that point cutting in opposite directions towards the extremities of the shaft. The advantage of the tools bearing on opposite sides is that all flexure of the bar which may proceed from the pressure of the tool is prevented by their mutual reaction.

There is also another lathe of great magnitude, constructed on the same principle, for turning and boring the wheels of railway engines and carriages. The wheels, fixed upon their axles, are suspended between the two faced plates of the lathe, and two pairs of cutting-tools are applied to opposite sides of them, in the same manner as has already been described.

Civil Engineering, Architecture, and Building Contrivances.

The subdivision included the machines and implements used in hydraulic works, scaffoldings, and centring; machines used in the construction of bridges and tunnels, and expedients for crossing rivers and ravines; docks, harbors, and canal works; light houses and beacons; gas work and contrivances, for the production and distribution of artificial light; of roofs covering large areas of water works, and methods for the supply of towns with water; of sewerage, cleansing, paving, and the contrivances connected with the sanitary condition of towns; and also for the heating and ventilation of buildings.

It comprises some of the most important and interesting monuments of art; among which were found pile machinery, coffer dams, machinery for the construction of light-houses, diving-bells, and diving apparatus, boring apparatus, bridges of every form and material, canal machinery, harbors of refuge, breakwaters, jettings, wharves and piers, dredging machines, and machines used in harbor works, railway stations, and theatres, fire proof buildings, &c.

Model of the wrought iron bar Chain Suspension Bridge at Kieff, (Russia,) now erecting across the Dnieper; the largest work of the kind hitherto executed.—Designed by C. Agnoles, Trafalgar Square, London.

This bridge has four principal openings of 440 feet each, and two side openings of 225 feet. On the right bank of the river is a swivel bridge, which gives a free opening of 50 feet for the passage of boats, &c., on the river. There is a disadvantage in the suspension principle when the chains cannot be moved from shore to shore, as in this case, an island of masonry having to be formed in the river as a mooring abutment, to allow of the free passage for boats at the other side. There are, therefore, three abutments, two for the chains and one for the swivel bridge, and five piers; all these required coffer-dams of unusual size, particularly for the abutments. The chains are composed of broad, flat links, twelve feet long, and weighing about four hundred weight each.

The tie rods which hang from the chains on each side are two inches in diameter, and are immediately connected to the girders which support the platform. The manner in which the platform is constructed is the chief novelty which has been introduced in their structure, and consists in a judicious combination of iron and wood, the object being to obtain a light and stiff platform. Two kinds of girders are adopted here, namely: trussed girders and tension girders; the trussed girders are chiefly composed of wood, and are deeper than the tension girders, which latter are rendered rigid by tension bars. One set of chains supports the trussed girders, and the other set supports the tension girders; and these occur alternately. The additional depth of the trussed girders is for the double purpose of stiffening the platform and supporting the foot-paths which are outside of the chains. The trussed girders are connected underneath, at each end, by longitudinal ties which run the whole length, and the balustrades separate the carriage-way from the foot-paths; they act conjointly with the ties underneath in checking any tendencies to undulation, the girders being also braced diagonally to prevent side play.

The whole of the machinery and iron used in the construction of the Kieff bridge was made in England, and weighs about 3,300 tons. Nine steam engines are employed, varying from eight to fifty-horse power, in pumping, driving piles, grinding mortar, and hoisting timber, &c. The cost of the bridge, when finished, is estimated at £400,000.

Model of Railway Bridge over the Wye, at Chepstow.—By Brunel.

This bridge is a novelty in engineering. It is composed entirely of wrought iron. One span is 300 feet, and the other 100 feet. The principle of construction adopted in spanning the 300 feet seems to be that of an extravagant trellis; and another principle of the same character as the Britannia tubes—that is, the top is subject to compression, and the bottom to extension. This bridge has two lines for the up and down trains.

The span of 300 feet which we allude to more particularly consists of two huge, uncouth-looking trussed girders; the bottom of each girder is composed of two simple wrought-iron beams, which resist extension, and between which one of the lines runs; these beams are formed of boiler plates riveted together. The two girders are supported at two points, 100 feet apart from each end, from a wrought-iron tube above, which stretches across the whole span; and this tube resists the compression. This tube has also been raised at a considerable elevation above the bottom girders, so that the weights—such as trains, &c.—passing along the line, may be properly resolved or distributed over the tube by means of the tie rods and stays. The 100-feet spans are crossed simply by wrought-iron beams.

Model of One Arch of the High Level Bridge at Newcastle-upon-Tyne.—Exhibited by Rasks, Crawshaw, & Co., of Gateshead, contractors for the Iron Works.

This bridge was designed by R. Stephenson, and is certainly a masterpiece of engineering. The banks of the Tyne, both at Newcastle and Gateshead, are exceedingly steep, and are connected by a viaduct 1,375 feet in length, running at a height of 112 feet above high-water mark. There are six principal openings, each of 126 feet span. The principle on which the bridge is constructed is the bow and string; the arches which form the bow are of cast iron, and the rods which form the strings are of wrought iron, to resist tension. There are four arches to each span, two on each side, which bear properly on the piers, through the medium of bed plates, on which the arches rest; the strings of each arch consist of two wrought-iron rods, keyed to the arches at the abutments. Cast-iron columns, connected to the arches, support a platform above, on which three sets of rails are laid, and they also support another platform below for a carriage road, the footpaths running between the two arches on each side. This road, in fact, runs along the strings, but has no connexion with them. The arches take the weight of both platforms above and below, having the strings independent, to resist only the tension. One cannot examine this bridge without having the mind strongly impressed with the rapid progress made in the mechanical art, a structure of this kind, particularly the iron work, requiring the adjustment of an immense number of parts; and yet no joints, and hardly any fastenings are to be seen—in fact, it is difficult to make out how it has been put together. The piers may look light to the eye for the superincumbent mass, but actually it is another striking feature in the structure, and speaks in favor of the progress in another branch of engineering known as civil.

Model of the Central Arch of the Anse Burn Viaduct on the Newcastle and North Shields Railway.—B. Green, Newcastle.

The great peculiarity of this bridge consists in the light and economical method of construction. The arches are of timber, built up of layers or planks sufficiently thin to allow being bent to the required sweep. The arch having thus been built up to the required size, is bound together by iron straps, bolts, &c. It is then scientifically strutted to resist and distribute whatever may be required.

Model of an Improved Lantern and Revolving Apparatus for Light and Signal Vessels at Sea.—W. Wilkins & Co., Long-acre.

The principal improvements in this apparatus consist in constructing the machinery to work beneath the deck, instead of in the lantern, as formerly. A vertical rod, working in metal bearings, is attached to the mast, with a large gun-metal pinion fixed to the top of the rod at the height to which it is necessary to hoist the lantern, wherein a train of cog wheels is placed, to connect with the pinion and communicate the motion obtained therefrom to the traversing apparatus that supports the lamps and reflections.

The advantages of this arrangement are, that the lanterns can be made much lighter; that the rolling of the vessel, caused by so great a weight at the mast-head, is greatly diminished; and the machinery, being more under control, and better protected, works with greater regularity and precision. In the opinion of experienced persons, these improvements are most important, and the uninitiated may form an idea of their utility by reflecting upon the situations in which the light vessels are placed; and also that these vessels are at all times difficult of access, and in stormy weather, when accidents are most likely to occur, quite unapproachable; so that it will be obvious any alteration which reduces the liability to derangement is greatly to be appreciated.

There is also a vast benefit derived from the novel construction of the lamps and jumble work, which, by a movement exactly coinciding with the motion of the vessel, causes a perfect level to be always maintained, and insures the proper flow of oil to burners, however irregular that motion may be. This improvement is not of so recent introduction as the former; but when it was first invented, it produced a complete revolution in the apparatus used for floating lights, and enabled the beautiful argand lamp, with parabolic reflectors, to be used instead of the old lamps with flat wicks.

There are 108 light-houses on the English coast, 51 of which are for ports or harbors.

There are also 18 floating-lights; including Scotland and Ireland, there are 219 light-houses, most of which are under the control of the Trinity House.

They collect £240,000, and cost £97,000.

Model of Liverpool Docks.

This model is undoubtedly one of the most interesting objects of the kind in the Exhibition. It originated in a desire, on the part of some of the leading inhabitants of Liverpool, that this great port, the outlet of so large a portion of the commerce of Great Britain, should be fairly represented in the display of all nations. The idea has been admirably carried out by Mr. J. Grantham. The model is 40 feet in length, 10 feet wide, and on the scale of eight feet to a mile, and represents a surface of five miles. The docks are represented as being filled with 1,600 small vessels, fully rigged; and, altogether, the model forms a very beautiful object, impressing the inspector with the magnitude of Liverpool as a port.

The model is chiefly cut out of wood, the finer portions being constructed of paper, and the water represented by glass, stained of a greenish tint, and silvered, in order to reflect the ships which float on its surface. Its cost is stated to be £750. It is supported on an appropriately designed base, formed of elephants, cast in iron, from the back of which the columns which support the roof arise; pediments filled with appropriate decorations, in imitation of bas-relief, being at the end and centre. This model is strikingly calculated to display the advantage of this most important commercial town, of which some idea may be formed from the following statistics: In the year 1650, it is said, there were only three ships belonging to the port. In 1816 there were 6,888 entered the docks, of 774,243 tons burden, and paying, in dock dues, £92,500. In

1850 there were 20,457 vessels entered, of 3,500,000 tons burden, and paying £211,000 dock dues. There are 21 docks, 2 half-tide docks, 8 graving docks, and 4 basins, capable of conta[illegible]ng ,500 sail. The annual income of the docks is about £300,000, [illegible] the charge about £280,000. The receipts of custom duties, in 1851 amounted to £3,366,284. Liverpool imports eight-ninths of all cotton shipped to Great Britain. As many as 50,000 hogsheads of sugar, 20,000 barrels and bags of coffee, and 10,000 puncheons of rum, have been brought to Liverpool in one year. As one among numberless illustrations which might be given of the extent of Liverpool commerce, it has been stated that 27,000 cubic feet of logs of cedar, for making lead-pencils, have been in the docks at one time.

Out of the remaining numerous objects well worthy of careful inspection, we can only briefly enumerate a few of the most striking. The model of a self-supporting suspension bridge, invented by Captain Kenezynski, presented the means of building a wooden bridge without any support from centring. If it be a bridge of one arch, for example, short iron chains, or bars of iron, are fixed in the mattresses on each side, to be used as supports for the first timbers of the arch. As the work proceeds, other and larger bars are attached, to act as a scaffold for the next timbers; and in this manner the work is advanced from each side until the key block of wood can be inserted, and the arch can support itself. The suspension bars are retained as additional supports, and, by means of screws and nuts, may be lengthened or shortened, to increase or diminish the strain upon them.

The model of a bridge of a very new kind is exhibited by Mr. Bain, of Greenwich. It is intended to cross a river, without offering hindrance to ships of any size. The road-way is enclosed in a large tube, to be let down under the bed of the river, like an inserted arch. This tubular bridge under water is to be lighted by apertures in the upper portion until the water-mark is reached, and if the curve be not very great, the light admitted on both sides might penetrate sufficiently to the bottom.

Another curiosity in the plans proposed for crossing rivers was exhibited in a rough model of a portable bridge across the river Avon, at Clifton. The suspension bridge from cliff to cliff having been abandoned, for want of funds, it is proposed to have a platform elevated from a truck, moving on rails, in the bed of the river.

A model of the landing machine for the floating railway ferry to the Edinburgh and Dundee railway exhibited the curious contrivance adopted for shipping and unshipping railway carriages. The steam ferry boat has rails fore and aft, on which the van containing the luggage and heavy goods is shipped, to be carried across the Frith of Forth. The landing machine, in appearance, resembles a draw-bridge; one end of it is lowered into the fore-part of the ferry boat, and fixed to it so that the nails on both may coincide. The carriages are then allowed to run down singly into the boat, their speed being retarded by means of a rope. In unshipping the train, the rope is used to drag the carriage up the incline, which, at low tide, is very steep.

The commissioners of northern light-houses exhibited a model of the Skerryvose light-house, which has been built in recent years, under circumstances of immense difficulty. Mr. Allan Stephenson undertook the work in 1834, but it was not until ten years afterwards that the lights were exhibited. The rock is twelve miles from a small island called Tinee, and Tinee is two or three days' sail from any part of the coast whence supplies could be obtained; hence the difficulties encountered by the engineers and workmen were most harassing. It was at all times difficult to approach the rock, and when there, the number of working days in a year was very small. The rock itself is excessively hard, and the difficulty great of transporting stones thither. But all difficulties gradually gave way to the skill and perseverance of the engineer, and the structure was at length completed. It is 138 feet high, curving inwards from a basis of 42 feet. It contains nine stories, or apartments, in height. More than 4,000 tons of materials were used in its construction. The lighting apparatus consists of eight annular lenses, revolving round a lamp of four centric wicks, and producing every minute a bright blaze, visible at a distance of 18 miles.

There were some models of gas apparatus and gas metres; but the exhibition of gas apparatus was very limited, on account of all fire and light being prohibited in the building This very necessary regulation had the effect of inducing most of the manufacturers of gas burners, and other gas apparatus, to decline exhibiting.

Near to the gas apparatus was a ventilating pump, worked by a weight, and producing a copious stream of air, at a moderate velocity, suitable for the ventilation of private houses.

One of the most unique models of its kind, and which was an object of deserved admiration, was that of the Under-cliff, Isle of Wight, by Captain Ibbetson. It is the only model of a large extent of country on an equal scale, the vertical height and base being on the same scale; and it is also probably the only model that has been entirely worked out of doors. We understand that it was carried into every corner of a field or court, and modelled on the spot, and that there has been more than 60,000 heights measured trigonometrically, and all correspond with the base. The geological strata on the cliffs have also been measured trigonometrically. The entire labor occupied upwards of five years, and altogether reflects the very highest credit upon the ingenuity and perseverance of Mr. Ibbetson.

Naval Architecture, Military Engineering, Ordnance, Armor, and Accoutrements.

In this class were included models of ship-building, for the purposes of commerce and war, for the application of steam and other powers, and also of vessels used for amusement, and small vessels generally; rigging, anchors, windlasses, and articles connected with practical seamanship, and the saving of life from shipwrecks; infantry and cavalry arms, clothing and accoutrements, camp equipages, naval gunnery, and weapons of attack and defence; artillery equipments both in garrison and in the field; machines for mounting and dismounting ordnance carriages, &c.; ordnance and projectiles, small arms—such as rifles, muskets, carbines, pistols, &c.; and, lastly, military engineering, field equipments, methods of passing rivers and other obstacles; the attack and defence of fortresses, and field fortifications.

The models of vessels were exceedingly numerous, and were most of them remarkable for their delicacy and finish. A steamer exhibited by J. Clarke, of Birkenhead, was amongst the most attractive objects in this class. The whole was remarkably well proportioned, and was fitted up in the most complete manner, exhibiting all the latest improvements introduced in steamers of the larger class. This model merited the attention of those acquainted with naval architecture, as it was rigged in the most perfect manner, both as regards the materials and style. The hull, which is also very neatly finished, is also of a good mould, and suitable for speed and stowage. This vessel seems well calculated to possess all the qualities desirable in a good sea-boat, and for carrying weight at an increased speed.

Model of Life-Boat.—By Mr. Dyne, London.

The object of this invention is to render ordinary ships' boats so buoyant that they virtually become life boats, and are capable of saving the crew and passengers under almost any circumstances. The material employed is naturally extremely buoyant, and by the process to which it is subjected is rendered impermeable to moisture. By filling the spaces between the timbers and beneath the thwarts with this material, previously made up into properly proportioned packages, and then covering the whole with a thin lining of board, a boat is rendered so buoyant that, even when overloaded with passengers, should the waves break over it, there would be no risk of its sinking; or should even the bottom be stove in, the frame would float and act as a raft, which the material, from its tenacity and fibrous nature, would hold together. The specific gravity of the material is so very small that the additional weight to the boats is scarcely felt on hoisting them on board, and no injury can be caused by driving nails, or by blows, as is the case with metallic or cloth air-tubes, &c. The process can also be advantageously applied to the bulwarks, and between the timbers and ceilings of ships; and it must be evident that in the event of their going to pieces, each portion would, from its power of flotation, become a life-buoy. It should be remarked that the material can be adapted in any bulk, in any form, and to any part of the ship or boat usually left vacant; and, consequently, that it will not diminish the space for stowing the cargo, and that the mattresses, couches, seats, and all the furniture, could be rendered subservient to saving life. It may likewise be applied to jackets, belts, life buoys of all kinds, and floats for fishermen. The life belts are unequalled in lightness, can be adjusted in ten seconds, and are incapable of being injured by puncture or climate.

Mr. W. Dyne, of London, exhibited a life boat formed of diagonal battens, laid similar to that of lattice-work—its outer sheathing being formed of gutta percha; its buoyancy is 350 cubic feet of air, capable of sustaining upwards of nine and a half tons. It has in its bottom 3,600 holes, half an inch in diameter, to allow all water supplied to pass off. It has a convexed bottom, thirty feet long, two feet wide, and eighteen inches deep, in which are placed three perforated fins for the purpose of steadying and keeping the boat in an upright position, acting, when the boat lurches from either beam, similar to a paddle wheel, a reaction taking place, through the perforated parts, which will be seen to multiply its weight of water to four times its amount. In this convexed part, and between the fins, are contained two tons weight of water which must be displaced therefrom before the boat can turn over; but such will be almost impossible, it being more than half the weight of the boat. As a provision against such a disaster, she turns over on her quarter sixteen hundred weight of water, which rights her again. It may be remarked that the two tons and sixteen hundred weight of water referred to are not one ounce weight to the boat when in her upright position. At the stem and stern, and on each beam and quarter, is run a bow, to which are connected galvanized springs, which will not corrode, and which will be found of the greatest utility in the event of collision—which act similar to railway buffers, and enable a stranded vessel to communicate with the shore. It is intended to be placed at the stern of the ship, so that on any alarm being given of "a man overboard," the person at the helm can dislodge it instantly, and, as it falls into the sea, a fusee becomes ignited, which burns with a brilliant light, guiding the sinking man to it. Should the accident occur at night, four uprights are placed upon it, containing rockets, blue and other lights, to be kept burning and shot off.

The same person also exhibited an emigration life boat, intended for a first-class vessel, of the following dimensions: 20 feet long, by 14 feet wide; it is united by strong bolts, and is very portable from the mode of its construction, which allows it to be folded into the compass of 20 feet long, by two feet six inches wide. On occasion of shipwreck, it is capable of supporting 100 persons, with provisions, for seven days; in addition to which, it may be made available for a portion of the cargo, and can be put in requisition in a few minutes.

The Duke of Northumberland had recently offered a prize of £100 for the invention of the most efficient form of life-boat, and this offer led to the exercise of much ingenuity on the subject. No less than 54 models competing for the prize were exhibited, of which we can only notice two or three.

The first thing to be provided against in a life-boat is its liability to capsize in a heavy sea. One mode of remedying this evil is so to construct the boat that it may right itself immediately after being upset. To effect this, it is necessary that the boat should be of a very peculiar shape, which may probably not adapt it so well for going through the water, and that it should be heavily weighted along the keel, giving it a deep draught of water, which renders it difficult to pull, and to get rid of the water when swamped, as a boat so deep in the water is peculiarly liable to be.

In most of the models exhibited, the total width is eleven feet; and we imagine it will be exceedingly difficult to launch them in a strong breeze, when blowing into the coast from which they are to set out. Moreover, these boats are liable to turn over, though they will right again. Prevention is better than cure; and it is, therefore, manifest that a boat which cannot upset is better than one that will upset and right itself, half-drowning and knocking about the persons on board, and washing away those who are unfortunately not lashed. If, in order to prevent upsetting, the breadth of beam be greatly increased, it offers too much resistance to wind and water, especially on moving against a gale. A double-bodied boat, consisting of two boats held apart by a

platform, or by several beams, would be far more difficult to upset, while it would be more manageable, and offer less resistance, both to wind and water.

The model by Mr. H. Severn, one of the competitors, was constructed after this fashion, and was not only remarkably ingenious, but very handsomely finished. His boat was sixteen inches wide, and seemed to possess more beam than any other model in the collection, and appeared at the same time well calculated to row as fast against wind or sea as a boat eight feet wide; each half boat being four feet wide, and eight feet apart, which gives it sixteen feet beam; it also requires no ballast, frees itself of water, and would sail fourteen miles, or more, an hour. The principal advantage of this boat appears to be, that if a person were in the water, the boat rowing up, he would come between the two, where he could be caught by the crew, in either boat. The greatest difficulty in boats of this kind appeared to be the manner of fastening the beams; but this Mr. Severn has successfully overcome by three beams, which are fastened by bands of copper going round the bottom under the keel, up the first side, and united on the top of the beam also by a diagonal rod.

The model by W. Teasdel, like many others, was very good, but had only one head, which, when a gale is blowing, and a heavy surf running, is very dangerous on account of turning round. There were many others among the competing models, which were on the old principle.

There was another life boat deserving of notice, and remarkably beautiful in form, clinker-built, with flanks of gutta-percha, exhibited by W. Bonny.

The sides were doubled from the bilge to the spar-deck, and divided into water-tight compartments, and the fore and aft parts of the boat were also divided in the same manner. She had been rowed and sailed on the Thames, and many experiments had been made with her. She was repeatedly filled with water; men endeavored in vain to overturn her, and she sailed full of water, apparently without the least impediment; though ordinary boats, under such circumstances, would have been wholly unmanageable and useless. The yacht, being hauled over, and so half filled with water, upon being released, righted at once of herself. The inventor asserts that she cannot be capsized or sunk by accident, and hardly intentionally by powerful force applied to her. The plan is applicable to crafts of all sizes, and of any external lines, so that boats already in use can have the principles of the yacht applied to them.

There was a singular model, by a Mr. Bateman, for the construction of a wooden boat, having as many vertical cylinders as there are persons to be accommodated, each cylinder to be 36 inches deep, by 16 inches in diameter. Each cylinder has a cover when not in use; but when the cover is removed, a man may get into the cylinder, and thus seek for safety. The interstices are filled up with cork, and other arrangements made for lightening, strengthening, and rowing the boat.

There were several new methods of propelling and navigating vessels, among which we may notice the illustrations exhibited by Mr. J. Reed, Lieutenant Jones, and Mr. M. Ruthven. In Mr. Reed's invention he places two shafts perpendicularly with the stern post, and reaching to the bottom of the keel, when they are fixed one on each side of the same, and at the bottom of each are attached square blades, or fans, which are made in such a manner as to feather in the direction required. The upper parts of the shafts are cranks, which are in the body of the boat; motion is given to these cranks by steam; they work alternately, and would, it is thought, supersede the screw for speed. The reversing gear is well managed; but would appear to require some further improvement, owing to a tendency to get out of order.

Lieutenant Jones exhibited a propeller of quite an original description, which is placed in the centre of the vessel; the propellers, three in number, are made in the shape of spades, the handles being fixed to cranks, of which there are six, three in the upper shaft, or beam, and the same on the other, to the upper, only placed some few feet below it; the shafts, or beams, are fixed in the same manner as in the paddle-wheel; motion given to the cranks, and the propellers follow each other, going at the same speed as the cranks.

In Mr. Ruthven's model, when the deck is removed, there are seen apertures covered by a kind of flooring, which forms a case for the water which the apertures let in; this conducts the water to a well in the centre of the boat, in which works a wheel similar to a paddle wheel, only placed horizontally. To each side of the well is attached a pipe, extending to the side of the vessel, where it is connected with a movable nozzle. The engine power is applied to the axis of the wheel in the well, which, turning round, discharges the water through the nozzles, and propels the boat. If required to go astern, the mouth of the nozzle is turned towards the bow of the boat; if to stop, it is placed perpendicularly downwards, and consequently will not exert any force either way. The faster the vessel goes, the more water comes in through the nozzles.

Of pleasure boats there was a large show, but not a very great variety. Mr. W. Biffen, of London, displayed a model boat, calculated to change into a four or eight-oars, at pleasure, by merely taking out some of the parts, thereby making one boat as good as two. When not in use, it can be packed so as to occupy less space than a single boat on the old principle.

A model of an outrigged sculling boat, sent by Noulton & Wyld, is very extraordinary, as the body of the vessel is composed of one single plank from stem to stern, without a joint or reel.

The Typhoductor, or Storm Pointer.

Colonel Lloyd, one of the special commissioners of the Exhibition, exhibited a very remarkable instrument, called a typhoductor, or storm-pointer—an instrument for obtaining by inspection the bearing and relative position of a revolving storm or hurricane. It is now a well ascertained fact, that great storms have a rotary motion, like a whirlwind. The theory commonly called the "law of storms," as made known in several publications by persons of eminence, has been established from thousands of well authenticated observations in different parts of the world, and extending over a period of several years. It proves that during a gale of wind, particularly near to the tropics, the wind blows with the greatest fury round a common centre; at this centre there is little or no wind, even a perfect calm; but there is generally a terrific and confused sea. The most violent and dangerous parts of these revolving gales are

somewhere near this central calm, the wind there blowing the most fiercely, acquiring, it is stated, a velocity of even a hundred miles an hour. These storms sweep both land and sea in certain parts of the globe; their track and direction are pretty well known, and they travel bodily from their place of origin to their destination at variable speeds—sometimes at not more than four to six miles per hour; sometimes, but seldom, at that of 20 to 30 miles per hour, although the wind within their range is blowing round with the fury just mentioned.

If a ship unhappily becomes entangled within the range of these terrible gales, she is in great peril. Many have foundered, and others have pursued their fearful course round and round until they have been reduced to helpless wrecks, dismasted and water-logged. In the northern hemisphere these winds blow round the compass from east, by north to west, or the contrary way to the hands of a watch; whereas in a southern hemisphere it is just the reverse, blowing round as the hands of a watch would go.

This principle must always be borne in mind as the very foundation of all the information to be sought hereafter. On these most valuable data, instructions have been drawn up by Colonel Reed, and others, how to ascertain the relative position of a gale, so as to know whether it is approaching to or going from a ship, travelling by its side, or crossing its path.

The object of Colonel Lloyd's ingenious instrument is, by graphic illustration, to show that when the wind blows from a particular point of the compass, you can only be in one relative position in regard to the centre of the whirl storm, so that either the storm is approaching the ship or the ship approaching the storm, and first, of course, encountering the outer edge. As a consequence of the law of rotation, the wind, supposing the whirl to be circular, must blow at a tangent, or right angles to the point of the compass where the ship or observer may be, but under diametrically opposite conditions, as far as regards the two hemispheres. Thus, in a northern hemisphere, if the wind blows east, the centre of the storm must be due south of the observer; blowing north, the vortex east; coming from the west, the centre of the gale is north; and, lastly, with the wind south, the gale is due west. Of course, in the intermediate points of the compass, the bearings are likewise different.

In a southern latitude the whirl-storm blows round just the contrary way. With an east wind the storm centre bears north; with a north wind, west; with a west wind, south; and with a south wind, east. Bearing in mind these facts, and with sea-room, it is easy not only to avoid hurricanes, but to make them subservient, in many cases, to the ship's ultimate course.

There was a formidable display of guns and weapons of every description in this section. In the English department some small models of artillery, amongst which those of Captain Tylden, were remarkable for their work and finish. Of the system of loading large guns at the breech, there is but one specimen, by Mr. Gardner, of Lambeth. Although this system is of the greatest antiquity, the amount of initial velocity lost by an imperfect closing of the breech caused it to be discontinued; but the introduction lately of long ranges, and an increased accuracy of fire from greater perfection in the guns, have again led attention to be directed to the subject. The advantage possessed by this system is that its manner of loading, and small recoil, allow of casemates being of less depth, thereby saving expense of construction. About the year 1832 a small gun, having a leaden bullet of 107 grains, was tried at Turin. In this model the bore was pierced right through the piece, and the breech was crossed horizontally by a quadrilateral hole, where a coil was placed, to block up the bottom of the bore after the piece was loaded. This has been the basis of all subsequent inventions. The first experiment on a large scale was tried in Savoy on a six-pounder, which, after a few improvements, succeeded so well that a similar one was cast at the Acker foundry, in Sweden, by the Baron Wahrendorff. The Swedish government afterwards cast twenty-four-pounders for this purpose; and in 1842 they were tried at Woolwich. The object intended was to show how by this system, being applied to guns on board ship, the accidents which sometimes occur from the difficulties of running guns out and in would be obviated. Although the experiments proved successful, yet the still complicated manner of closing the breech would not allow of its being brought into general use. M. Gardner's model, although ingenious, by no means lessens this objection; the mass of mechanical force employed for this purpose being excessively cumbersome, and the length of the lever which he employed, if on the scale of a twenty-four-pounder, would be perplexing.

The improved gun-carriage, exhibited by Messrs. Ferguson, is well worthy of attention. It consists of a most ingenious application of the slide to common broadside carriages, including friction chocks, training chocks, and trucks of an improved form. These important improvements can be fitted to the broadside carriages now in use without occupying any more room on deck; nor would their application alter the general appearance or system of exercising the guns; while a saving of expense would be effected, both in time and labor, as compared with the working of ordinary carriages. The friction chocks act as a powerful check to the recoil, and also prevent the guns running out otherwise than required; these movements being under perfect control by one man, and capable of being regulated with the utmost nicety. Guns fitted with the improved carriage may be secured at sea by any of the usual methods, in addition to which they will have the powerful aid of the friction chocks to keep them in their places. In case of injury, all the parts are easily repaired; and should it be necessary to transport the guns on shore, or on board other vessels, the added improvements will in no way impede their usefulness as common carriages, and the additions may be removed in a few minutes, if required.

The howitzers and mortars of wrought iron, from Spain, indicated a certain class of artillerists who desire to introduce wrought-iron into the service for field guns. There are two qualities necessary for the soundness of every gun, which are tenacity and hardness of the metal; and the superiority of one piece over another (all their points being similar) is calculated by the quantity it bears to the other relative to these two propensities. A certain weight is also requisite to prevent too much recoil. Every species of wrought-iron presents a fibrous structure—the fibrous being more or less distinct and apparent according to the process made use of in the work. In iron beaten with the hammer, the grain or the fibres are not so easily discerned, and the bars have a more uniform tenacity in the several directions. By comparing with one another the several processes by which iron is wrought, we come to this conclusion: that the fibres always form in the direction in which the iron lengthens. All that has been said with respect to iron is generally applicable to steel, except that the force or cohesion of steel far surpasses that of iron bronze; and iron castings, on the contrary, present a uniform force of cohesion in every direction—their structure consisting in an admission of crystallized grains, of which the crystals are often apparent to the naked eye. Although these wrought-iron guns present apparent advantages—amongst others, of having the direction of the fibre of the iron perpendicular to the axis of the gun, where the greatest strain from the power is exercised—yet their objections in real service are so great that their practicability cannot be admitted. It is difficult to bore them so accurately that no fissure should be made in the metal, which, on ramming down the powder, might cause ignition. They soon destroy the carriage by the suddenness and length of the recoil.

The oxidation of the bore will so enlarge it as to render it unserviceable; and not the least of these objections is the moral effect on the men from the fear of their bursting. If wrought-iron is objectionable in field guns, it is more so in those of large calibre. An almost insurmountable difficulty exists in welding the parts together perfectly, and an impossibility of ascertaining whether the welds are perfect; for when the boxes are of small size, as in gun-barrels, the hammering compresses and reunites the particles, and corrects these defects; but in large masses the effects of the hammer do not reach the interior of the mass, which is consequently left open and spongy, although the metal on the surface, and to a slight depth, is compact and fibrous.

The shot and shells of cast steel from the Russian imperial works were fine-looking specimens of their projectiles. The hardness of their surface will be valuable in the field, by causing more dependence to be placed on the accuracy of windage.

From the United States three different kinds of articles in gunnery only were exhibited. These were the common army rifle, Colt's revolvers, and Maynard's primer. The first of these, manufactured by Robbins & Lawrence, of Windsor, Vermont, received much approbation for the excellent quality of their material, and the thoroughness and completeness of their workmanship. The second article mentioned, Colt's revolver, probably gained a firmer hold in the estimation of the best judges of fire-arms than any piece of gunnery which has been invented the last fifty years. Though it had been long in use with us, both for army and sporting purposes, it seems not to have been known in England. Meeting with doubts upon its first presentation at the Exhibition, it gradually gained its way into favor, until, before the close of the Crystal Palace, it was universally acknowledged to have achieved a success unequalled by a single invention from any part of the world.

Hardly second to the revolver in the impression made upon the public mind was Maynard's primer. This most ingenious and effective piece of mechanism, the very simplicity of which is its greatest wonder, when applied to fire-arms of any model, increases their efficiency to a degree which, to be fully realized, must be personally witnessed. Too late in its arrival at the Exhibition to be passed upon by the jury of awards, it received, nevertheless, from scientific men, army officers, and professed sportsmen, a meed of approbation that far exceeded any renown it could have acquired from the "medal" or "mention" of excellence.

The detonating material of Maynard's primer is in the form of *little lozenges*, each about one-sixth of an inch wide and one-thirtieth of an inch thick. These lozenges are enclosed between two narrow strips of strong paper, cemented together and rendered water-proof and incombustible. The single strip thus made is a little less than one-fourth of an inch wide, and contains four of these lozenges (each of which is a charge) in every inch of its length; the charges forming projections of their own shape on one side, leaving considerable and equal spaces between them; the other side of the strip being one flat surface.

One of these strips, containing fifty (or more or less) charges, is coiled up and placed in a magazine in the lock, where, by opening a lid, it can be inspected readily, and from whence it is fed out by the action of the lock, one charge being moved forward each time the hammer is raised. When the hammer descends it cuts off and fires the charge fed out upon the nut (or nipple, if one be used) of the gun, thus igniting the powder of the cartridge in the barrel.

These primers are made by a very simple machine, (also invented by Dr. Maynard,) capable of making a million a day, at about one-tenth the cost of the percussion caps heretofore used in the United States army and navy.

CONCLUSION

A comprehensive view of the vast collection of objects in the great Exhibition is the great desideratum with all those persons who have read only of its marvels. Such a view it is not easy to give. Every report which has ever issued from that great storehouse of industry, whether from the royal commissioners, the foreign commissioners, the juries, or the executive committee, has dealt of details. It has almost necessarily done so, because through details alone could the mind create any picture of the vast edifice, and its contents, which should at all resemble the original. And yet a comprehensive view of the whole—so that, when the disposition and arrangement of the building have been mastered, a just conception may be formed of the whole display, the characteristic features of each part be distinguished, and definite ideas of the industrial attributes developed be stored in the mind—is what is most needed.

The industries of nearly all the nations of the globe were presented in Hyde Park. In those industries the national individuality was preserved. They became the most faithful mirror, in fact, of national character which could be exhibited. Other pictures may deceive, but the picture which the industrial products of a people present must be true. The course of events, guided as it is by a higher power than man's, does not always illustrate the moral and social attributes of communities. Not so the fruits of labor—the quality and description of material which engross the toil, supply the demand, and engage the tastes and predilections of a people. These tell their tale as faithfully as the actions of an individual indicate his nature, and by them, rightly considered, the condition and progress of a community may be correctly judged.

The form of the Crystal Palace has been made familiar, by innumerable pictures, to the whole world In some respects it resembled a cathedral, its long avenues, stretching from east to west, being intersected midway by a transept. An equal division of space thus resulted, which was turned to account in the most appropriate manner. The western half was occupied by the industrial products of the British empire; the eastern by those from other countries. The question of precedence, not as between Great Britain and the world, but between all foreign rivals, was settled by a geographical solution. The transept was the equator. India, on the British side; China, Tunis, the Brazils, Persia, Arabia, Turkey, and Egypt, on the foreign side, were grouped around it as the torrid zone.

This geographical plan was not, and indeed could not be carried out through the whole building; but it extended far enough to destroy all ideas of preference as to locality, and all feelings of jealousy arising therefrom. It harmonized, also, admirably with the character of the structure, and gave a symmetry and equipoise to the whole which would not otherwise have been attained.

As Great Britain occupied the greatest space—a space equal to all the rest of the world—she certainly deserves the first notice. Crossing the transept, the first compartments westward were occupied by the products of the British colonies. India—with its pottery, its inlaid ivory, its renowned textile fabric, its jewels and gold, surpassing the most finished productions of any European nation—contrasted strangely with India as the contributor of the rudest furniture, the most awkward machinery, the most uncouth household implements, and the most fitless mechanical tools of any country on the globe. And yet nothing could more correctly represent India as she is—uniting the highest skill with the most brutal ignorance, princely wealth with abject poverty, and luxury beyond description with want that seeks no higher end than the sustenance of a day. The Australian possessions, the Canadas, Nova Scotia, New Zealand, the British West Indies, the Cape of Good Hope, Malta, western Africa, the Channel islands, and all other parts of the world where the cross of St. George has been planted, were each represented by itself in its own peculiar products. In some were seen the evidences of barbaric pomp, belonging to the traditions of the past; in others the rudeness in design and material of all the useful arts; in others yet the trophies of ancient civilization and refinement, marvellously brought down to our own time; the fruits of labor upon the virgin soils of Australia and the Canadas, sent to be consumed in the mother country; the mineral, vegetable, and animal treasures, sought out by commerce and made valuable by manufactures; and the raw produce in various conditions, indicative of the struggle of infant communities towards a larger industrial development.

The colonies of Great Britain occupied, nevertheless, but a fractional part of her immense space in the Crystal Palace. It was from the United Kingdom that the great mass of her productions came. The comparative ease, freedom from expense, and direct benefit to be gained, which the British contributors enjoyed, furnished one great reason for the full representation of the industrial products of the country. But, with all these advantages, no person could witness the extent, variety, and excellence of the proceeds of British labor with which nearly one-half of the immense fabric was crowded, and at the same time remember that each one of these myriads of articles was but a sample of vast products daily issuing from loom, and furnace, and workshop, to fill the markets of the whole world, without astonishment and admiration. Her raw produce, filling one immense compartment, half the length of the whole building; her mining, quarrying, metallurgic, and mineral products, occupying the extreme south; her chemical and pharmaceutical products and processes—substances used as food, and vegetable, and animal substances used in manufactures—stored in the galleries; her pleasure carriages and railway and naval mechanism, arranged along the north; her civil and military enginery, on the west; her agricultural implements, occupying an immense ground area parallel with her minerals; her philosophical, musical, surgical, and horological instruments, and the processes depending upon their use, handsomely arranged in the galleries near the nave; her display of manufacturing products, comprising nineteen sections, arranged on either side of the central avenue above and below—cotton woven fabrics, fabrics woven of mixed materials, leather, furniture, hardware, cutlery, furs, and paper, occupying principally positions on the ground floor; and silks, velvets, shawls, carpets, floor-cloths, clothing, jewelry, glass, ceramic manufactures, and earthenwares placed in the galleries of the nave; her fine arts, crowding the sculpture court, and scattered throughout the building; and her manufacturing machines and tools moved by steam, plying their multiplex labor in one immense and separate compartment—showed what must be that vast and complicated system which supplies the materials to feed her swarming millions, which maintains her commercial credit, and enables her to pay the interest of a debt which would overwhelm most nations of the world.

The genius of Great Britain is mechanism. More than in any country on the globe, mechanism is there extending its dominion over the whole empire of labor. In textile fabrics, in fashioning iron like wood to the most exact proportions, in working the printing press and navigating the ocean, in all agricultural pursuits everywhere, in everything lightening the burden of toil and rescuing human life from dangerous pursuits, mechanism reigns supreme. Beyond this the genius of Great Britain has not gone. Ornament in all her productions is inseparably wedded to usefulness. The creation of the beautiful with her artisans rests only in the adaptability of mechanism. It is said that a better and purer style of national industry is beginning to be observable in England; but however this may be, her best productions, when placed beside similar productions from the continent, show violation of harmony in color and design, and evidences of neglected taste, to the most casual observer. But in mechanism, in its highest and noblest ends, in its tendencies to relieve labor of its drudgery, and to delegate to iron, to steam, and to other powers of the inanimate world the burden of toil, Great Britain must be acknowledged to be in advance of all the world.

Crossing the transept, in the centre of which the crystal fountain glittered in light, China, Tunis, Egypt, and central and southern American tropical countries, first spread out before the spectator their various productions. The collection of Chinese manufactures bore that peculiar impress of which no article from the "flowery land" is ever divested. The porcelain from the great works of the Pozang Lake, the chemical preparations, recalling the historical fact of the early development of chemical knowledge among its inhabitants, the edible birds' nests, the

porcelain jars and vases, the lanterns, screens, and elaborate carvings, the lacquered and japan ware, and other articles long known to travellers, but which recent commercial intercourse has brought into the world, were all stamped with those features, which, like the physiognomy of its inhabitants, are recognised as soon as seen.

The peculiar industrial products of Persia were brought together in sufficient numbers to convey a somewhat adequate conception of the direction given to their activities. Particularly did the embroideries, rugs, and carpets give a true test of the prevalence of those principles of chromatic selection which influence the inhabitants of sunny climates. The character of these articles, too, like those from China, can never be mistaken; the ornament, with its tastefulness, ever displaying that peculiarity of arrangement and design which immediately leads to the recognition of its Eastern origin. Leaving these and all the miscellaneous objects connected with Eastern luxuries, passing by, also, however curious in themselves, as too small for notice in a mere general view, the feathered flowers of Brazilian industry, the vegetable wax and candles from St. Domingo, the mineral wealth of Chili, and the mats, head dresses, bark cloth, and Indian vases, presented by her Majesty, Pomare, Queen of the Society islands, let us stop for a moment before the large collection of Tunisian productions, sent by one exhibitor only, in the person of the Bey, his highness Mushir Basha.

The space allotted to Tunis was fitted up with counters and stalls, after the manner of a series of native shops. In the centre was pitched the hair tent of a Bedouin Arab. On the walls hung the gay caparison of his horse and the holyday attire of his wives. Heavy carpets covered the floor, and skins of the leopard and lion made the lounges and beds. Here were the leaves of the famed henna, the figs, raisins, and dates, the saffron and indigo, the cloaks and *joubas*, with their oriental characteristics, and the fez caps, with their brilliant dyes. This whole division formed a true and highly picturesque representation of the industrial condition of Tunis, itself a kind of trophy of ancient civilization, marvellously brought down to the present day.

The products of Egypt, presided over by Captain Abdel Hamia, himself the most curious production of all, presented, not an extensive, but a complete and interesting collection. The beautiful cottons, linens, and silks of the native looms, the Damascus swords, the dried and preserved fruits, the rice, wheat, Indian corn, barley, beans, and lentils of this wonderfully fertile country, and the rude domestic implements, in contrast with the beautiful specimens of embroidery and textile art, show the industrial condition of a people preserved through centuries without change or progress.

Of Greek exhibitors, inclusive of the Greek government, there were thirty-five in number. The articles they exhibited indicate the existence of various sources of wealth, which appear only to await a vigorous application of the means of industrial progress to become productive. The vegetable products shown included valonia, madder, currants, raisins, and tobacco; the mineral, those marbles which, wrought by ancient art, have formed the admiration of every time and people; and the animal, a jar of Hymettian honey, linked with classical associations. But the products of Greece at this day, like her people, bear the lineaments of degeneracy.

Perhaps no portion of the Exhibition attracted more general attention than that which was occupied by Turkey. To the more stupidly curious visitors, the luxurious furniture and gorgeous trappings which she displayed were objects of unceasing admiration; while to intelligent observers, the evidences which were to be seen, amid the barbaric splendor of her manufactures, of a genius struggling for freedom, enlisted a kind and degree of sympathy unlike what was manifested for any other nation. Too much praise cannot be accorded to the Sultan for his endeavors to revive the manufactures which once existed, and by the introduction, at his own cost, of new machinery, to give a fresh impetus to the industry of his country. The surest basis of her future progress, however, is to be found in the enlarged education she is giving to her young men. Her means of instruction at home are rivalling those which the best schools of Germany and England confer, and added to these she sends a large deputation from among the most promising sons of her chief citizens abroad every year; not to acquire the arts of ship-building and civil engineering alone, but to become conversant with the views of men of sound practical opinions on all important subjects. In embroidery and articles of gorgeous work, Turkey has long stood pre-eminent among oriental nations; but she seems to be aware that the day has arrived when a display of mere magnificence is no longer accounted the test of wealth or greatness. In proof of this, she produced at the Exhibition broad cloths, equal to the best English; cotton fabrics and silk piece goods, little inferior to the French; and reeled raw silks, unsurpassed by the best Italian. The high cost of these shows, indeed, that her improved manufactures are but in their infancy; but it also shows that the country possessing the greatest natural resources of any country in Europe has started in that race where indomitable determination—the strongest characteristic of the Mussulman—is the sure guarantee of success.

Arrived at nearly the same point in her retrogression from industrial independence that Turkey has reached in her advance towards it, Spain exhibited in her compartments the melancholy evidences of decadence from greatness. She who once ruled a dominion as wide as Britannia, to whom argosies came laden with the spoils of the Old World and New, who held the Netherlands by her armies, in spite of Louis XIV., and sent her armada, styled invincible, to chastise England, upon the great arena of industrial competition in the nineteenth century, held the place of but a third-rate power. A few sword blades from the oldest forges in Europe, a few beautiful silk fabrics from the once-renowned works of Talavera, a few samples of common cloths from Segovia, an imperfect representation of the manufactures of hemp and flax, specimens of cordage and sail cloths, and an indifferent collection of grains, marbles, metals, and earths, constituted the main portion of the products from the peninsula.

Not unlike Spain in the meagre display of textile fabrics, but surpassing her in the show of raw materials and produce, Portugal held also but an inferior position in the great Exhibition. There were, however, fine carvings in ivory, indicative of much skill in execution, a few interesting works in the precious metals, and the great oil jar from Alentejo, to draw attention to the small division she occupied.

Italy, as a whole, was not represented. Sardinia, Tuscany, and the papal States, were congregated, as independent sovereignties, among the other nations of the world; but neither Naples of modern days, nor Italy of ancient glory, possessed a local habitation or a name in the Crystal Palace. It is significant of much to the reflecting mind, that from the papal States two sections only were represented, viz: raw materials and sculpture. Among the former were silicious quartz, asphalte, and alum; and among the latter, sculptures, cameos in onyx and shell, and beautiful mosaic work from the Vatican. Tuscany seemed to be awakening from her sleep, and, by the samples which she sent of the products of her mines and her soil, to give earnest of efforts towards better days. Though the industrial superiority which she held during the middle ages, when the most powerful nations of Europe were her tributaries, can never be regained, she may yet—from her timber, (the best in Europe,) her marbles, and her metallic ores—from which the boracic acid of commerce is almost exclusively obtained—again enjoy an enviable pre-eminence. Even in advance of her, in all that pertains to the true greatness of nations, was her sister State, Sardinia. Nearly one hundred exhibitors represented her industry. A liberalist in opinion and action, in the highest and best sense of the word, came to preside over her interests. Sixty operatives—intelligent young mechanics and artisans, supported by the government—studied those lessons of practical knowledge in the Exhibition which would be most serviceable to home industry. Her contributions afforded good evidence of improving labor. To say nothing of her pharmaceutical specimens, unsurpassed by any nation, or of her rich mineralogical show, there was nothing throughout the Exhibition to equal the filigree and chased silver work from Turin, or to surpass the products of the velvet looms of Genoa. Success to all activity which impels the industry of Italy towards better days! Among the fine arts, still clinging to their ancient home, and recalling, even in their degeneracy, the traces of a nobler inspiration and a happier era, was a piece full of meaning—a matron teaching her children to walk alone, emblematic of "Young Italy."

Next in order of location came the collection of France, the most attractive and extensive of any in the foreign department, and in more points than one rivalling that of the United Kingdom. It would be vain to attempt, in this brief notice, to indicate even the principal features of this congress of French industry. Among the raw materials, silk, in every variety of process, claimed general admiration. Hemp, wool, and other textile materials were amply displayed. The delicate chemical preparations, the grosser products, the cements and paints, the metals and metallic manipulations, the prepared food and simple grains, made an interesting exhibition of themselves. The machinery department, from the huge water-wheel down to the kitchen bellows; the department of manufactures, from the gorgeous tapestry of the Gobelin's looms to the embroidered garter; the department of ceramic manufactures, from the service of Sevres china, too costly for money to purchase, down to the newest pattern of baking dishes; the department of fine arts, from the group of Cain and his Family, to the blurred and lifeless talbotype; and the rich department of jewelry, from the jewels of her majesty the Queen of Spain to the plain wedding ring of the peasant—each one, in its time and place, through all its most minute ramifications, skillfully arranged, and in every respect full of artistic feeling, was apparently complete. It is a peculiar characteristic of French industry, that all its products touch upon the wants, the comforts, and the luxuries of the million. They deal alike in the beauty of the cottage and the embellishment of the palace. Their bronzes, their lamps, and chandeliers, and candelabra, their furniture, their cambrics, shawls, and silks, even the most ordinary products of the shops, are with them works of art, rather than results of industry. While they do not neglect the demands of trade, it is the glory of France that her workmen aspire in everything to purity of design. The features of her character are imprinted upon all she produces; there being no more perfect picture of the great nation than is to be seen in her works of industry.

Belgium showed machinery and iron work, agricultural implements, carpets, and wood carvings, proving her right to be considered a first rate manufacturing country. Perhaps there is not in the world, as the various results of their industry show, a more industrious, artistic, or pains taking people.

The show of Austria, if the productions of her Italian possessions were to be accounted hers, was magnificent. Her furniture was unequalled for richness and splendor; her Bohemian glass sustained its world-wide reputation for beauty; her statuary exhibited a vigor and excellence unapproached; and her lithographers proved, by their contributions, that they led the world.

The German collection, from the numerous States of the Zoll Verein, wanting in that variety and expansiveness which mark the industrial developments of the great western States of Europe, showed a force and enterprise of the manufacturing spirit which bid fair to supplant England and France in the markets of the world. In the element of cheapness in production, none can equal the Germans. The "Amazon" and "Libusa," and other marks of statuary, testified that in higher art there is possessed by her sculptors energy and earnestness of expression, both characteristic of her people and approaching the sublime. In hardware and cutlery, in textile fabrics of the cheaper kind, and in medium porcelain, the States of Germany are destined to be the workshop of the world.

Of Norway, Sweden, Denmark, and Switzerland, it is unnecessary to say more than that each, in its industrial products, reflected its peculiar national characteristics. This, too, was equally true of Russia. From these, the grand, and striking, and regal, only came. The seal of the autocrat was stamped on everything. In all the beauty and magnificence, and costliness, and display of the Russian division, one saw nothing of the people. It was an exhibition of the enterprise of the executive—of the power of the sovereign—of the resources of the exchequer. It is not intended to be said that no individual contributions were received from Russia. The costly vases made, malachite doors, and heavy silks, were many of them the production of manufactories built up by private enterprise; but in even these the hand of an absolute power was everywhere apparent, encouraging or restraining—tempting forward by the hope of reward, or holding back by the fear of punishment.

Perhaps the industrial products of no two countries which ever existed presented so many points of strong contrast as did those of Russia and the United States at the Exhibition. In the one case, everything which was shown was costly; in the other, cheap. The compartments of Russia, splendidly fitted up and appointed, were attractive from the princely magnificence of the articles displayed. The compartments of the United States, on the contrary, decorated with great plainness, drew admiration from those who visited them by the adaptability of everything they contained to the purposes for which they were intended. Thousands never ceased to gaze with wonder on jewels, embroidery, velvets, silks, and furs, contributed from the various imperial establishments of St. Petersburgh and Moscow. There were others, however—and they, too, were counted by thousands before the Exhibition closed—who found—in the water pails, made by machinery, and furnished at one-quarter the usual price; in the pegged boots and shoes, between the upper leather and soles of which not a waxed end was drawn; in the improved household, barn, garden, and field implements; in the bell telegraphs, and spring chairs, and cooking ranges, and hot air furnaces, and camp bedsteads—a degree of intelligent interest excited by the display in no other part of the building. The Russian exhibition was a proof of the wealth, power, enterprise, and intelligence of Nicholas; that of the United States an evidence of the ingenuity, industry, and capacity of a free and educated people. The one was the ukase of an emperor to the notabilities of Europe; the other the epistle of a people to the workingmen of the world.

The history of our portion of the exhibition—of the lack of all pecuniary aid from the government, of its early discouragements, vicissitudes, and trials, of its gradual emerging from darkness, of its stoutly-fought battles, its victories and success, and of its hardly but fairly won honors at the close—is all too well known to the whole world to need recapitulation here. It is sufficient to say that we were not misunderstood. We might have sent far more of our productions to England; but that would only have confirmed, not altered, the verdict which the world has given us. We alone, of all people, exhibited the products of unfettered, untaxed, unpatronized labor. We showed the results of pure democracy upon the industry of men. We demonstrated the progressiveness of the human mind when in the enjoyment of liberty. And we alone, from among the assemblage of two-score nations, bore away the palm for intelligent labor.

XI.

INFORMATION

TO

PERSONS HAVING BUSINESS TO TRANSACT

AT THE

PATENT OFFICE.

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INFORMATION

TO PERSONS HAVING BUSINESS TO TRANSACT AT THE

UNITED STATES PATENT OFFICE.

Sec. I. OF THE FORMS PRESCRIBED BY LAW, AND THE RULES ADOPTED BY THE OFFICE.

The following forms and rules are founded, the first upon positive law, and the second upon the constructive power the Commissioner has to issue such orders as will secure impartial justice to applicants and facilitate the transaction of business.

The laws now in force relative to patents are those approved July 4, 1836; March 3, 1837; March 3, 1839; August 29, 1842; May 27, 1848; March 3, 1849; and March 3, 1851.

The forms resting upon these are fixed, and cannot, of course, be varied without the intervention of Congress; but rules, having their origin in the Commissioner, can be revised or modified at his discretion.

Sec. II. FOR WHAT PATENTS MAY BE GRANTED.

By the act of 1836, section 6, patents were granted for any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter, not known or used by others before the applicant's discovery or invention thereof, and not, at the time of his application for a patent, in public use, or on sale, with his consent or allowance as the inventor or discoverer; but, by the act of 3d March, 1839, no patent is held to be invalid by reason of the purchase, sale, or use [of the invention] prior to the application for a patent, except on proof of abandonment of such invention to the public, or that such purchase, sale, or public use has been for more than two years prior to such application for a patent.

By the 3d section of the act of 1842, patents are also granted for new and original *designs:*

1. For a manufacture, whether of metal or other material.
2. For the printing of woollen, silk, cotton, or other fabrics.
3. For busts, statues, or bas reliefs, or composition in alto or basso relievo.
4. For any impression or ornament (whether complete in itself, or) to be placed on any article of manufacture in marble or other material.
5. For any new and original pattern, or print, or picture, to be either worked into or worked on, or printed or painted, or cast or otherwise fixed on, any article of manufacture.
6. For any new shape or configuration of any article of manufacture.

All such designs not being previously known or used by others.

Sec. III. TO WHOM PATENTS MAY BE GRANTED.

Patents are granted to citizens of the United States; to aliens who shall have been resident in the United States one year next preceding, and shall have made oath of their intention to become citizens thereof; to one or more assignees of entire patent rights; to administrators and executors, and to foreign inventors or discoverers, but the law makes no provision for granting to the latter patents for new and original *designs.*

In case of the decease of an inventor, before he has obtained a patent for his invention, "the right of applying for and obtaining such patent shall devolve on the administrator or executor of such person in trust for the heirs at law of the deceased, if he shall have died intestate; but if otherwise, then in trust for his devisees, in as full and ample manner, and under the same conditions, limitations, and restrictions, as the same was held, or might have been claimed or enjoyed, by such person in his or her lifetime; and, when application for a patent shall be made by such legal representatives, the oath or affirmation shall be so varied as to be applicable to them."

Joint inventors are entitled to a joint patent; but neither can claim one separately.

Sec. IV. OF APPLICATIONS FOR PATENTS.

Of the propriety of making an application for a patent, the inventor or his agent must be the sole judge. The Patent Office is open, the records and models may be consulted during office hours, and the applicant can personally, or by attorney, satisfy himself of the expediency of filing his papers.

Further than the facilities thus afforded, the office can yield no assistance until the case is regularly before it in manner prescribed by law.

By the act of July 4, 1836, entitled "An act to promote the useful arts, and to repeal all acts and parts of acts heretofore made for that purpose," a principle entirely new was engrafted upon the system under which patents had been previously granted.

Under the provisions of this act it was made the duty of the Commissioner of Patents, on the receipt of any application for a patent, to institute "an examination of the alleged new invention or discovery," with a view to determine whether the same had been before "invented or discovered by any other person in this country," or "patented or described in any printed publication in this or any foreign country." Thus was the grant of patents in future restricted to such "inventions or discoveries" as were *new,* in the most absolute

sense of the term, and a very laborious and responsible duty imposed upon this office. In aid of the solution of the question of *novelty,* thus raised on every application, the applicant was required to furnish a full and clear description of his invention, signed, witnessed, and verified by his oath, accompanied by a model and drawings of the same; all being deemed necessary in order to illustrate his claim to a patent. Furnished with these illustrations, the office was then required to go into a rigorous and extended examination, taking in the whole range of history on the given subject, whether its evidences were to be found in patents granted, caveats filed, or descriptions published, in this or in any foreign country, in any period of time.

In the conduct of these examinations, it is necessary to keep in constant and laborious employment a number of persons specially selected for their knowledge and skill in the arts; to refer with guarded care to caveats filed in the secret archives of the office, and which can only come into view on such occasions; to patents already granted, and to such works on the arts as have been published here or elsewhere; and also to keep pace with the current of invention throughout the world, by a constant and copious supply of such publications, in this country and in Europe, as are devoted to this object.

It will readily be seen that this office cannot undertake to respond to the numerous inquiries CONSTANTLY *addressed to it,* whether such or such an invention is new, and whether a patent can be obtained for it; because every such inquiry involves the *whole question of novelty;* and before the office could express, or even form, an opinion, the same range of rigorous examination now required by law on a regular application would be necessary, and this, too, without illustration. Such inquiries are based on very imperfect general descriptions; while, in applications for patents, the law requires that the office shall have the aid, not only of clear and full description, under oath, but also accurate drawings and models, before it shall decide the question whether, in any given case, the invention be *new,* &c. The attempt to answer such interrogatories would effectually interrupt the business of the office, and be a direct infringement on the rights of those who apply for patents, as the examinations of their applications must necessarily be suspended; moreover, it would be prejudging cases, and be a violation of law.

There is another class of inquiries which, for the reasons above enumerated, cannot meet with a response from this office, viz: inquiries founded upon brief and imperfect descriptions, propounded with a view to ascertain whether such alleged improvements have been patented, and, if so, to whom; nor can the office respond to inquiries touching pending or rejected applications (unless they have been withdrawn) without the consent of the applicants in writing.

The office is frequently called upon to explain certain principles of Patent law, to give information as to modes of procedure in the protection of patents, and suits for infringements, and also as to the value of a patented invention, and upon a variety of topics concerning the rights of patentees and others. The office cannot act as counsellor for individuals, nor as an expounder of law, except in reference to questions arising within the office; and the extent of information that can be given in these cases, is to forward a copy of Patent laws and the usual printed official circular.

It is hoped that this information will prove satisfactory. It will be distinctly understood that, in declining to respond to the class of inquiries above stated, this office acts under the necessity of the case, and not from any disposition to withhold information.

In presenting an application for a patent, much disappointment and delay will be avoided by attending to the following directions: 1st. The *petition* should be made to the *Commissioner,* praying that a patent may be granted for the invention. 2d. The *specification* should be filed, describing, as clearly and concisely as possible, the improvement made. 3d. The *oath* or *affirmatio*-

should be made to the originality of the invention. 4th. *Drawings*, when the nature of the case admits of them, should accompany the application. 5th. The ***model or specimen***, as the case may be, clearly representing the improvement, should be deposited; and, 6th. The *fee* required by law should be paid, and in manner pointed out in section XVIII.

Owing to the great increase of business in this office, and in order to prevent all possibility of mistake as to the fact whether an application is complete, it has become necessary to put an end to the practice of receiving cases in detached portions at various times. It is now often the case that the fee is paid at one time, the papers forwarded at another, the drawing at a third, and the model delivered at still a different period. Long intervals are often suffered to elapse between each stage of the procedure, and it is necessary at each step to search the books of the office to ascertain what the party has done before.

In the multitude of applications, this state of things leads to the expenditure of much time, and, in case of similarity of names of parties, or of the character of inventions, is liable to be a cause of error. I have, therefore, deemed it necessary to adopt the following rule, which will be enforced on and after May 1850:

All the papers and the fee in each application must be filed in this office at the same time, whether they be delivered by the applicant or his agent, or forwarded by mail; and in those cases where the party or his agent is in this city, then the model must be delivered at the same time. If the party or his agent is not on the spot, the model can be forwarded at their convenience.

This office cannot refuse to receive such papers and fees as may be forwarded to it at different intervals, but parties who persist in such a course are warned that this office will, hereafter, not acknowledge the receipt of the same, nor hold itself responsible for any errors that may arise from such irregular proceedings.

Not until these requirements are *faithfully* and *minutely fulfilled*, according to the instructions hereafter given, can *any case* receive the action of the office.

1st. *Of the petition.*—The inventor, having made a useful invention of discovery, must make application, in writing, to the Commissioner, signifying his desire of obtaining an exclusive property therein, and praying that a patent may be granted therefor. The usual form is annexed. The petition *must* be signed by the applicant.

FORM OF PETITION.

To the COMMISSIONER OF PATENTS:

The petition of John Fitch, of Philadelphia, in the county of Philadelphia, and State of Pennsylvania—

RESPECTFULLY REPRESENTS:

That your petitioner has invented a new and improved mode of preventing steam-boilers from bursting, which he verily believes has not been known or used prior to the invention thereof by your petitioner. He therefore prays that letters patent of the United States may be granted to him therefor, vesting in him and his legal representatives the exclusive right to the same, upon the terms and conditions expressed in the act of Congress in that case made and provided; he having paid thirty dollars into the treasury, and complied with the other provisions of the said act.

JOHN FITCH.

2d. *Of the specification.*—He must then deliver a written description of his invention or discovery, and of the manner and process of making, constructing, using, and compounding the same, in such full, clear, and exact terms, avoiding unnecessary prolixity, as to enable any person skilled in the art or science to which it appertains, or with which it is most clearly connected, to make, construct, compound, and use the same; and in case of any machine, he shall fully explain the principle, and the several modes in which he has contemplated the application of that principle or character by which it may be distinguished from other inventions; and shall particularly specify and point out the part, improvement, or combination which he claims as his own invention or discovery.

It is important, in all cases, to have the specification describe the sections of the drawings, and refer by letters to the parts The following is the form adopted by the office:

FORM OF SPECIFICATION.

To all whom it may concern:

Be it known that I, John Fitch, of Philadelphia, in the county of Philadelphia, the State of Pennsylvania, have invented a new and improved mode of preventing steam-boilers from bursting, and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in providing the upper part of a steam-boiler with an aperture in addition to that for the safety-valve; which aperture is to be closed by a plug or disk of alloy, which will fuse at any given degree of heat, and permit the steam to escape, should the safety-valve fail to perform its functions.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation: I construct my steam-boiler in any of the known forms, and apply thereto gauge-cocks, a safety-valve, and the other appendages of such boilers; but, in order to obviate the danger arising from the adhesion of the safety-valve, and from other causes, I make a second opening in the top of the boiler similar to that made for the safety-valve, as shown at A, in the accompanying drawing; and in this opening I insert a plug or disk of fusible alloy, securing it in its place by a metal ring and screws, or otherwise. This fusible metal I, in general, compose of a mixture of lead, tin, and bismuth, in such proportions as will insure its melting at a given temperature, which must be that to which it is intended to limit the steam, and will, of course, vary with the pressure the boiler is intended to sustain. I surround the opening containing the fusible alloy by a tube, B, intended to conduct off any steam which may be discharged therefrom. When the temperature of the steam, in such a boiler, rises to its assigned limit, the fusible alloy will melt, and allow the steam to escape freely, thereby securing it from all danger of explosion.

What I claim as my invention, and desire to secure by letters patent, is the application to steam-boilers of a fusible alloy, which will melt at a given temperature, and allow the steam to escape, as herein described, using for that purpose the aforesaid metallic compound, or any other substantially the same, and which will produce the intended effect.

JOHN FITCH.

Witnesses—
ROBERT FULTON,
OLIVER EVANS.

When the application is for a machine, the specification should commence thus:

Be it known, that I, of , in the county of , and State of , have invented a new and useful machine for—[stating the use and title of the machine; and if the application is for an improvement, it should read thus: a new and useful improvement on a, or on the, machine, &c.]—and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same: reference being had to the annexed drawings, making a part of this specification, in which figure 1 is a perspective view, figure 2 a longitudinal elevation, figure 3 a transverse section, &c., (thus describing all the sections of the drawings, and then referring to the parts by letters. Then follows the description of the construction and operation of the machine, and ending with the claim, which should express the nature and character of the invention, and identify the parts claimed separately or in combination. If the specification is for an improvement, the original invention should be disclaimed, and the claim confined to the improvement.) The specification must be signed by the inventor.

3d. *Of the oath or affirmation.*—"Every inventor, before he can receive a patent, must make oath or affirmation that he does verily believe that he is the original and first inventor or discoverer of the art, machine, manufacture, composition, or improvement, for which he solicits a patent; and that he does not know or believe that the same was ever before known or used; and also of what country he is a citizen." In every case the oath or affidavit must be made before a person having general powers to administer oaths. Justices of the peace have not, in all cases, this general power.

The oath required from applicants for patents may be taken, when the applicant is not, for the time being, residing in the United States, before any minister plenipotentiary, chargé d'affairs, consul, or commercial agent holding commission under the government of the United States, or before any notary public of the foreign country in which such applicant may be.

If the applicant be an alien, and have resided one year in the United States next preceding the application, and have given legal notice of his intention to become a citizen of the United States, he must make oath to these facts before he can apply for a patent for the same fee as that paid by a citizen.

FORM OF OATH.

CITY AND COUNTY OF PHILADELPHIA, }
State of Pennsylvania, } *ss.*

On this day of , 185 , before me, the subscriber, a personally appeared the within named John Fitch, and made solemn oath [or affirmation] that he verily believes himself to be the original and first inventor of the mode herein described for preventing steam-boilers from bursting; and that he does not know or believe the same was ever before known or used; and that he is a citizen of the United States.

Signed, A. B.

A foreigner should make oath of what country he is a citizen. An alien resident should make oath that he has resided in the United States one year next preceding his application for letters patent, and has made oath of his intention to become a citizen thereof.

4th. *Of the Drawings.*—The law requires that "the applicant for a patent shall accompany his application with drawings and written references, *when the nature of the case admits of drawings.*" These drawings should, in general, be in perspective, and neatly executed on sheets of drawing-paper; and such parts as cannot be shown in perspective must, if described, be represented in plans, sections, or details. *Duplicates* are required if a patent issues—one being attached to the patent, and the other placed on file in the office. An examination, as to originality of invention, may be made on a single drawing, when no agent is employed; but in all cases presented by agents or attorneys, duplicate drawings must be filed before any examination can be had. They must be signed by the patentee, and attested by two witnesses, except when the specification describes the sections or figures, and refers to the parts by letters; in which case they are neither required to be signed nor accompanied by written references, the whole making one instrument. Drawings are absolutely necessary when the case admits of them. They must be on separate sheets, distinct from the specification, and one at least must be made on stiff drawing-paper, in fast colors.

The Patent Office does not make original drawings to accompany applications for patent. It furnishes copies of the same only after the patent is completed. Draughtsmen in the city of Washington are always ready to make drawings at the expense of the patentees.

5th. *Of the Model or Specimen.*—Every application must be accompanied by a model when the invention admits of one. It must be neatly and substantially made, of durable material, and, if possible, not over one cubic foot in contents. In case models are made of pine, or other soft wood, they should be painted, stained, or varnished. The name of the inventor (and assignee, if assigned) must be printed or engraved upon or fixed to it in a durable manner.

When the invention is of a "composition of matter," the law requires that the application be accompanied with specimens of the ingredients, and of the composition of matter, sufficient in quantity for the purpose of experiment.

Models and specimens forwarded without a name cannot be entered on record, and are therefore liable to be lost or mislaid.

Models, if deposited with any of the following agents, will be forwarded to the Patent Office free of expense:

The Collector of the port of Portsmouth, New Hampshire.
The Collector of the port of Portland, Maine.
The Collector of the port of Burlington, Vermont.
The Collector of the port of Providence, Rhode Island
The Collector of the port of Boston, Massachusetts.
The Collector of the port of Hartford, Connecticut.
The Collector of the port of New York.
The Collector of the port of Philadelphia, Pennsylvania.
The Collector of the port of Baltimore, Maryland
The Collector of the port of Richmond, Virginia.
The Collector of the port of Charleston, South Carolina
The Collector of the port of Savannah, Georgia.
The Collector of the port of New Orleans, Louisiana.
The Collector of the port of Detroit, Michigan.
The Collector of the port of Buffalo, New York.
The Surveyor at St. Louis, Missouri.
The Collector of the port of Cleveland, Ohio.
The Surveyor at Pittsburg, Pennsylvania.
The Surveyor at Cincinnati, Ohio.
The Surveyor at Louisville, Kentucky.

Agents must send models received by them by packet, whe the same are forwarded at the expense of the office.

If applicants prefer to have their models transmitted by express, instead of by packet, they must in all cases pay the expense of transportation. Neither models nor specimens must, under any circumstances, be sent by mail. (See Sec. XX.)

The transmission of models by the agents extends to those for new applications, as well as those restored in consequence of the destruction of the originals.

Models of unpatented machines, specimens of compositions and of fabrics, and other manufactures or works of art, will be received and arranged in the National Repository of the Patent Office.

6th. *Of fees payable for a Patent.*—The fee payable on an application for a patent by a citizen of the United States, or by a foreigner who has resided in the United States one year next preceding the application, and has made oath of his intention to become a citizen, is *thirty dollars;* by a subject of Great Britain, *five hundred dollars;* by any other foreigner, *three hundred dollars.*

In a case of a total assignment, before the patent issues, of his invention by a foreigner to a citizen of the United States, the same fee is required as if the patent issued to the inventor himself.

Instructions in regard to the manner of paying these fees may be found in Sec. XVIII of this pamphlet.

The above six pre-requisites having been complied with, the application is ready for examination. But the neglect of any one of them, or of the instructions relative thereto, will be sufficient to delay the action of the office until they have been satisfactorily fulfilled.

If the following questions can be answered affirmatively before transmitting the papers, few applications will be returned for correction:

1st. Is the petition signed by the applicant and addressed to the Commissioner of Patents?

2d. Is the specification signed and attested by two witnesses, and does it contain a specific claim?

3d. Has the inventor made oath of his citizenship, and in accordance with instructions and forms given above?

4th. Are the drawings described and referred to in the specification? If not, are they signed before two subscribing witnesses, and accompanied by written references? Are duplicates sent?

5th. Has the model (or specimen) been deposited, and is the name of the inventor and assignee, if the invention be assigned, durably affixed thereto?

6th. Is the fee remitted, and in manner prescribed in Sec. XVIII?

Sec. V. OF THE PROCEEDINGS DURING EXAMINATION.

Applications are examined and patents issued in the order in which the proper documents are completed, except in cases in which the claims so nearly resemble those undergoing examination as to render an interference probable; in which case they will be taken up and examined with the cases then under examination.

A decision deliberately made and affirmed by one Commissioner cannot be disturbed by his successor. Some years since, the evils arising from such revisions became so apparent and embarrassing, that a positive rule to that effect was adopted. It was submitted to, and approved by, the President of the United States.

This office, therefore, cannot, except under extraordinary circumstances, disturb decisions so re-affirmed, but must refer all who consider themselves

aggrieved to their remedy by appeal; for instructions with regard to which, or withdrawal, see Sec. VI, par. 3 and 4. For instructions relative to interfering applications, Sec. VI, par. 5.

A *defective* specification or drawing may be amended at any time before a patent has issued; in which case the applicant will be required to make oath anew. In case papers are withdrawn from the office for alteration or amendment before examination, the application will take its turn for examination as a *new case* filed on the day of the reception of the altered or amended papers.

In case specifications and drawings should be found defective, they are returned to the applicant, with instructions to amend. When returned to the office, they are again examined; the examination in such cases taking precedence of all new cases on hand at the time of their reception. But if, on such examination, it should be found that the instructions to amend have been disregarded, or not properly attended to, the papers are again returned to the applicant; and, upon their second return to the office, the examination of such papers is delayed until all the business on hand at the time of their reception is disposed of.

When papers are thus returned to applicants for amendment, should they find it necessary, or deem it important, to prepare new documents in order to make suitable amendments, *the original papers must be returned to the office together with the amended or new papers;* otherwise, examination upon such cases will be delayed until the original papers are received by the office.

After an application has been examined, no alteration made in the character of the invention can be considered under the same fee. Any such alteration requires a new fee, papers, &c., before examination can be had.

In general, if any addition is to be made to an invention duly before the office, or any change in its character, the applicant must withdraw and file his application anew.

The personal attendance of an applicant at the Patent Office is unnecessary. The business can be done by correspondence or by attorney. All explanations and suggestions in relation to pending and to all other cases should be in writing, addressed to the Commissioner. Correspondence with the examiners, or other subordinates, is strictly prohibited.

When an application has been *finally decided*, the office will retain the original papers, allowing the applicant to obtain copies thereof

Sec. VI. OF THE RESULTS OF AN EXAMINATION.

1st. *If the claim or claims be allowed.*—If a patent issues, it is transmitted to the inventor or his agent. If to the latter, he must have filed a full power of attorney authorizing him to receive it. In case an assignment be made of the entire patent right, the patent will be sent to the assignee or his attorney.

2d. *If the claim be rejected.*—In cases of rejection, such references are made in the official communication as, in the opinion of the office, justify its decision If the applicant is satisfied with the grounds of rejection, he may withdraw his application; if, on the contrary, he still deems himself entitled to a patent, he can request a reconsideration of the case, provided the references and arguments relied upon by the office as grounds of rejection have been carefully considered by him; and explanations, whether verbal or in writing, based upon the inapplicability of the one, or the unsoundness of the other, may be received at any convenient time. These are the only grounds upon which an application can be reconsidered, and this final action in the case cannot be had until it comes up in its turn as a case presented anew. If the applicant is still dissatisfied, he can appeal from the decision of the Commissioner, as prescribed by law.

3d. *Of the withdrawal.*—When either an American or foreign application is rejected, and the applicant relinquishes his claim, and desires to avail himself of the provisions of the 7th section of the act of 1836, and the 12th section of the act of 1837, he must petition the Commissioner of Patents, stating the abandonment of his application; in which case two-thirds of the original fee will be returned. The model and papers are retained by the office; and if the latter have been withdrawn for correction, or for any other purpose, they must be returned to their files before a withdrawal of two-thirds of the fee can be allowed. No money is, however, refunded on the withdrawal of an application after an appeal has been taken from the decision of the Commissioner, nor any part of the fees received on filing caveats, or applications for additional improvements, or for reissues, or for extensions, or for designs.

In withdrawing an application the following forms may be followed:

To the COMMISSIONER OF PATENTS:

SIR: I hereby withdraw my application for a patent for improvements in the cotton-gin, now in your office, and request that twenty dollars may be returned to me, agreeably to the provision of the act of Congress authorizing such withdrawal.

ELI WHITNEY.

CABOTVILLE, MASS., *July* 16, 1849.

Received of the Treasurer of the United States, per Thomas Ewbank, Commissioner of Patents, twenty dollars, being the amount refunded on withdrawing my application for a patent for improvements in the cotton-gin.

ELI WHITNEY.

CABOTVILLE, MASS., *July* 16, 1849.

As the law does not allow public moneys to be paid in *bank bills*, or by *draught on banks*, particular instructions should be given by the person withdrawing as to the manner in which the money shall be paid—*i, e.*, whether to his order at this office, or remitted by mail, *in gold, at his risk*. Money in *gold* and *silver* only is receivable and payable at this office.

4th. *Of appeal.*—When a patent is refused by the Commissioner, the applicant can have remedy by an "appeal to the Chief Justice of the District Court of the United States for the District of Columbia," by giving notice thereof to the Commissioner, and filing in the Patent Office, within such time as the Commissioner shall appoint, his reasons of appeal, specially set forth in writing, and also paying into the Patent Office, to the credit of the Patent Fund, the sum of twenty-five dollars, in manner prescribed in section XVIII.

"And it shall be the duty of said Chief Justice, on petition, to hear and determine all such appeals, and to revise such decisions in a summary way, on the evidence produced before the Commissioner, at such early and convenient time as he may appoint, first notifying the Commissioner of the time and place of hearing, whose duty it shall be to give notice thereof to all parties who appear to be interested therein, in such manner as said Judge shall prescribe. The Commissioner shall also lay before the said Judge all the original papers and evidence in the case, together with the grounds of his decision, fully set forth in writing, touching all the points involved, by the reasons of appeal, to which the revision shall be confined; and, at the request of any party interested, or at the desire of the Judge, the Commissioner, and the Examiners in the Patent Office, may be examined, under oath, in explanation of the principles of the machine, or other thing, for which a patent in such case is prayed

[for.] And it shall be the duty of said Judge, after a hearing of any such case, to return all the papers to the Commissioner, with a certificate of his proceedings and decision, which shall be entered on record in the Patent Office; and such decision, so certified, shall govern the further proceedings of the Commissioner in such case: *Provided, however*, That no opinion or decision of the Judge in any such case shall preclude any person interested in favor [of] or against the validity of any patent which has been or may hereafter be granted, from the right to contest the same in any judicial court, in any action in which its validity may come in question."

In cases of appeal it has been decided by the said Chief Justice that the case must be dismissed, unless the "reasons of appeal" are filed in the Patent Office within the time prescribed by the Commissioner, and that no further reasons or argument in writing, or otherwise, and no answer to the grounds of the Commissioner's decision, can be received, heard, or considered afterwards; but that the appeal must be decided upon the papers filed in the Patent Office, and the written grounds of the Commissioner's decision. Notice of this decision is given because a practice somewhat different has heretofore prevailed.

In cases where patents are refused for any reason whatever, either by the Commissioner of Patents or by the Chief Justice of the United States court for the District of Columbia, remedy can be had by bill in equity; "and the court having cognizance thereof, on notice to adverse parties," (and when there shall be no adverse party a copy of the bill shall be served upon the Commissioner of Patents, when the whole of the expenses of the proceedings shall be paid by the applicant, whether the final decision shall be in his favor or otherwise,) "and other due proceedings had, may adjudge and declare either the patent void in the whole or in part, or inoperative and invalid in any particular part or portion of the United States, according to the interest which the parties to such suit may possess in the patent or the inventions patented; and may also adjudge that such applicant is entitled, according to the principles and provisions of this act, to have and receive a patent for his invention, as specified in his claim, or for any part thereof, as the fact of priority of right or invention shall, in any such case, be made to appear. And such adjudication, if it be in favor of the right of such applicant, shall authorize the Commissioner to issue such patent, on his filing a copy of the adjudication, and otherwise complying with the requisitions of this act: *Provided, however*, That no such judgment or adjudication shall affect the rights of any person except the parties to the action, and those deriving title from or under them, subsequent to the rendition of such judgment."

It has recently been decided, in the district court of Eastern Pennsylvania, that all proceedings in equity against the Commissioner of Patents must be commenced and prosecuted in the courts of the District of Columbia; no court out of the District having jurisdiction over the subject matter.

Before appealing from the decision of the Commissioner, the oath of invention must be renewed.

5th. *Of interfering applications.*—Whenever an application is presented for a patent which, in the opinion of the Commissioner, would interfere with any other patent for which an application may be pending, or with any unexpired patent which shall have been granted, it shall be the duty of the Commissioner to give notice thereof to such applicants or patentees, as the case may be; and if either shall be dissatisfied with the decision of the Commissioner on the question of priority of right or invention, on a hearing thereof, he may appeal from such decision on like terms and conditions as are provided in the case of applications for inventions not new; and the like proceedings shall be had to determine which, or whether either, of the applicants is entitled to receive a patent as prayed for.

In contested cases, the following rules have been established for taking and transmitting evidence:

1st. That all statements, declarations, evidence, &c., shall be in writing, setting forth, minutely and particularly, the point or points at issue, and shall be verified by oath or affirmation.

2d. That all statements, declarations, proofs, and evidence shall be filed in the Patent Office by the parties, respectively, before the day of hearing.

3d. That, before the deposition of a witness or witnesses be taken by either party, notice should be given to the opposite party of the time and place when and where such deposition or depositions will be taken, so that the opposite party, either in person or by attorney, shall have full opportunity to cross-examine the witness or witnesses. And such notice shall, *with proof of service of the same*, be attached to the deposition or depositions, whether the party cross-examine or not; and such notice shall be given in sufficient time for the appearance of the opposite party, and for the transmission of the evidence to the Patent Office before the day of hearing.

4th. That all evidence, &c., shall be sealed and addressed to the Commissioner of Patents, by the persons before whom it shall be taken, and so certified thereon.

5th. That the certificate of the magistrate taking the evidence shall be substantially in the following form, and written upon the envelope, viz:

"I hereby certify that the depositions of A B, C D, &c., relating to the matter of interference between E F and G H, were taken, sealed up, and addressed to the Commissioner of Patents by me.

"A B, *Justice of the Peace.*"

6th. In cases of extension, where no opposition is made, *ex parte* testimony will be received from the applicant; and such testimony as may have been taken by the applicant, prior to notice of opposition, shall be received: *Provided*, The applicant shall give prompt notice to the opposing party or parties of the names and residences of the witnesses whose testimony has been thus taken.

7th. That no evidence, statement, or declaration, touching the matter at issue, will be *considered* upon the said day of hearing, which shall not have been taken and filed in compliance with these rules: *Provided*, That if either party shall be unable, for good and sufficient reasons, to procure the testimony of a witness or witnesses within the stipulated time, then it shall be the duty of said party to give notice of the same to the Commissioner of Patents, accompanied by statements, *under oath*, of the cause of such inability, and of the *steps* which have been taken to procure said testimony, and of *the time* or *times* when efforts have been made to procure it, which last-mentioned notice to the Commissioner shall be received by him previous to the day of hearing aforesaid.

Sec. VII. OF ADDITIONAL IMPROVEMENTS

"Whenever the original patentee shall be desirous of adding the description and specification of any new improvement of the original invention or discovery, which shall have been invented or discovered by him subsequent to the date of his patent, he may, like proceedings being had in all respects as in the case of original applications, and on the payment of fifteen dollars, as hereinafter mentioned, have the same annexed to the original description and specification; and the Commissioner shall certify, on the margin of such annexed description and specification, the time of its being annexed and recorded; and the same shall thereafter have the same effect in law, to all intents and purposes, as though it had been embraced in the original description and specification.

In all such cases the claim in the original patent is subject to a re-examination; and, if it shall appear that any part of the claim was not original at the time of granting the patent, a disclaimer of said part must be filed in the Patent Office, or the specification of claims restricted, by having the patent reissued before the improvement can be added. If the improvement cannot be added, it may, if patentable, be secured by a separate patent, on the payment of the fee of thirty dollars. If the patent was granted before the 15th of December, 1836, a model and drawings of the invention, as first patented, verified by oath, must be furnished, unless dispensed with by the Commissioner.

FORM FOR ADDITION OF NEW IMPROVEMENTS.

To the COMMISSIONER OF PATENTS:

The petition of James Rumsey, of the county of Berkely, and State of Virginia—

RESPECTFULLY REPRESENTS:

That your petitioner did obtain letters patent of the United States for an improvement in the boilers of steam-engines, which letters patent are dated on the first day of March, 1835; that he has, since that date, made certain improvements on his said invention; and that he is desirous of adding the subjoined description of his said improvements to his original letters patent, agreeably to the provisions of the act of Congress in that case made and provided; he having paid fifteen dollars into the treasury of the United States, and otherwise complied with the requirements of the said act.

JAMES RUMSEY.

Sec. VIII. OF DISCLAIMERS.

The 7th section of the law of 3d March, 1837, provides as follows:

"That whenever any patentee shall have, through inadvertence, accident, or mistake, made his specification of claim too broad, claiming more than that of which he was the original or first inventor, some material and substantial part of the thing patented being truly and justly his own any such patentee, his administrators, executors, and assigns, whether of the whole or of a sectional interest therein, may make disclaimer of such parts of the thing patented as the disclaimant shall not claim to hold by virtue of the patent or assignment, stating therein the extent of his interest in such patent; which disclaimer shall be in writing, attested by one or more witnesses, and recorded in the Patent Office, on payment, by the person disclaiming, in manner as other patent duties are required by law to be paid, of the sum of ten dollars. And such disclaimer shall thereafter be taken and considered as part of the original specification, to the extent of the interest which shall be possessed in the patent or right secured thereby by the disclaimant, and by those claiming by or under him subsequent to the record thereof. But no such disclaimer shall affect any action pending at the time of its being filed, except so far as it may relate to the question of unreasonable neglect or delay in filing the same."

In case of patents granted before the 15th December, 1836, no disclaimer will be admitted for record until a model and drawings of the invention, as originally patented, verified by oath, shall have been deposited, unless dispensed with by the Commissioner.

FORM OF DISCLAIMER.

To the COMMISSIONER OF PATENTS:

The petition of Eliphalet Nott, of Schenectady, in the county of Schenectady, and State of New York—

RESPECTFULLY REPRESENTS:

That he has, by assignment duly recorded in the Patent Office, become the owner of a right for the several States of Massachusetts, Connecticut, and Rhode Island, to certain improvements in the steam-engine, for which letters patent of the United States were granted to Jacob Perkins, of Boston, in the State of Massachusetts, dated on the first day of March, 1835. That he has reason to believe that, through inadvertence and mistake, the claim made in the specification of said letters patent is too broad, including that of which the said patentee was not the first inventor. Your petitioner, therefore, hereby enters his disclaimer to that part of the claim in the aforenamed specification which is in the following words, to wit: "I also claim the particular manner in which the piston of the above described engine is constructed, so as to insure the close fitting of the packing thereof to the cylinder, as set forth;" which disclaimer is to operate to the extent of the interest in said letters patent vested in your petitioner, who has paid ten dollars into the Treasury of the United States, agreeably to the requirements of the act of Congress in that case made and provided.

ELIPHALET NOTT.

Witness—JOHN PRINCE.

When the disclaimer is made by the original patentee, it must, of course, be so worded as to express that fact.

SEC. IX. OF REISSUES.

When an applicant wishes to cancel an old patent, and to correct a mistake or error which has arisen from inadvertence, he should state this fact in his application, and expressly *surrender* the old patent, which must be transmitted to the Patent Office before a new patent will be issued. And no improvement or alteration, made subsequently to the filing of the application upon which the original patent was granted, can be introduced into a patent upon reissue. Section 13, of the act of July, 1836, enacts: "That, whenever any patent, which has heretofore been granted, or which shall hereafter be granted, shall be inoperative or invalid, by reason of a defective or insufficient description or specification, or by reason of the patentee claiming, in his specification, as his own invention, more than he had or shall have a right to claim as new, if the error has or shall have arisen by inadvertence, accident, or mistake, and without any fraudulent or deceptive intention, it shall be lawful for the Commissioner, upon the surrender to him of such patent, and the payment of the further duty of fifteen dollars, to cause a new patent to be issued to the said inventor, for the same invention, for the residue of the period, then unexpired, for which the original patent was granted, in accordance with the patentee's corrected description and specification."

In a reissue the claim is subject to re-examination, and if it shall appear that any part was not original at the time of granting the patent, the reissue will not be granted, unless said part be omitted, or a disclaimer filed in the Patent Office. If nothing can be claimed, the reissue cannot be granted, nor the surrendered patent returned. Where the patent was granted before the 15th of December, 1836, a model and drawings of the invention, as originally patented, verified by oath, must be deposited in the Patent Office before a reissue can be granted, unless dispensed with by the Commissioner; and when the original patent has been lost, before a reissue can be granted the original patent should first be restored, and then surrendered.

In case of the death of an inventor, or of any assignment of the original patent made by him, a similar right vests in his executors, administrators, or assignees; and the patent so reissued, together with the corrected description and specification, have the same effect and operation in law on the trial of all actions thereafter commenced for causes subsequently accruing, as though the same had been originally filed in such corrected form before the issuing of the original patent.

On a surrender several patents may be issued for distinct and separate parts of the invention, upon the payment of thirty dollars for each.

FORM OF SURRENDER OF A PATENT FOR REISSUE.

To the COMMISSIONER OF PATENTS:

The petition of Samuel Morey, of Philadelphia, in the county of Philadelphia, and State of Pennsylvania—

RESPECTFULLY REPRESENTS:

That he did obtain letters patent of the United States for an improvement in the boilers of steam-engines, which letters patent are dated on the first day of March, 1835. That he now believes that the same is inoperative and invalid by reason of a defective specification, which defect has arisen from inadvertence and mistake. He therefore prays that he may be allowed to surrender, and he hereby does surrender, the same, and requests that new letters patent may issue to him, for the same invention, for the residue of the period for which the original patent was granted, under the amended specification herewith presented, he having paid fifteen dollars into the Treasury of the United States, agreeably to the requirements of the act of Congress in that case made and provided.

SAMUEL MOREY.

SEC. X. OF EXTENSIONS.

Section eighteen of the act of 1836 enacts, "That, whenever any patentee of an invention or discovery shall desire an extension of his patent beyond the term of its limitation, he may make application therefor, in writing, to the

Commissioner of the Patent Office, setting forth the grounds therefor; and the Commissioner shall, on the applicant's paying the sum of forty dollars to the credit of the Treasury, as in the case of the original application for a patent, cause to be published in one or more of the principal newspapers in the city of Washington, and in such other paper or papers as he may deem proper, published in the section of the country most interested adversely to the extension of the patent, a notice of such application, and of the time and place when and where the same will be considered, that any person may appear and show cause why the extension should not be granted." The patentee shall furnish a statement in writing, under oath, of the ascertained value of the invention, and of his receipts and expenditures, sufficiently in detail to exhibit a true and faithful account of loss and profit in any manner accruing to him from and by reason of said invention. And if, upon a hearing of the matter, it shall appear to the full and entire satisfaction of the Commissioner, having due regard to the public interest therein, that it is just and proper that the term of a patent should be extended, by reason of the patentee, without neglect or fault on his part, having failed to obtain, from the use and sale of his invention, a reasonable remuneration for the time, ingenuity, and expense bestowed upon the same, and the introduction thereof into use, it shall be the duty of the Commissioner to renew and extend the patent, by making a certificate thereon of such extension, for the term of seven years from and after the expiration of the first term; which certificate shall be entered on record in the Patent Office; and thereupon the said patent shall have the same effect in law as though it had been originally granted for the term of twenty-one years, and the benefit of such extension shall accrue to assignees and grantees of the right to use the thing patented to the extent of their respective interests therein: *Provided, however*, That no extension of a patent shall be granted after the expiration of the term for which it was originally issued.

By the first section of the act of May 27, 1848, it is provided "that the power to extend patents, now vested in the board composed of the Secretary of State, Commissioner of Patents, and Solicitor of the Treasury, by the eighteenth section of the act approved July fourth, eighteen hundred and thirty-six, respecting the Patent Office, shall hereafter be vested solely in the Commissioner of Patents; and when an application is made to him for the extension of a patent, according to said eighteenth section, and sixty days' notice given thereof, he shall refer the case to the principal examiner having charge of the class of inventions to which said case belongs, who shall make a full report to said Commissioner of the said case, and particularly whether the invention or improvement secured in the patent was new and patentable when patented; and thereupon the said Commissioner shall grant or refuse the extension of said patent, upon the same principles and rules that have governed said board; but no patent shall be extended for a longer term than seven years."

The following suggestions and rules have been adopted for the benefit of those persons who may hereafter apply for extensions:

The questions which arise on each application for an extension are—

1. Is the invention *novel*?
2. Is it *useful*?
3. Is it *valuable* and *important* to the public?
4. Has the inventor been *adequately remunerated* for his time and expenses in originating and perfecting it?
5. Has he used due diligence in introducing his invention into general use?

To enable the Commissioner to come to a correct conclusion in regard to the third point of inquiry, the applicant should procure the testimony of persons not interested in the invention, which testimony should be taken under oath.

In regard to the fourth and fifth points of inquiry, in addition to his own oath showing his receipts and expenditures on account of the invention, by which his profit or loss is to be ascertained, the applicant should show, by the testimony of disinterested witnesses on oath, that he has taken all reasonable measures to introduce his invention into general use; and that, without default or neglect on his part, he has failed to obtain from the use and sale of the invention a reasonable remuneration for the time, ingenuity, and expense bestowed on the same, and the introduction thereof into use.

The law now requiring that a notice of sixty days shall be given of each application for extension, it will be necessary for the applicant to file his petition and pay the requisite fee at least three months before his patent expires.

Persons opposing the extension of a patent must file in the Patent Office their reasons, specifically set forth in writing, twenty days before the day of hearing.

In case of opposition by any person to the extension of a patent, both parties may take testimony, each giving reasonable notice to the other of the time and place of taking said testimony, which shall be taken according to the rules prescribed by the Commissioner of Patents in case of interference.

All arguments submitted to the Commissioner must be in writing.

The report of the examiner, now required by law to be made to the undersigned, will, if practicable, be ready fifteen days before the day appointed for the hearing. And, in order that the examiner may have ample time to make his report, the patent, together with all the testimony and arguments, should be filed in the office at least twenty days before the day of hearing.

If the applicant fails to furnish the undersigned with a statement, *in detail*, of his receipts and expenditures, as required by the 18th section of the act approved July 4, 1836, his application must be rejected. His attention, therefore, is particularly called to this point, as many fail to accompany their petitions with any statement of receipts and expenditures.

If a patent has expired before application for extension is made, or if such application is made *within* the sixty days' notice now required by law, the office can afford the inventor no relief. If he desires a *renewal* of his patent, his remedy is to be found only in a special act of Congress.

Sec. XI. OF DESIGNS.

The 3d section of the act of 1842, without repealing or changing the law under which patents have heretofore been granted, enacts: "That any citizen or citizens, or alien or aliens, having resided one year in the United States, and taken the oath of his or their intention to become a citizen or citizens, who by his, her, or their own industry, genius, efforts, and expense, may have invented or produced any new and original design for a manufacture, whether of metal or other material or materials; or any new and original design for the printing of woollen, silk, cotton, or other fabrics; or any new and original design for a bust, statue, or bas relief, or composition in alto and basso relievo; or any new and original impression or ornament, or to be placed on any article of manufacture, the same being formed in marble or other material; or any new and useful pattern, or print, or picture, to be either worked into, or worked on, or printed, or painted, or cast, or otherwise fixed on any article of manufacture; or any new and original shape or configuration of any article of manufacture not known or used by others before his, her, or their invention or production thereof, and prior to the time of his, her, or their application for a patent therefor, and who shall desire to obtain an exclusive property or right therein to make, use, and sell, and vend the same, or copies of the same, to others, by them to be made, used, and sold, may make application in writing to the Commissioner of Patents expressing such desire, and the Commissioner, on due proceedings had, may grant a patent therefor, as in the case now of application for a patent: *Provided*, That the fee in such cases, which by the now existing laws would be required of the particular applicant, shall be one-half the sum, (*i. e.*, fifteen dollars;) and that the duration of said patent shall be seven years; and that all the regulations and provisions which now apply to the obtaining or protection of patents, not inconsistent with the provisions of this act, shall apply to applications under this section."

It will be perceived from the above that the law extends protection to a new class of objects, and that this is merely *additional* to previous acts.

In making an application to secure a design, the same course of proceedings is required as in applying for an invention. The petition, specification, and oath, executed as prescribed below, must be filed, and the specimen and duplicate drawings deposited. In case of rejection, no part of the fee for designs is refunded.

FORM OF APPLICATION FOR PATENTS FOR DESIGNS.

To the COMMISSIONER OF PATENTS:

The petition of Benjamin West, of the city and county of Philadelphia, and State of Pennsylvania—

RESPECTFULLY REPRESENTS:

That your petitioner has invented or produced [a new and original design for a composition in alto relievo,] which he verily believes has not been known prior to the production thereof by your petitioner. He, therefore prays that letters patent of the United States may be granted to him therefor, vesting in him and his legal representatives the exclusive right to the same, upon the terms and conditions expressed in the act of Congress in that case made and provided, he having paid fifteen dollars into the treasury, and complied with the other provisions of the said act.

BENJAMIN WEST.

FORM OF SPECIFICATION.

To all whom it may concern:

Be it known that I, Benjamin West, of the city of Philadelphia, in the county of Philadelphia, and State of Pennsylvania, have invented or produced a new and original design for a composition in alto relievo, and I do hereby declare that the following is a full and exact description of the same. [Here follows a description of the design with reference to the specimen or drawing, the specification to conclude with declaring what the inventor claims, in terms characteristic of the design, &c.]

BENJAMIN WEST.

Witnesses—
NOAH WEBSTER,
NATHANIEL BOWDITCH.

FORM OF OATH.

CITY AND COUNTY OF PHILADELPHIA, *State of Pennsylvania,* } *ss.*

On this day of , 185 , before the subscriber, a , personally appeared the within-named Benjamin West, and made solemn oath [or affirmation, as the case may be] that he verily believes himself to be the original and first inventor or producer of the design for a composition in alto relievo, and that he does not know or believe that the same was ever before known or used; and that he is a citizen of the United States.

Signed, B. A.

SEC. XII. OF FOREIGN PATENTS.

A patent may be taken out by the inventor in a foreign country without affecting his right to a patent in the United States, provided the invention has not been introduced into public and common use in the United States prior to the application. In every such case the patent is limited to fourteen years from the date of the foreign letters patent. The introducer, *as such*, of a new invention from a foreign country is not entitled to letters patent. If an alien neglects to put and continue on public sale the invention in the United States, on reasonable terms, for eighteen months, he loses all the benefit of the patent.

Applications for inventions *patented* in a foreign country will be taken up for examination immediately after all the necessary papers and drawings have been filed, the fee paid, and the model deposited. As the letters patent issued in this country for inventions patented abroad bear date with the foreign letters patent, this rule has been adopted with the view of giving the longest term to the patent in this country. No invention will be considered as patented in a foreign country unless the specification has been enrolled, and the patent in all respects complete.

For a similar reason, applications for the surrender and reissue of letters patent, and for additional improvements to be added to original letters patent, will be examined immediately after they shall have been completed.

SEC. XIII. OF CAVEATS.

The 12th section of the act of 1836 provides: "That any citizen of the United States, or alien who shall have been a resident of the United States one year next preceding, and shall have made oath of his intention to become a citizen thereof, who shall have invented any new art, machine, or improvement thereof, and shall desire further time to mature the same, may, on paying to the credit of the treasury the sum of twenty dollars, file in the Patent Office a caveat, setting forth the design and purpose thereof, and its principal and distinguishing characteristics, and praying protection of his rights till he shall have matured his invention; which sum of twenty dollars, in case the person filing such caveat shall afterwards take out a patent for the invention therein mentioned, shall be considered a part of the sum herein required for the same. And such caveat shall be filed in the confidential archives of the office, and preserved in secrecy. And if application shall be made by any other person, within one year from the time of filing such caveat, for a patent of any invention with which it may in any respect interfere, it shall be the duty of the Commissioner to deposite the description, specifications, drawings, and model in the confidential archives of the office, and to give notice (by mail) to the person filing the caveat of such application, who shall, within three months after receiving the notice, if he would avail himself of the benefit of his caveat, file his description, specifications, drawings, and models; and if, in the opinion of the Commissioner, the specifications of claim interfere with each other, like proceedings may be had in all respects as are in this act provided in the case of interfering applications.

"Whenever the applicant shall request it, the patent shall take date from the time of filing the specification and drawings, not, however, exceeding six months prior to the actual issuing of the patent; and, on like request, and the payment of the duty herein required, by any applicant, his specification and drawings shall be filed in the secret archives of the office until he shall furnish the model, and the patent be issued, not exceeding the term of one year; the applicant being entitled to notice of interfering applications."

Caveats may be renewed yearly by payment of a new fee of $20; but the protection afforded by a caveat is against only such applications as are filed within the year from the time of filing the caveat.

A full description of the invention is required to enable the Commissioner of Patents to judge of interferences.

The law makes no provision for the filing of caveats by *foreigners*.

For the information of caveators, the following rules have been adopted:

1. Caveat papers cannot, under *any circumstances*, be withdrawn from the office, nor undergo any alteration, after they have been once filed; nor can *any* information concerning them be communicated to *any person, at any time*, without the consent of the caveators in writing.
2. Additional papers relating to *the invention* may be admitted under the same file, the date of reception of such papers being noted.
3. In case of filing papers additional to an original caveat, the right to notice of such papers expires with the caveat; and any additional papers, not relating to the invention as first caveated, are not entitled to notice.
4. Caveat papers once filed cannot be inspected by the caveator, except in presence of a sworn officer, nor by any other persons than those duly authorized by law to examine such papers; nor can any information touching them be communicated to third parties without the consent of the caveator in writing.
5. The caveator, or other person properly authorized by him, may at any time obtain copies of the caveat papers at the usual rates.
6. It is desirable that caveats should be explicit as to the character and features of the invention, embrace suitable drawings or sketches, and a model if convenient. The caveat fails of its purpose when the invention is not sufficiently explained.

FORM OF CAVEAT.

To the COMMISSIONER OF PATENTS:

The petition of Amos Whittemore, of the city and county of New York, and State of New York—

RESPECTFULLY REPRESENTS:

That he has made certain improvements in the machine for making wool cards, and that he is now engaged in making experiments for the purpose of perfecting the same, preparatory to his applying for letters patent therefor. He therefore prays that the subjoined description of his invention may be filed as a CAVEAT, in the confidential archives of the Patent Office, agreeably to the provisions of the act of Congress in that case made and provided; he having paid twenty dollars into the treasury of the United States, and otherwise complied with the requirements of the said act.

AMOS WHITTEMORE.

NEW YORK, *July* 16, 1849.

Here should follow a description of the general principles of the invention, so far as it has been completed.

SEC. XIV. OF THE DURATION OF PATENTS, AND THE PENALTY FOR ILLEGALLY STAMPING ARTICLES.

The term for which a regular patent is granted is *fourteen years;* but it may, under certain circumstances, be extended for seven years, as herein before mentioned. Patents for designs are granted for *seven years* only.

Stamping or affixing the name of any patentee on any article without authority so to do, or affixing the word *patent*, or *letters patent*, or the stamp, mark, or device of any patentee, on any unpatented article, is forbidden under a penalty of not less than one hundred dollars.

Patentees or their assignees are required to affix the date of the patent on each article vended or offered for sale, under a like penalty; thus affording to the public notice of the duration of the patent. When the article is of such a nature that the name of the patentee cannot be printed thereon, it should be affixed to the case or package containing it.

SEC XV. OF THE REPAYMENT OF MONEY DEPOSITED BY MISTAKE.

The first section of the act of 1842 authorizes the Treasurer of the United States to pay back any money which has been paid into the treasury by actual mistake, as for patent fees, thus precluding the necessity of special application to Congress for relief, and is in the following words: That "the Treasurer of the United States be, and he hereby is, authorized to pay back, out of the patent fund, any sum or sums of money, to any receiver or depository, to the credit of the Treasurer, as for fees accruing at the Patent Office through mistake, and which are not provided to be paid by existing laws, certificate thereof being made to said Treasurer by the Commissioner of Patents."

SEC. XVI. OF GRANTING ANEW LOST PATENTS, AND SUCH AS WERE DESTROYED BY THE FIRE OF 1836.

The third section of the act of March 3, 1837, provides: "That whenever it shall appear to the Commissioner that any patent was destroyed by the burning of the Patent Office building on the aforesaid fifteenth day of December, or was otherwise lost prior thereto, it shall be his duty, on application therefor by the patentee, or other person interested therein, to issue a new patent for the same invention or discovery, bearing the date of the original patent, with his certificate thereon, that it was made and issued pursuant to the provisions of the third section of this act; and shall enter the same of record: *Provided, however*, That, before such patent shall be issued, the applicant therefor shall deposite in the Patent Office a duplicate, as near as may be, of the original model, drawings, and description, with specification of the invention or discovery, verified by oath, as shall be required by the Commissioner; and such patent and copies of such drawings and descriptions, duly certified, shall be admissible as evidence in any judicial court of the United States, and shall protect the rights of the patentee, his administrators, heirs, and assigns, to the extent only in which they would have been protected by the original patent and specification."

The privilege of renewal of lost patents is now extended to those *granted* before the fire of December, 1836. Formerly, it was limited to those actually *lost* before the fire, thus excluding many lost subsequently, and before they were recorded anew in this office, leaving the inventor without remedy.

FORM OF OATH ON RESTORING DRAWINGS, OR SKETCHES FROM WHICH DRAWINGS MAY BE MADE, TO REPLACE THE ORIGINALS DESTROYED IN THE OFFICE.

City and County of New York, }
State of New York, } ss.

On the first day of March, 1838, before the subscriber, a , personally appeared Robert Fulton, of the city of New York, and made solemn oath that he is the inventor [*or is interested in the invention as administrator, &c.*] of an improved mode , for which letters patent of the United States were granted to him, dated the day of ; and the annexed drawing [*or sketch*] is, as he verily believes, a true delineation of the invention described in the said letters patent.

A. B.

N. B. *Patentees*, and the public in general, are urged to use their influence to aid the office in restoring the records of all patents and assignments on record before the fire in December, 1836. The same cannot be used in evidence unless *so recorded anew*. No expense is incurred. The papers are received and transmitted by mail free of postage.

Sec. XVII. OF ASSIGNMENTS.

An inventor can assign his entire right before a patent is obtained, so as to enable the assignee to take out a patent in his own name; but the assignment must be first entered of record, and the application therefor must be duly made, and the specification signed and sworn to by the inventor. In the case of an assignment by a foreigner, the same fee will be required as if the patent issued to the inventor.

The assignment of a patent may be of the whole or of an undivided part, "by any instrument in writing." All assignments, and also the grant or conveyance of the use of the patent in any town, county, State, or specified district, must be recorded in the Patent Office within three months from the date of the same. But assignments, if recorded after three months have expired, will be on record as notice to protect against subsequent purchasers. Grants and assignments, recorded prior to the 15th December, 1836, must be recorded anew before they can be valid as evidence of any title.

In all cases in which the entire invention has been assigned before the issue of the patent, the correspondence should be in the name of the assignee, he being the party in interest.

By the act of May 27, 1848, the Commissioner of Patents is directed to charge fees for recording assignments, powers of attorney, licenses, &c., at the following rates, viz:

On all assignments, &c., which shall not contain over 300 words	$1 00
On all assignments, &c., containing more than 300 words, and not more than 1,000 words	2 00
On all assignments, &c., containing more than 1,000 words	3 00

Which fees are, in all cases, *to be paid in advance, in specie*.

The receipt of assignments is never acknowledged by the office, but they are generally recorded in their turn, and transmitted to the persons entitled to them.

FORM OF ASSIGNMENT OF AN ENTIRE INVENTION, BEFORE OBTAINING LETTERS PATENT, AND TO BE RECORDED PREPARATORY THERETO.

Whereas I, Jethro Wood, of Scipio, in the county of Cayuga, and State of New York, have invented certain new and useful improvements in ploughs, for which I am about to make application for letters patent of the United States; and whereas David Peacock, of Burlington, New Jersey, has agreed to purchase from me all the right, title, and interest which I have, or may have, in and to the said invention, in consequence of the grant of letters patent therefor, and has paid to me, the said Wood, the sum of five thousand dollars, the receipt of which is hereby acknowledged: Now, this indenture witnesseth, that, for and in consideration of the said sum to me paid, I have assigned and transferred, and do hereby assign and transfer, to the said David Peacock, the full and exclusive right to all the improvements made by me, as fully set forth and described in the specification which I have prepared and executed, preparatory to the obtaining of letters patent therefor. And I do hereby authorize and request the Commissioner of Patents to issue the said letters patent to the said David Peacock, as the assignee of my whole right and title thereto, for the sole use and behoof of the said David Peacock and his legal representatives.

In testimony whereof I have hereunto set my hand and affixed my seal, this sixteenth day of July, 1849.

JETHRO WOOD. [L. S.]

Sealed and delivered in the presence of—
George Clymer,
David Rittenhouse.

FORM OF ASSIGNMENT OF A PARTIAL RIGHT IN A PATENT.

Whereas I, Jethro Wood, of Scipio, in the county of Cayuga, and State of New York, did obtain letters patent of the United States for certain improvements in ploughs, which letters patent bear date the first day of March, 1838; and whereas, David Peacock, of Burlington, New Jersey, is desirous of acquiring an interest therein: Now, this indenture witnesseth, that, for and in consideration of the sum of two thousand dollars, to me in hand paid, the receipt of which is hereby acknowledged, I have assigned, sold, and set over, and do hereby assign, sell, and set over, unto the said David Peacock, all the right, title, and interest which I have in the said invention, as secured to me by said letters patent, for, to, and in the several States of New York, New Jersey, and Pennsylvania, and in no other place or places. The same to be held and enjoyed by the said David Peacock, for his own use and behoof, and for the use and behoof of his legal representatives, to the full end of the term for which said letters patent are or may be granted, as fully and entirely as the same would have been held and enjoyed by me had this assignment and sale not been made.

In testimony whereof I hereunto set my hand and affix my seal, this sixteenth day of July, 1849.

JETHRO WOOD. [L. S.]

Sealed and delivered in the presence of—
JACOB PERKINS,
BENJAMIN FRANKLIN.

SEC. XVIII. OF THE FEES—HOW PAYABLE.

All fees must be paid in SPECIE, and in advance, except those required for drawings and copies, the expense of which will be communicated on application for the same.

Every applicant, on presenting his petition or application, must pay into the treasury of the United States, or into the Patent Office, or to any of the Assistant treasurers, treasurers of the mint and branch mints, collectors and surveyors of customs, and receivers of public money, particularly named below, a deposite to the credit of the Treasurer, as follows:

If a citizen of the United States, as a patent fee	$30 00
If a foreigner, who has resided in the United States one year next preceding the application for a patent, and shall have made oath of his intention to become a citizen	30 00
If a subject of the sovereign of Great Britain	500 00
All other foreigners	300 00
On entering a caveat	20 00
On entering an application for an appeal from the decision of the Commissioner	25 00
On extending the patent beyond the fourteen years	40 00
For adding to a patent the specification of a subsequent improvement	15 00
In case of reissues, for every additional patent	30 00
On surrender of an old patent, to be reissued to correct a mistake of the patentee	15 00
On application for a design	15 00
For a disclaimer	10 00
For copies of patents, or any other paper on file, for each 100 words	10
On all assignments, &c., which shall not contain over 300 words	1 00
On all assignments, &c., containing more than 300 and not more than 1,000 words	2 00
On all assignments, &c., containing more than 1,000 words	3 00

For copies of drawings a reasonable sum, in proportion to the time occupied in making the same.

Money is frequently lost, owing to an incautious method of securing it to the letter. Fees, when sent direct to the Commissioner in specie, should therefore be firmly attached to the letter, to avoid the danger of loss from becoming loose and wearing through the envelope.

It is recommended to make a deposite with an assistant treasurer, or other officer authorized to receive public moneys, of the fee for a patent or other application, and to remit the certificate. Where this cannot be done without much inconvenience, gold may be remitted by mail at the risk of the applicant.

In case of deposite made with the assistant treasurers, or other persons authorized to receive public moneys, a *duplicate receipt* should be taken, stating by whom the payment was made, and for what object. The particular invention should be referred to, to enable the applicant to recover back the twenty dollars in case of the withdrawal of the petition. The certificate of deposite may be made in the following form:

Office of the

The Treasurer of the United States has credit at this office for dollars in specie, deposited by , of the town of , in the county of , and State of , the same being for a patent [*or whatever the object may be*] for a steam-boiler.

, A. B.

Officers who are authorized to receive patent fees on account of the Treasury of the United States, and to give receipts or certificates of deposite therefor, viz:

Assistant Treasurer of the United States, Boston, Massachusetts.
Assistant Treasurer of the United States, New York, New York.
Treasurer of the Mint, Philadelphia, Pennsylvania.
Surveyor and Inspector, Pittsburg, Pennsylvania.
Assistant Treasurer of the United States, Charleston, South Carolina.
Collector, Baltimore, Maryland.
Collector, Richmond, Virginia.
Collector, Norfolk, Virginia.
Collector, Buffalo Creek, New York.
Collector, Wilmington, North Carolina.
Collector, Savannah, Georgia.
Collector, Mobile, Alabama.
Treasurer, Branch Mint, New Orleans, Louisiana.
Assistant Treasurer of the United States, St. Louis, Missouri.
Surveyor of the Customs, Nashville, Tennessee.
Surveyor of the Customs, Cincinnati, Ohio.
Receiver of Public Moneys, Little Rock, Arkansas.
Receiver of Public Moneys, Jeffersonville, Indiana
Receiver of Public Moneys, Chicago, Illinois.
Receiver of Public Moneys, Detroit, Michigan.
Collector, San Francisco, California.
Depository, Tallahassee, Florida.

Any person wishing to pay a patent or other fee may deposite it with either of the officers above named, and forward the receipt or certificate to this office as evidence thereof.

Money sent by mail is at the risk of the person sending the same. And all money sent from the office by mail is at the risk of the person requesting to have it transmitted in that way. In no case should money be sent enclosed with models.

Sec. XIX. OF PATENT AGENTS.

There is, in this and other cities, a class of persons denominated "Patent Agents" or "Patent Attorneys," whose occupation is to offer advice and render assistance to individuals having business with the office. From certain information which has come to the knowledge of the Commissioner, it is deemed necessary to observe, that, whatever may be said to the contrary, no greater facilities are extended to them than to the inventor who makes his own application. The rules and regulations contained in this pamphlet are as much for their guidance as for the direction of the applicant himself, and as strict a compliance with them is required of one as of the other. Personal influence avails neither. Patents are granted or rejected upon the merits of the cases presented, and there are no circumstances which can, with the knowledge of the undersigned, be brought to bear to turn the office from the strictest impartiality.

To relieve applicants from the expense of employing agents, the examiners will decide questions of novelty and patentability upon papers imperfectly prepared, if sufficiently perspicuous to be understood, *when such papers are prepared by the inventor himself.* But, if an agent be employed, it is presumed that he is qualified for the business he has undertaken without calling on the office for instructions.

Inventors desirous of examining models before making application, should apply to the Commissioner or chief clerk, who will direct the machinist to aid them in all necessary inquiries. This caution is given to save applicants from impositions to which they are exposed. If the services of Patent Agents are desired, able and faithful ones can be found *at their offices* in this and other cities.

Patent Agents who have filed a full power of attorney, authorizing them to receive letters patent for the patentees, will be allowed to take them from the office; after which they cannot be returned, with the view to be transmitted to the inventor under the frank of the Commissioner. If agents retain the patents of their clients in their possession after they have been issued, it is a private matter between the patentee and his attorney, with which the office has nothing to do.

It is hardly necessary to state that no fees are received in this office except those provided for by law, and that no offers of sums of money, or payment of the same to third parties, can influence the decision upon a case, or hasten the period of its examination.

Sec. XX. OF CORRESPONDENCE.

In answer to an inquiry addressed to the First Assistant Postmaster General, touching mailable matter, the following letter has been received:

"Post Office Department, Contract Office,
August 30, 1849.

"To Thos. Ewbank, Esq., *Commissioner of Patents:*

"Sir: I hasten to say, in answer to your inquiry of to-day, that what may be sent by mail is specified by acts of Congress to be letters, letters enclosing money, newspapers, magazines, pamphlets, and all other written or printed matter whereof each copy or number shall not exceed eight ounces, packages thereof not exceeding three pounds in weight; public documents, printed by order of either House of Congress; and books and documents interchanged between the Executives of States. *Neither models of machines, nor the substances of which they are usually composed, wood, glass, tin, or other metals, are entitled, by law or regulation, to transmission in the mail;* and the mailing and forwarding of them will be refused in every instance where the required care is taken at the post office to exclude unmailable matter.

"Respectfully, your obedient servant,

"S. R. HOBBIE,
"*First Assistant Postmaster General.*"

All communications relating to official transactions should be addressed to the Commissioner of Patents; no other can receive attention; and it must not be regarded as discourteous if private letters to employees in office are returned without reply; nor must correspondents complain, even if their letters are properly addressed to the Commissioner, if their business receives no attention from the office, when their *signatures are so illegibly written* as to render it impossible to decipher them, or when the *post office* and State (or either of them) are omitted in their address.

No double correspondence can be sanctioned. When an inventor employs an agent, the office will correspond with either, but not with both.

This remark is necessary, from the numerous letters received from applicants asking for information of what their attorneys have done, and often protesting against their acts.

Telegraphic communications, if not received before 3 p. m., cannot be answered till the following day; the greater part arrive after the office has been closed. Moreover, *signatures* are sometimes so illegibly written that telegraphic operators misinterpret them, and the office is consequently at a loss properly to translate them.

Sec. XXI. PATENT OFFICE REPORTS.

These are generally submitted to Congress in January, and comprehend the transactions of the office during the preceding year; but, from causes over which this bureau has no control, they are seldom printed until the current year has nearly expired. In the mean time letters are constantly being received from citizens of every profession and section of the Union, asking for copies, under the mistaken idea that their distribution is under the control of the office. So far from this being the fact, a very limited number only is placed by Congress at its disposal, *e. g.* of the Report for 1847, ONE HUNDRED AND THIRTY FIVE THOUSAND COPIES were printed, of which THREE THOUSAND were appropriated to the Patent Office. The remaining 132,000 were subject to the orders and disposal of members of Congress. Of the Report for 1848 SEVENTY-FIVE THOUSAND were ordered; of these, TWENTY-FIVE HUNDRED were sent to this bureau, and of them ONLY FIVE HUNDRED had the *list of patents and claims* annexed.

It will be perceived that the office does not receive HALF the number inventors and patentees call for; and, as far as possible, it is deemed right first to supply them. Persons, therefore, desiring Reports, should distinctly state the grounds upon which their requests are preferred. If it shall appear that they have contributed to the support of the office by the payment of fees, or to the information contained in the Agricultural Report, their names will be entered upon a list kept for that purpose, and when the document is ready for distribution copies will be sent to their address in the order of their applications.

With few exceptions, the office is compelled to refer other citizens to the members of Congress from their districts.

THOMAS EWBANK,
Commissioner of Patents.

PATENT OFFICE, *October* 11, 1851.

REQUEST.

Congress having authorized the collection and distribution of seeds through this office, a transmission to this place of any rare and useful seeds may confer a great benefit on the community, and will, so far as practicable, be reciprocated by the Commissioner. A history of the seed transmitted, together with the place of production, is respectfully solicited.

NOTE ON PIN-MAKING.

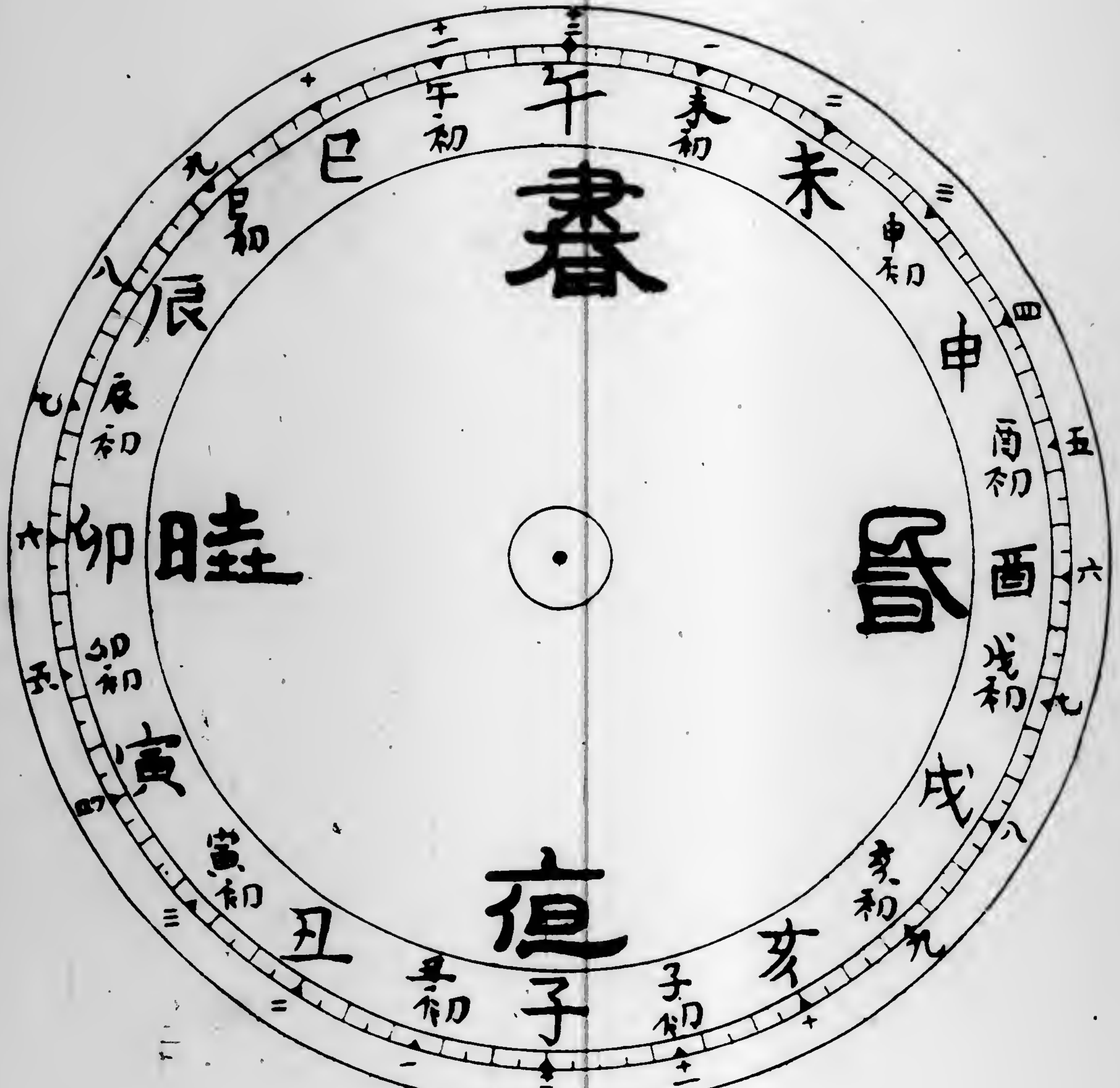
BY THE LATE WILLIAM SERRELL, OF NEW YORK.

In page 413, article "Pin Manufacture," of the Report of 1850, there are a few errors. Lemuel *Wellman* Wright (not William) was a native of Haverhill, New Hampshire, and a descendant of Mrs. Dustin, of historic notoriety by the slaughter of Indians to whom she was a prisoner, and by which she saved her life. Mr. Wright made his pin-machine between 1820 and 1824, and his specification will be found in Newton's Journal, vol. 9, 1825, page 281. The machinery was built as stated, and in use in 1826. It fed the wire from the reel, straightened and cut it, pointed the shank at two operations, headed it at two more movements—the last delivering the complete pin. The writer has many times turned out sixty pins, an inch long, per minute, by one hand.

The difficulty in pointing arose from the fact, that after D. F. Taylor and Wright separated, no workmen, *not* trained by Wright, could be found to make and adjust, and keep in order, the rotatory files that formed the points. Of all this the writer was personally cognizant up to 1830; but since that time has had no direct knowledge.

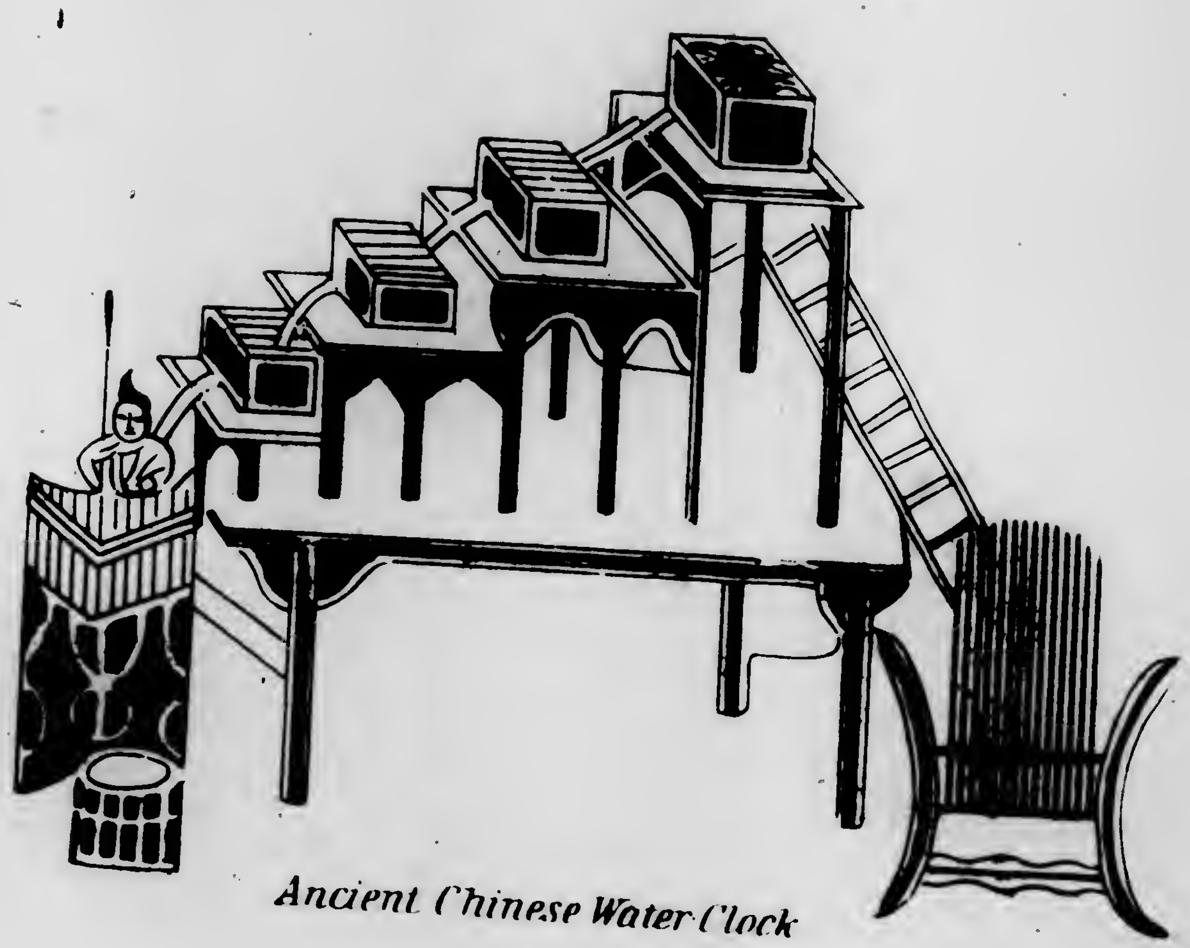
About 1825 or 1826, a set of these machines was sent to this country, to be worked under the American patent of 1825. The workman who was to have charge of them was delayed to bring the tools for repairing them, and for building others; but when he arrived, from some cause or other, he found every machine broken, so that he could not repair them. What has become of them is not known.

Mr. Wright was recently living at Chalford, England; and a history of his inventions, and the difficulties he has gone through, would fill a small volume. It is understood he has done best with his machinery for bleaching woven cotton and linen goods. He is now aged about sixty-three, but still active in the field of invention.

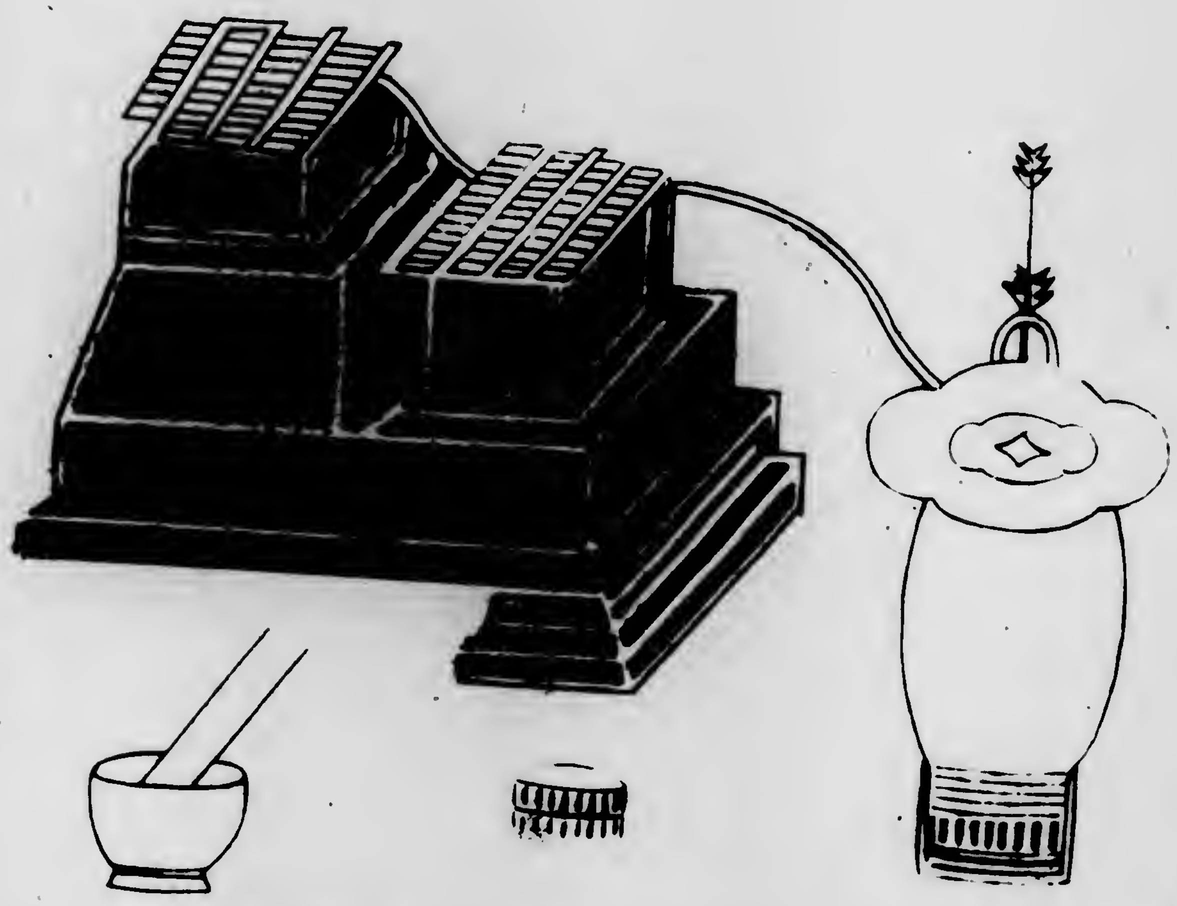


Dial Plate of Clock for the Chinese Market

C. B. Graham's Lith.



Ancient Chinese Water Clock



Ancient Chinese Water Clock

ANNUAL REPORT OF
THE COMMISSIONER
OF PATENTS

VOL. [illegible] 1851

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS

VOL. 2, 1851

32d Congress, 1st Session. | [HO. OF REPS.] | Ex. Doc. No. 102.

U.S. Patent office

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REPORT

OF THE

COMMISSIONER OF PATENTS

FOR THE YEAR 1851.

PART II.
AGRICULTURE.

CONTENTS.

WASHINGTON:
ROBERT ARMSTRONG, PRINTER.
1852.

LETTER

OF THE

COMMISSIONER OF PATENTS,

COMMUNICATING

The Agricultural portion of the Report of that Office for the year 1851.

May 3, 1852.—Laid upon the table and ordered to be printed.

August 30, 1852.—Ordered that 100,000 extra copies be printed.

August 31, 1852.—Ordered that 10,000 copies extra be printed for the use of the Patent Office.

Patent Office,
April 23, 1852.

Sir: I have the honor to submit, herewith, the Agricultural portion of the Report of this Office for the year 1851, and respectfully request you to lay it before the Senate.

In view of the rapid destruction and threatened extermination of the principal indigenous ruminants of the continent, a paper has been prepared, at my request, by Professor S. F. Baird, of the Smithsonian Institution, to show their susceptibility of domestication, and that duty requires us, instead of wantonly destroying, to preserve and multiply these noble denizens of our forests and plains, both because of the great interest attached to them by the naturalist, and of the value of some of them as laborers, and all of them as furnishing materials for manufactures and for food.

Very respectfully, your obedient servant,

THOMAS EWBANK.

Hon. Linn Boyd,
Speaker of the House of Representatives.

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Very respectfully, your obedient servant,

THOMAS EWBANK.

HON. LINN BOYD,
Speaker of the House of Representatives.

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I.

AGRICULTURE AND AGRICULTURAL EDUCATION.

INTRODUCTION.

In submitting this portion of the annual Report, it is gratifying to note that the interest in agriculture, and the improvements in this most vital of the arts, keep pace with the progress of the age in other respects. In our widely-extended country, embracing a range of climate and diversity of soil which enable us to produce almost every article of consumption, it seems to be peculiarly the province of the government to contribute all the aid in its power for the advancement of agriculture by the collection and diffusion of useful information on the subject. Those who are engaged in the culture of the earth are proverbially cautious of innovation; but where new and better paths have been long explored by science, and found to be safe by experience, they are never neglected.

Chemistry, the handmaid of all the sciences, has within a few years past contributed largely to the development of agricultural resources; and in most of the agricultural schools which have been established a competent knowledge of this subject is made the basis of education. In this conjunction of science with what was once supposed to require little beyond mere physical labor are pre-eminently involved the present prosperity and future advancement of nations.

If the government continue to collect the varied information comprised in the statistics of the recent Census, it will be highly instructive to note the increase of agricultural products to the acre in those sections of the country where the fostering rays of science have lent their aid to the culture of the soil. In this respect it must be admitted that we are far behind some portions of the Old World; nor is it remarkable that this should be so. Men crowded together upon a small area of land are compelled by stern necessity to make the most of their limited means; and where hunger is the schoolmaster, the lessons taught are not apt to be soon forgotten. With us a condition of things precisely the reverse exists. The possession of too much land has hitherto induced a careless and slovenly system of husbandry, from the effects of which in many of the earliest settled parts of our country we are but now beginning to recover. Some of the new practices introduced abroad are not applicable to the same extent, on account of the difference in soil and climate, and also in the price of labor. The great feature of modern improvement in England, which has added immensely to the value of lands in that country, and is destined in all probability to quadruple the products of the kingdom, is one which might be introduced into our country to a limited degree with great advantage: this consists in an extended system of *drainage*. In the moist climate of Great Britain this practice of under-draining, as it is there called, (for the drains are constructed of manufactured tiles, and covered,) embraces all lands, both high and low, and has been followed by astonishing results. The philosophy of draining consists in this: that it gives the cultivator command of the water by which his soil is affected; enabling him to use the redundancy in one case to supply deficiency in another. Too much water, whether it comes from excessive rain or permanent springs in the soil, is pernicious to cultivation: true, under certain conditions, it may even cause a greater luxuriance of vegetation; but, as a general rule, the plants produced in a wet soil are not so nutritious and valuable. It is stated in some reports on English agriculture by the late Rev. Henry Colman, of Masssachusetts, that the Duke of Portland, as far back as 1846, had completed more than seven thousand miles of drainage on his estates. Another proprietor made two hundred and fifty miles yearly; and a third had completed the drainage of four hundred and sixty-seven acres at an expense of more than £1,500, and had increased the rental of his land by these operations to the amount of £435 2*s*. 4*d*., or at the rate of 29 per cent. upon the capital expended. To mention but one of the many instances of profit from this source adduced by Mr. Colman, a farmer made upon wet land two hundred bushels of potatoes per acre; the product of the same land after it had been drained was six hundred and ten bushels per acre.

Not less surprising in its results is that comparatively new and wonderful fertilizer known under the name of *guano*. The beneficial effects it produces have excited attention to its value throughout the country; and the portable manner in which it is prepared, with the facilities of its transportation, lead us to hope that for the time to come its consumption will be greatly increased. In the last Report of this Office, certain statements in reference to its qualities and value were given on the authority of Hon. Willoughby Newton, formerly a member of Congress from Virginia. Mr. Newton's experience has been confirmed by every one, so far as we can learn, who has applied it judiciously and under favorable circumstances. There are two principal kinds of guano imported into the United States, viz. African and Peruvian; the latter being much the more valuable, and commanding nearly double the price of the former. It is sold at prices ranging from $25 to $45 per ton, the former being the price of the inferior or African variety. It is sown broadcast upon the land, at the rate of from three to four hundred pounds to the acre, and ploughed in to the depth of four or five inches, the land having been previously broken up. So powerful is the stimulant, that on some lands four hundred pounds to the acre would be an unsafe application; although a smaller quantity than two hundred pounds, where the land is not already fertile, produces but little effect. The most general application of it hitherto has been for the growth of wheat and clover, although it has been succesfully used in the culture of root crops and the fertilizing of ornamental grounds. It is commonly mixed with gypsum or plaster, in the proportion of one

third of plaster to two thirds of guano, the plaster serving to fix the volatile parts of the guano as well as to neutralize its caustic properties. It may be less durable in its effects than many other fertilizers, but there is probably no known substance which will produce such large returns with so little outlay of labor and capital as guano. The use of this article has been increasing in England for years past, and the demands for it have led to inquiries which may result in finding deposites of the material in other localities than the few now known. The following annual returns, with the first two quarters of the present year, furnished by the Treasury Department, will show that its use is gaining ground here:

Exhibit of the quantity and value of guano imported during the years ending 30*th June* 1848, 1849, 1850, *and* 1851, *and also from the* 1*st of July to the* 31*st of December*, 1851, *being the* 1*st and* 2*d quarters of the commercial year* 1852.

GUANO IMPORTED.

	Tons.	Value.
1848	1,013	$20,839
1849	21,243	102,274
1850	11,740	91,948
1851	23,153	97,851
1st and 2d quarters of 1852	23,353	76,799

From the foregoing it will appear that the importations of the two last quarters exceed the entire amount of any previous year.

In a subsequent part of this Report will be found agricultural statistics collected in taking the late census.

AGRICULTURE IN CALIFORNIA.

An address delivered by A. Williams, Esq., at a meeting in San Francisco, for presenting the premium of a silver goblet, offered by Mr. C. A. Shelton for the best varieties of vegetables and grains, contains some interesting particulars of the agricultural resources of California.

Mr. Williams says that California is a State whose agricultural capabilities—a far richer treasure than her mineral wealth—are unsurpassed in any portion of the earth, and whose variety of useful products are equalled only by their unparalleled extent and adaptation to the varied wants of man. In most of the others, a single excellence is characteristic and predominant. The lumber of Maine, the granite of New Hampshire, the wool of Vermont, the manufactures of Massachusetts, the agriculture of New York, the coal and iron of Pennsylvania, the grain and fruits of the middle and western States, the copper of Michigan, the corn, tobacco, and hemp of Virginia and Kentucky, the cotton of Alabama and Georgia, the sugar of Louisiana, the sugar, cotton, and indigo of Texas, the turpentine of North, and the rice of South Carolina, constitute, respectively, their most prominent and distinctive interests, and are the pride and glory of their citizens. But there is scarcely one of these that cannot be found or produced in our own State. In the natural productions of the earth conducive to the sustenance of man, is our State abundantly prolific. As we approach the centre of the State, the banana, the orange, the lemon, the olive, the fig, the plantain, the nectarine, the almond, the apricot, and the pomegranate of the South, mingle in the same luxuriant gardens of Los Angeles with the peach, the pear, the cherry, the plumb, the quince, and the apple of the North; the fruits of the oak and the pine, of gigantic size and delicious taste, furnishing to man and beast the richest and most nutricious food; the beautiful salmon of the noble Sacramento, often weighing thirty, forty, and even sixty pounds, vieing with any other in fineness of texture and richness of flavor, as well as in size; and one uncommon article of fine white sugar, the exudation of a species of pine tree called the sugar pine; the successive ranges of mountains, whose extent is lost to view in the distance, waving with rich harvests of oats, the spontaneous production of the soil; solid trees of the red-wood, on the banks of the Trinity and Shasta rivers, sixty-eight feet in circumference; hollow ones, whose cavity has sheltered sixteen men and twenty mules for the night; pines crowning the dizzy peaks of the Sierra Nevada three hundred and eighty feet in heigth, the first two hundred and fifty feet without a branch or limb, an extent of growth so far beyond the ordinary size as to seem almost incredible, but well known, and seen, and verified by the uniform and concurrent testimony of many whom I see sitting around me. And we have some still larger and taller specimens of other things nearer home, here in our own city, to which many who hear me will bear witness from experience, and which come to maturity "*monthly in advance*"—rents, the tallest kind of rents, put up higher than the pines, and sometimes harder to get around than red-wood! I hold in my hand a statement signed by twelve citizens of the county of Santa Cruz, Messrs. McLean, Gibson, Mallison, Peck, Clements, Pedriet, Mills, Stevens, McHenry, Sanborn, Kista, and Loveland, gentlemen of unquestionable veracity, an extract from which is as follows:

"On land owned and cultivated by Mr. James Williams, an onion grew to the enormous weight of twenty-one pounds. On this same land a turnip was grown which equalled exactly in size the top of a flour barrel. On land owned and cultivated by Thomas Fallen, a cabbage grew which measured, while growing, 13 feet 6 inches around its body. The weight is not known. The various cereal grains also grow to a height of from six to twelve feet. One red-wood tree in the valley, known as Frémont's tree, measures over fifty feet in circumference, and is nearly three hundred feet high."

Added to these astonishing productions is a beet, grown by Mr. Isaac Brannan, at San José, weighing sixty three pounds; carrots, three feet in length, weighing forty pounds. At Stockton a turnip weighed one hundred pounds. In the latter city, at a dinner for twelve persons, of a single potato, larger than the size of an ordinary hat, all partook, leaving at least the half untouched. These may be superlatives, but they do exist, and they show what our soil and climate are capable of producing. Nor are these more seemingly incredible than the well-known fact of a portion of our State, nearly six hundred miles in length, and

fifty in breadth, whose every foot of land from hill top to valley is more or less impregnated with gold of every conceivable form and size, from dust up to lumps weighing thirty pounds. But let us cast our eyes around this hall, and what do we see even from this hasty collection and casual contribution—an agricultural, botanical, geological, mineral, and floral exhibition, embracing nearly one thousand varieties of pressed flowers of every hue and of surpassing brilliancy, nearly two hundred varieties of which are illustrated by truthful and beautiful drawings; seeds of more than three hundred varieties of native flowers; twenty varieties of lily and other bulbous roots, embracing the remarkable soap plant, rivalling the finest boasts of the toilet, and adding to it its healing qualities, as if provided by Nature for the double purpose of sanitary and abluent properties for the native sons of the forest; specimens of one thousand varieties of the principal quartz veins and soils of the State; about twenty varieties of the principal grasses and clovers, many of the specimens pressed, embracing the burr clover, that feeds to fatness the "cattle of a thousand hills" when all other sustenance is parched and withered; Shelton's mammoth clover, whose stalks from one root covered an area of eighty-one square feet, some of the stalks six feet long, a half-inch in diameter, and the clover head five inches in circumference; single stalks of the white lily, producing one hundred flowers of indescribable delicacy and beauty; beautiful specimens of minerals and pressed flowers from H. Pratten, esq., of Nevada; stalks of the oat gathered by Mr. Shelton, thirteen feet high; specimens of wheat and barley having one hundred and fifty and two hundred mammoth stalks springing from one root, the produce of a single seed; the red sugar-beet grown by Mr. L. M. Beard, of San José, twenty-eight inches in circumference, and weighing forty seven pounds—some from the luxuriant gardens of Alderman Green, of this city, of only two months' growth, weighing six and seven pounds; a cabbage from H. Bolmer's ranch, mission of San José, weighing fifty-six pounds, and measuring seven feet in circumference, presented by Wilson & Co.; cucumbers raised by the same, eighteen inches in length; onions cultivated by Messrs. Smith and Broder, and contributed by Messrs. Chamberlain and Musser, five, six, and seven inches in diameter, and weighing three and four pounds each, nearly seventy thousand pounds to an acre, and the whole number from the acre supposed to average one pound each; potatoes from Mr. H. Speel, of Santa Cruz, one hundred and twenty pounds from five vines of a single hill—one from Mr. B. J. Stevens, of Santa Clara, thirteen inches in length, twenty-seven inches in circumference, and weighing seven and a quarter pounds; the Russian bald barley, grown by Mr. Johnson on his ranch, upon the banks of Bear river, weighing sixty-six pounds to the bushel, with a kernel near double the size of large wheat; raspberries five inches in circumference; of barley from the San José valley, nine hundred and sixty-five bushels were produced from less than five acres of land—some from the farm of Madame Scoofy, of Sonora, where twelve acres, by ordinary cultivation, produced a crop of fifty-three thousand pounds. These walls are festooned with luscious grape from Capt. Malstry, of Los Angeles, single bunches from the gardens of Gen. Vallejo, at Sonoma, weighing ten pounds; apples, peaches, figs, and other fruits of enormous size from the same; from Horner, tomatoes weighing two pounds each; pumpkins and squashes one hundred to one hundred and forty pounds each; cabbages two feet in diameter, and weighing over fifty pounds; onions, beets, and potatoes of enormous size, not isolated, but by hundreds of bushels; the top onion produced the first season from the ordinary seed, with samples of wheat and barley of uncommon size and weight; and added to the exhibition are also beautiful specimens of the Daguerrian and photographic art from Mr. Shew, and also from Mr. Bradley; lemon syrup of exceeding excellence, manufactured and exhibited by Messrs. Street & Co., of this city; exquisite feather work, by Madame Paacard; besides samples and specimens of countless varieties of plants, herbs, vines, fruits, grains and esculents of exceeding size and singular perfection, collected by Mr. Shelton, to the enumeration of which the proper extent of this address is wholly inadequate. Among the tropical productions introduced by him are coffee, ginger, banana, plaintain, and pomegranate, which are now in progress of successful cultivation; and he has this day received from Valparaiso a choice assortment of rare and valuable exotics—the entire stock of a greenhouse, embracing two thousand of the choicest French and Italian grape vines, fifty varieties choice pear trees, six varieties plums, three of apricots, twenty of peaches, five of currants, and seven thousand asparagus plants. Of flowers there are fifty varieties of jessamines, four of the African hibiscus, eight of chrysanthemums, twelve of althea, the wax plant, pinks, cacti, eighty-four dahlias, and over one thousand rose bushes. I have recently been informed by one of our adopted Celestials, whose phrenological developments of "*auri sacra fames*" predominated over his "*amor patriæ*," that our soil, climate, and seasons are well adapted to the growth of the tea plant, and that, as there existed no natural obstacle to its successful cultivation here, he had sent to China for seed, and intends to commence growing it in the ensuing spring.

Indeed, there is scarcely a fruit or a plant, a shrub or a flower, a mineral or a vegetable, of which any land can boast, but what is embraced within the limits of California, a "bright particular star" in the constellation of States, the crowning gem in the tiara of freedom. It needs but encouragement to develop her exhaustless resources. Agriculture is the greatest and most important, as it is the first, occupation of man. Manufactures, arts, sciences, commerce, inventions, all follow in her train. It is for the purpose of encouragement to the farming, as well as the horticultural, interests that we have here assembled; and this silver goblet, equally creditable to him who gives, and to him who receives, I am requested by Mr. Shelton, the giver, to present to you, Mr. Horner, as a premium for the best variety of vegetables and grains, and as a testimonial of his and our and the public appreciation of your persevering and successful efforts here in the great and noble field of agricultural and horticultural industry. In your case we have seen, while the public mind was absorbed by the irresistible maelstrom of the gold mania, a single individual in four years even more successful in developing the agricultural, than others the mineral, wealth which slumbers in the bosom of our soil, under peculiar disadvantages, from want of proper implements, proper seeds, and sufficient manual help—at first aided by the labor of only three natives of the forest, till the teeming soil, in grateful return for her cultivation, yielded her riches, in the fifth year enabling you

the present season, with the average aid of 60 co-laborers, to realize from 800 acres of land in the Santa Clara valley, of—

Potatoes	120,000	bushels.
Onions	6,000	"
Table beets	4,000	"
Turnips	3,000	"
Tomatoes	1,200	"
Barley	5,000	"
Pumpkins	20	tons.
Solid-headed cabbage	108,000	
Chickens	600	
Eggs	1,200	dozen.
Onion seeds	800	pounds.
Beet seed	200	"
Cabbage seed	100	"

And thus, at a cost of about $50,000, producing a crop worth, at present prices, some $200,000.

THE MINERAL MANURE THEORY.

Analytical Laboratory, Yale College,
New Haven, Connecticut, October 24, 1851.

Eds. Cultivator.—The subject which I have placed at the head of this letter is not one which can be fully discussed in a single page of your journal; and yet it is one of so much importance, that I desire to make a few explanations and statements regarding the shape which it has now assumed among scientific men. When I mention the "mineral manure theory," I speak of that view of manures which ascribes all, or nearly all, of their efficacy to their mineral constituents. The principal supporter, and, indeed, the originator, of the theory, is Professor Liebig. This distinguished chemist, distinguished no less by his clear and lucid style than by his high scientific reputation, was for a time devoted to the "ammonia theory," excluding those mineral manures to which he now attaches so much importance. A few years since, however, he saw cause to change his ground, and has since held that, if we furnish mineral manures in abundance, plants will, without doubt, always obtain their ammonia, or rather nitrogen, from the atmosphere of the soil.

In pursuance of this idea, he went so far as to compound, after a careful study of ash analyses, specific mineral manures for wheat, rye, oats, turnips, &c., which were to take effect upon all soils in a proper physical condition. The failure of these specific manures, which were patented in England, was, as many of your readers doubtless are aware, very decisive. I had supposed the subject rather at rest, but find that, in the last edition of Professor Liebig's "Letters on Chemistry," published so late as the commencement of the present year, he reiterates his former views on this subject in a most decisive manner, and prophesies that our future agriculture will depend upon them, however much we may distrust and disbelieve them now. I have also had occasion to observe quite recently that some gentlemen of high standing among our scientific men follow Liebig in this as well as in other theories. For these reasons I have thought it best to express my own opinions on this contested point, in order that our farmers may be aware that all chemists do not hold to views which militate almost directly against the ordinary results of practice.

My belief was that, when Professor Liebig advocated the "ammonia theory," he was nearer right than he is now, when he only admits the necessity of mineral manure; not that he was right then, but that better results would, in most cases, be obtained by the farmer in the use of ammoniacal or nitrogenous manures alone than by the use of mineral manures alone. We find land in all parts of the country where strictly mineral applications, such as lime, plaster, marl, &c., fail to produce any marked effect; but if upon any of our fields we apply guano, or sulphate, or carbonate of ammonia, the character of the vegetation is at once changed, its color alters, its luxuriance and vigor increase, and in a great majority of cases the product is augmented. Every farmer who has observed matters intelligently knows that the above statements are correct; indeed, they have been so far applied in practice, that the quantity of ammonia which any manure contains is taken as the highest standard of its value. A guano, for instance, with the usual per centage of ammonia, will bring twice as much as one which contains little ammonia, even though this deficiency is replaced by the most valuable possible mineral constituents. I must not be understood to say that mineral manures are not valuable; on the contrary, I have the highest opinion of them, and recommend their application in almost all cases where my advice is asked. The mineral constituents of the plant are no less indispensable than its organic part, and if one or two of them are absent from the soil, the plant will not flourish. There are many instances of these special deficiencies, which special mineral manures alone will supply, and there are certain mineral substances which have been found specially valuable. The most valuable of all these is phosphoric acid. Now, the *phosphates*—that is, the compounds of this acid—are not more necessary to the plant than are the *alkalies*, but the supply is far more apt to be scanty; and this—not its intrinsic importance to the plant—is the cause of its higher value to the farmer. The same principle applies when we say that nitrogenous manures, of which ammonia is the most common form, are more valuable than others known in agriculture. They are volatile, easily decomposable, and very soluble; for all of these reasons, they are extremely apt to disappear most rapidly. These manures, then, are worth more to the farmer than any others, because they are most likely to be needed, and because their scarcity renders it somewhat difficult to obtain a good supply.

I make these statements fearlessly and confidently, although against so high an authority as Liebeg. I should not presume to differ from him on mere theoretical grounds, but feel that I am here sustained by almost uniform practical results. It must be acknowledged that we have occasional instances reported of plants grown upon soils nearly or quite destitute of vegetable matter; but in most of these that have fallen under my observation, the fact of the *entire absence* of vegetable, and particularly of nitrogenous matter, has not been sufficiently established. The information that they give is neither entirely definite, nor well enough made out, by continuous and careful experiments, to be set off against an array of facts brought forward in favor of the opposite view. Single experiments, for a single year, must always be looked upon with distrust until amply verified; and it is by mainly trusting to such, so far as we are informed, that the exclusive mineral theory has been built up. The laboratory alone is pretty sure to go wrong when it attempts to prescribe rules for practice. The chemist must go into the field and study actual experience if he would serve the farmer effectually. It has been my intention to experiment somewhat largely upon this particular subject; but in the last number of the Journal of the Royal Agricultural Society of England is a paper of Messrs. Lawes and Gilbert, that almost precludes the necessity of doing anything more. These gentlemen have been experimenting on a large scale for the last ten years, and their results are clearly and admirably set forth. They took a field at the close of a four years' rotation, when the manures added at the commencement of the course were exhausted. On this ground they have cultivated wheat for ten years under various conditions. One plot remained unmanured, and the produce of this served as a standard and a starting point for comparison during the whole period. Thus, if its yield in 1845 was seventeen bushels per acre, the improvement over this in an adjoining plot, otherwise the same, was set down to the advantage of whatever manure had been employed. Such a system of cropping, continued for so long a time, obviously affords results that are worthy of much confidence. The first year's comparative practice was made with various approved mineral manures alone. It was found that, even by the addition of large quantities of these, the increase of product over the unmanured plot was but trifling. In the next year the same character of mineral manures were employed, but with the addition in several cases of ammoniacal or nitrogenous substances. In all of these the effect was quite marked, the yield increasing to ten, twelve, and fourteen bushels, above the unmanured plot. This, in short, was the character of all the results; sometimes ammoniacal manures alone were added, and then the increase was several times more than by mineral manures alone. One experiment was very striking: four hundred weight per acre of Liebig's special mineral manure, for wheat, was applied to a plot, and produced an increase of but about two or three bushels upon this same plot in the next year. A purely ammoniacal manure gave an increase of ten or twelve bushels. To make the experiment still more conclusive, no manure was added to this plot for the next crop, and the yield then fell again almost to the original standard.

These trials seem to me perfectly conclusive in this matter, so far as wheat is concerned; they prove that ammonical manures increase its growth far more than mineral manures, where both are already present in moderate supply, and that the addition of any amount of the latter will do little good unless the former be also present. These views are still further sustained by a very able paper in one of the late French scientific journals. The experiments in this case were made upon oats, and were between forty and fifty in number. They commenced by growing them out in sand, first deprived of every thing soluble by acid, and then burned to draw off all vegetable matter. In this, as might have been expected, no perfect plants were produced. One mineral substance after another was added, until at last it was found that, with a certain *series* of them, the plant flourished better than with any others. It, however, was still far from luxuriant, or from yielding a fair amount of grain. It was not until some manures containing nitrogen had also been added that entirely healthy, fertile, and strong plants were obtained. These experiments appear to have been very carefully conducted, and furnish important confirmation to those of Messrs. Lawes and Gilbert.

There are other questions involved in these experiments, which for want of space cannot be discussed here. The main point is, I think, fully established. The farmer may supply special deficiencies by special mineral manures, and should aim to keep up the supply of mineral substances in the soil; but he cannot render it fertile, and continue it so, with them alone; he must also supply nitrogen in some form, and will find it in a great majority of cases the most important and efficacious of all fertilizers. In despite of *theoretical* views to the contrary, he will find that, in *practice*, he can best afford to give a high price for those manures—that, especially, rich in ammonia or some other compound of nitrogen.

Yours, very truly,

JOHN P. NORTON,
Albany Cultivator.

EXPERIMENTS WITH PERUVIAN GUANO AND BARN COMPOST.

New York, *November* 12, 1851,

Dear Sir: I send you, herewith, a number of the "New England Farmer," (March 1, 1851,) containing an account of some experiments with Peruvian guano and barn compost, to which I beg leave to invite your attention. These experiments were made by my father, Josiah Keene, at his farm in Rhode Island. Much care was bestowed on them; and their design was to furnish data to estimate the relative value of these fertilizers. I think the positive information they furnish much exceeds that of the great body of agricultural papers. I have not seen any experiments on guano of so much positive value.

Yours, respectfully,

S. S. KEENE, *M. D.*

Hon. Thomas Ewbank.

[From the New England Farmer.]

Mr. Cole: Having several years ago experimented with guano, (of such quality as could then be procured,) with results unfavorable to the article as a fertilizer, it was with little faith, and that founded principally upon the great reputation of Peruvian guano, that we undertook the following experiments:

The guano employed on this occasion was obtained directly from Peter Harmony Nephews, of New York, Peruvian government agent for the sale of it. We were thus satisfied of its genuineness. The experiments were conducted with care, and their results much surprised us. One part Peruvian guano and three parts of dry loam constituted the guano compost mentioned below.

First experiment.

On the 1st of September, 1849, upon land in good tilth, we sowed rye broadcast, (intended for soiling in the spring,) at the rate of three bushels to the acre. The 1st of April following, its appearance was unpromising and sickly, insomuch that we feared it might prove a failure.

April 8, 1850.—We applied to a portion of the field guano compost, at the rate of three hundred and twenty pounds of guano (value seven dollars) to the acre. The ground was moist, the snow having just disappeared. In a few days the beneficial effects of the guano were manifest, those portions of the field to which it had been applied becoming greenest, tallest, and thickest; which characteristic they maintained to the end of the season.

May 28.—We cut green one square rod of guanoed rye, and another square rod of unguanoed, lying side by side, and weighed them carefully.

Weight of guanoed square rod - - -	105 pounds.
Do. unguanoed do - - -	60 "
Return for guano applied, per rod - -	45 " being

a gain of more than two-thirds.

July 23.—We reaped at maturity one square rod of guanoed rye, and the same of unguanoed, side by side, and weighed the bundles.

Weight of guanoed bundles - - -	44 pounds.
Do. unguanoed do. - - -	35 "
Gain for guano - - -	9 "

In September we threshed these bundles and weighed the grain.

Weight of guanoed grain - - -	16 pounds.
Do. unguanoed do. - - -	10 "
Gain in grains, per rod - -	6 "

A gain of six pounds of grain in one rod is equal to sixteen bushels to the acre, calculating fifty-eight pounds to the bushel. Valuing rye at eighty cents a bushel, these sixteen bushels are worth twelve dollars and eighty cents. Valuing rye straw at seven dollars a ton, the three pounds per rod, (see difference between six and nine in the two tables above,) or four hundred and eighty pounds per acre, are worth $1 50.

Thus we have—

Value of sixteen bushels of rye - - - - -	$12 80
Do four hundred and eighty pounds of straw - -	1 50
Return for seven dollars' worth of guano - - -	14 30

Second experiment.

This was made on grass. The land had not been ploughed for many years, nor manured for three years, but was moderately fertile.

April 1, 1850.—We applied the guano compost to a portion of this grass, at the rate of three hundred and twenty pounds of guano (value seven dollars) to the acre. Alongside, at the same time, we top-dressed another portion with barn compost, (cow droppings and dry peat, equal parts, well composted in the barn,) in the proportion of sixteen loads to the acre, valued at $1 50 per load, or twenty-four dollars for the sixteen loads. The grass on the guanoed portion soon surpassed that on the top-dressed portion in verdure, became tallest and thickest, and remained so until mowed.

July 14.—We mowed a square rod of each of these portions, side by side, and on the 16th weighed the products. They were only two-thirds dry, owing to wet weather.

Weight of guanoed rod	- - - - -	62 pounds.
Do. top-dressed	- - - - -	42 "
Gain by guano in one rod	- - - -	20 "

Nearly fifty per cent. greater yield per acre with seven dollars' worth of guano than with twenty-four dollars' worth of barn compost. The aftermath was also greenest and thickest on the guanoed portion.

Third experiment.

This was also made on grass. Land rather light and dry. It had been stocked to grass four years, and had not been manured for three years.

April 11, 1850.—We applied guano compost (three hundred and twenty pounds, or seven dollars' worth of guano, to the acre) during a light fall of snow.

July 16.—Mowed two square rods, side by side, (one had been guanoed—to the other nothing had been applied,) and weighed them green.

Weight of guanoed rod	- - - - -	60 pounds.
Do. unguanoed	- - - - -	32 "
Gain by guano per rod	- - - -	28 "

Nearly one hundred per cent. gain. Aftermath green and thick.

Fourth experiment.

This was also on grass. A border of low meadow, which had been valueless, was ploughed in 1848, and sowed down to grass the 1st of September, 1849. Before sowing down, gravel had been scattered upon the surface, and barn compost, at the rate of thirty loads to the acre, had been spread and harrowed in.

April 12, 1850.—Applied guano compost (three hundred and twenty pounds of guano to the acre) to a portion of this border.

July 22.—Mowed two square rods, side by side, and weighed green grass moist with dew.

Weight of guanoed rod	- - - - -	115 pounds.
Do. unguanoed	- - - - -	62 "
Gain by guano, per rod	- - - - -	53 "

Nearly one hundred per cent. The straw was fine on the guanoed portion, and the aftermath much the heaviest, some of the herds' grass coming to maturity the second time.

Fifth experiment.

This was made on Indian corn for soiling. Land in good tilth.

June 6, 1850.—We ploughed under the whole field barn compost, at the rate of thirty loads to the acre, and harrowed deep.

June 8.—Furrowed deep for planting corn in drills. Into a portion of the furrows we dropped barn compost, at the rate of six loads to the acre (value nine dollars); we then dropped southern corn, at the rate of two and a half bushels to the acre, and covered. Into another portion of the furrows we strewed guano compost, (three hundred and twenty pounds of guano per acre,) covered it lightly with earth, then dropped southern corn, at the same rate as above, and covered.

June 16.—The guanoed rows were well up—the manured rows scarcely visible. During the whole season the guanoed rows kept the lead and excelled the manured rows in verdure, height, and size of stalks.

Two heavy gales of wind in July prostrated the whole field. The guanoed portions were the most injured; and about the middle of August, before the stalks had attained their full size, we were obliged to cut them. We weighed (green) a square rod of each of the rows, side by side.

Weight of square rod of guanoed rows	- -	450 pounds.
Weight of manured	- - - - - -	365 "
Gain for guano per rod	- - -	85 "

Several other similar experiments were made, some of which showed even more surprisingly the effects of guano; but these are the only ones sufficiently complete to publish. They all confirm the great reputation of Peruvian guano. The value of this substance, compared with other fertilizers, cannot at present be determined; but it may be considered the cheapest in use.

President Fillmore, in his late message to Congress, draws the attention of that body to the Peruvian guano trade, as a subject of importance to American agriculture.

The annual consumption in the United States is fifteen thousand tons: the demand principally for the middle States. Many worn-out plantations in that section have been made productive by Peruvian guano.

Were this agent to be more extensively employed in New England, it no doubt would yield abundant returns, for it is peculiarly qualified to fertilize her cold and exhausted soil. If Peruvian guano has failed in some hands, it has arisen probably from want of knowledge or care in the use of it. It is also notorious that spurious and worthless articles are sold for Peruvian guano. These experiments will be continued, and their results communicated to the public.

JOSIAH KEENE.

NORTH PROVIDENCE, R. I., *February*, 1851.

Remarks.—We have accounts of various results from the use of guano. In some cases it has been highly profitable; in others it has produced no perceptible effect. As suggested by our correspondent, we have no doubt that guano has often been used injudiciously, and often a spurious kind has been obtained; for a great deal of guano sold is adulterated. In addition to these principal causes of failure, the season is sometimes unfavorable from drought; and occasionally there is a want of adaptation of the manure to the soil and crop.

We trust that some cultivators will persevere in their experiments until the use of guano is reduced to a system, and its just value ascertained; for it is highly desirable that we have our resources for fertilizers enlarged, and that we have some manures that can be had in abundance, and are profitable, so as to be convenient in transportation and application. We advise experimenters on guano to be particular, and note the exact results, as Mr. Keene has done. Let us have something more than vague guessing.

WELL-DIGGING.

PRAIRIE DU CHIEN, WIS., *January* 1, 1852.

DEAR SIR: Your Agricultural Circular was duly received, but I have been unable to take the necessary time to reply until now; and even now I must confine my remarks to but one topic—that is, *well-digging*. There is, however, no one subject of more importance to the farmer who has not living, running water on the surface; and no part of the operation is of more intrinsic importance than that of ascertaining where to dig, which will be the chief topic of consideration in this communication.

I am aware of the difficulty of convincing some men that things may be *facts*, which they cannot understand the why and wherefore of, or comprehend the reason for. And I know as well that the same skepticism would exist as to their own existence, and as to a thousand other facts, the reason for which we do not comprehend any better, or more clearly, than that in reference to finding water under ground; but because they are common, and of every-day occurrence, we never think of the why and the wherefore of their existence. They are matters of fact, and we should be regarded as candidates for some lunatic asylum if we questioned them.

True philosophy does not inquire for the *reasons for* a thing before it admits the fact of its existence, but ascertains first if it be a fact; and if it is so, then to inquire after the reasons for it. This will be the course pursued in this essay. That water runs in veins in the earth is a fact now so universally admitted, or rather known, that no one pretends to doubt it; and it is equally well known that if, in digging a well, the digger hits upon the vein, he gets good spring or living

water. But the question is, how are we to ascertain where to dig in order to strike this vein? or is it a fact that some men, and even women, can tell, by any means, where water can thus be found? It will be admitted that, *if it is so*, it is of more importance to any dry or springless portion of the country than turnpikes, plank, or railroads; for what is the soil worth without living water? It will also be admitted that, if Nature or Nature's God has provided an ample supply of so useful and necessary an element as water, running in all directions in the bowels of the earth, the work would be incomplete, and man and beast might suffer, or a great portion of the earth must be left a barren waste, unless the same goodness which provided the supply also provided means by which its location could be ascertained with more certainty than by haphazard digging. This I take to be reasonable; and if so, reason favors the probability of such a provision. The first point to establish is the fact that some men can direct the well-digger where to strike the vein; and then, secondly, to show the law of nature by which this is done. As to the first point, it must be established by *facts* in the mouths of competent witnesses. It is done by what is now scientifically called Bletonism, which is defined by Webster to be "the faculty of perceiving and indicating subterraneous springs and currents by sensation; so called from one *Bleton*, of France, who possessed this faculty." Some call it divining, or raising the divining rod; some, water philosophy; and others, "water witchery."

The most ordinary instrument used is a fork, of peach, hazel, or willow, of the last year's growth, so as to be small, slim, and full of sap. The tip ends are placed horizontally in the hands, the palms of which are upward; this brings the fork upward in the shape of an inverted V—thus, Λ; and in the hands of those with whom it will work—for it does not work with every one—this fork-end is attracted by the water, if living spring-water, under ground, but not by dead or standing stagnant water; nor by what is called *seep* water. It is also attracted by silver, iron, or other metals which attract the electric fluid; for electricity is the secret of the matter, after all. But to the facts:

In 1812 I settled on a springless farm in Ohio, expecting to obtain water by digging a well. A neighbor of mine, who had on an adjoining farm obtained good water only fourteen feet from the surface of the ground, by means of this Bletonism, urged me to try the same means. But being of the class who could not, or rather would not, believe in what I could not comprehend, I declined resorting to what, to me, as to others, appeared to be consummate nonsense, and I spent my leisure time in the dry time of *three* years in digging, but found no water. At length, despairing of finding water in this way, and having a curiosity to *test* this new science, I invited a "water philosopher" to try his skill for me. It is proper to observe, that this man was an independent farmer, a man of intelligence and high moral worth; and as he performed in this matter without fee or reward, I had no possible ground for suspecting any design of humbuggery on his part. And further, he told me that he knew no more of the reason, the why or wherefore, it worked in his hands, while it would not in those of others, than I did. By mere accident he ascertained that he was "one of 'em;" and on discovering this, he experimented until he discovered this fact—that the rod would be attracted at an angle of 45°, and that from the point at which the attraction commenced to where the attraction was perpendicular, would indicate the depth to dig to reach the water.

All this, however—his high character and his explanations—did not remove my doubts. He prepared his peach twig-fork, and I placed him over a well which I had dug, and was at this time full of surface or seep-water; wishing, if possible, not to lose the labor thus expended. But this seep-water had no effect whatever on the rod. The operator then travelled slowly, I keeping my eye upon the rod and his hands, to see if the turning of the rod was not from the motion of his own hands. At length the butt or fork-end of the rod went down; the operator holding his hands upon the rod so tightly, to prevent its slipping, that they turned purple, and I could plainly see that the twig-ends of the rod did not slip or turn round in his hand, but that the twigs actually twisted so that the bark broke and gave way. When I saw this I gave it up. What I saw with my own eyes, and that, too, against strong prejudices, I could not doubt. He selected the point where the dip of the rod was the strongest, and measured the depth by the 45° rule, and I stuck the stake to dig by; and in the ensuing autumn, when all was dry, I dug, and found the depth, quantity, and quality of the water just as he had told me. With such facts before me I could no longer disbelieve, because I had not then ascertained the reasons for it, or the law of nature by which such events were brought about. Shortly after this I saw a statement in the public prints—taken, I believe, from the *Cultivator*, of New York, over the signature of a respectable Quaker of that State—to the following effect: A friend of his called upon him, and, among other things, his farm, its beauty and high state of cultivation, came up as a topic of conversation, and the owner observed that he would sell it at half its value, because there was no living or spring-water on it. His friend inquired, "Why don't thee *dig?*" "I have," was the reply, "dug several wells, some of them ninety feet deep, and get nothing but seep-water, which is not good." "But," continued his friend, "why don't thee get a water philosopher to tell thee where to dig?" "Because I don't believe in such nonsense; I won't believe in anything of the kind for which I can see no good reason, and there is no reason why such a rod will work in one man's hands and not in another's." But his friend was not to be put off with so stale an argument. "But thou mayest believe it whether thou canst comprehend it or not, for I have proved it and know it to be true; and if thou wilt get a good philosopher, one who has been proved, and dig where he tells thee, if thou dost not find water I will pay thee all thy expenses." His friend was so urgent, and withal so liberal, he could do no less in courtesy than try it. He did so, and the operator fixed upon a site near the corner of his house, on the side towards the barn, from which the barn-yard could be easily supplied, and fixed upon twenty feet as the depth to dig. He paid the man his dollar and told him, "I have called for thee and I will pay thy charges; but I do not believe a word thou sayest, for here and there, within a few feet of the place thou hast fixed upon, I have dug ninety feet and found no such spring as thou tellest of; but if I do find it as thou sayest, I will give thee fifty dollars." The result was, he dug, found water as told, paid the man his fifty dollars, got him to select several other sites on the farm for wells for stock, and published his discovery for the benefit of his fellow-men who might be in like ignorance and prejudice, and as much to their own damage as his was to him.

Some thirty years since, a tract upon this subject, from the pen of the celebrated Adam Clark, fell into my hands, from which, as well as I can recollect, I gathered the following facts: The Doctor, as a Wesleyan Methodist preacher, was stationed in the Guernsey islands, in the British channel, the inhabitants of which were originally French but now under British rule. He soon discovered that good water was almost a paramount object. Cisterns had been resorted to, but their supply depended upon the amount of rain, of which, in some seasons, there was a scarcity, and consequent distress among the inhabitants followed.

Now, if there was a place on earth or *in* the sea where this science was needed, it was here; and if it was humbuggery, this, above most places, was the place to palm it off, and the anxiety of the people to obtain a supply of good water would induce them to forego a few failures before they would give up the pursuit. The Doctor found things in this situation, and among the members of his flock a man who pretended to, or rather did, tell people where to dig for and obtain good water. But this was too much for the Doctor; he could or would believe in no such humbuggery, and he cited the member to trial for attempting to humbug, or impose upon, the people, which he would not allow.

Upon the trial, the accused proved by several respectable witnesses that he had told them where to dig; that they had done so, and found water as he had predicted. Still the Doctor was not satisfied but that there might be some mistake or accident, if there were no imposition; and the accused should select a spot to dig in his presence, that he might test the matter in person. This was done, and the water found. But lest this might have been an accident, he would have it tried over. It was tried, and again proved true. The Doctor could hold out no longer, and lay claim to the character of a reasonable man. The fact that such things were done by some, and could not be done by others, was established beyond the possibility of a doubt, and as a true philosopher he set about the inquiry as to the reason for such a phenomenon. But not discovering any law of nature therefor, he concluded that it must be a special gift of God to some, for the benefit of the human race.

These events occurred over fifty—say sixty—years ago, when philosophy was less advanced than at present. They happened, also, near the French coast, and among a people of the same language, and in communication with France; and possibly this profession went from Guernsey to France; where, being established as a fact, the acute philosophy of France was brought to bear upon it, as to the reason of, and for it, which resulted in the discovery of the agency of the electric fluid in the matter; and the whole is resolved into an established law of nature, though but recently discovered and understood.

A gentleman in the North "has been examining the subject for many years, and has tried a great variety of experiments, which show that all the phenomena of the rod are governed by the laws of electricity. He tested the rod by the electric machine. When the rod is brought near the positive pole, it is attracted towards it; but if brought towards the negative pole, it is repelled. A silk handkerchief placed between the rod and the water, or the conductor, breaks the connexion, and there is no electric attraction made upon the rod: remove the handkerchief, and the rod is instantly drawn down. All his experiments resulted in this explanation of the phenomena." The Rev. Mr. Avery, of Holden, some years since, made similar experiments, and came to the same conclusions. The subject has been thoroughly investigated, and with the same results. In almost every place there are those in whose hands the rod will operate, and men of high intellectual moral worth, and far above deception or trick, are found among them.

The law which governs in this matter is thus explained:

1. That wonderful fluid called electricity is distributed throughout the whole earth, but some bodies generate or imbibe more of it than others. Those that contain more than their natural proportion are said to be *positively*, and those which contain less to be *negatively* charged.

2. One of the established laws of electricity is found in the fact that two bodies, both *positively* or both *negatively* charged, invariably repel each other; while if one is positively, and the other negatively charged, they uniformly attract each other.

3. It is well known that the best subterranean conductors are beds of ore or native metals, and veins of water. It is their nature to extract the latent fluid from surrounding objects, and absorb it themselves; hence where these exist, there will be the most electricity.

4. In general, the human body is also a good conductor, but there are some exceptions. Some men usually generate or imbibe the negative and positive in such equal quantities as to maintain an equilibrium in their systems: the rod in the hands of such will not be sensibly affected; others are surcharged, and have more than their share, and produce positive electricity. Such it is said, if they have black hair, will, if rubbed in cold weather, emit sparks.

5. An individual containing a very small amount of electricity, or who is highly negatively charged, (and only such can operate,) if he takes the rod in his hands and passes over a surface beneath which there is a stream of water, or a stratum of ore, by the unchanging laws of nature, the rod *must* be affected; and, consequently, a sensation will be produced in him who holds it. The person making the experiment is highly negatively charged—that is, has but little of the fluid in him: the water beneath his feet has absorbed the electricity of the adjacent bodies in the earth: the elastic twig in his hands forms a part of the connexion between the positive and negative poles; and two bodies, the one positively, and the other negatively charged, by a law of nature, always attract each other; and, under such circumstances, most unquestionably the twig will be attracted downward towards the water, and the operator will *feel* it as well as see it.

6. If the experimenter is positively charged, like the water below, his system having produced or imbibed a large portion of the latent fluid by the law already referred to, there will be a repulsion: the twig, instead of bending downward towards the water, will bend backward towards himself, and the result will be equally perceptible.

A recent extract from a French paper gives the description of a man, of high moral and intellectual standing, who is so sensitive to electrical influence that he can tell without a rod or anything in his hands where the veins of water are by the sensation produced upon the throat as he passes over the earth. The sensation is similar to that felt from a galvanic battery.

The reader may inquire how we are to know whether the attraction is from water or from ore of some kind? The answer, as to most countries, is, that the geological character of the ground will generally determine the point. That, however, will not answer in the lead mines of this region. Here the surface presents so different a soil from that of other mineral countries that no law of *the books* can apply to us. One thing is certain: if it should prove to be mineral, it would probably be valuable; so that nothing would be lost by the experiment. But in some scores of trials for water in this mineral region, by means of the rod, not one, to my knowledge, has failed, or led to mineral instead of water.

There are numbers of miners among us who depend on the rod to find crevices in the rock under the clay surface. They seek for crevices because lead ore is usually found in them, though there may be, and are, many crevices in which there are no minerals. My observation in this matter leads to the conclusion that a vein of water has stronger attraction for the rod than any of the ores, excepting silver and iron; and that they must exist in considerable quantities to attract equally with water; so that, if the operator should happen to hit on ore, instead of water, there would be no loss. To what depth the electric fluid will attract I am not advised. I have known water to be found in this way from ten to forty feet under the surface, and my impression is that it will reach to a greater depth—possibly to seventy feet.

It is hardly necessary to point out the advantages of this science to the farmer, or its value to every springless farm. The farmer wishing to build, and to have water convenient, will first discover the vein of water, and dig his well. The operator can be tested or proved before the positive pole, or any electric machine, or by having previously found water. It will save time and money lost in haphazard digging, and will add greatly to the comfort of a family to have water at hand; and to make this certain let the water be first discovered, the well dug, and the house then built to suit the situation.

ALFRED BURNSON.

Hon. Thomas Ewbank,
Commissioner U. S. Patent Office.

AGRICULTURAL EDUCATION.

Sutton, Worcester Co., Mass.,
February 12, 1852.

Sir: By invitation from your most excellent department, I propose making some suggestions beyond those of last year, published in your Report for 1850. Those were intended to be strictly confined to the usual Circular inviting statistics, as it does from all parts of our widely-extended country; and the information thus collected and placed in so condensed a form gives a thinking community an opportunity of observing some of the apparently good reasons why our sons are, and have been for the last ten years, leaving the old homestead for the crowded city or the far West. It would seem to be because our soils have been under the skimming process for a long term of years, and that our young men had never found out that there was any science in agriculture until it was too late for them to retrace their steps; and the consequence is, that their places are filled with laborers from all parts of the wide foreign world. Sure it is they have health and a strong arm, and may be called servants, and more properly than "helps," so that the foreman or master must necessarily be constantly in the field with them, or some unaccountable mistake will be committed. They have no minds and no care for the general welfare of the crops.

This was not the condition of the farmer in former times, when his sons were at home and in the field. Then he could feel quite at ease in his old age, as they understood his method quite as well as himself. In too many instances where the sons have left, the father has sold the old homestead rather than undertake to carry on with such servants as he could obtain, and retired, perhaps, to the town or village, there to spend his last days with some friend; whilst his mind is back to the old homestead, regretting, when too late, that he so abruptly left the only home he will find in this world. And we may very naturally ask the question, What has become of the old homestead? Why, in quite too many instances, it has fallen into the hands of one of his neighbor farmers, or rather into speculators' hands, whose plan of operation is to purchase a farm in a high state of cultivation, with good buildings and fences thereon, and then put it under the skimming process and get all he can from it, without any expense or labor for improvements; buildings, fences, and fields are all used for present advantage, that he may pocket the proceeds. The soil is soon exhausted, and the farm is sold for what it will fetch, and another purchase made. By this means he obtains wealth just as any miser does. This destructive system is by no means confined to Massachusetts, but shows itself at every turn in the road in the United States. How desolating to a neighborhood—how destructive to society!

Is there no remedy for this evil? I think there is: by letting our sons become acquainted more generally with the science of agriculture. But how is this to be done? It is said that we have no American science. Now, if this be the case, should we not go immediately to our national government and acquaint them with the fact, and request of them the immediate appointment of a few young men to the different professorships that may be necessary for teaching American agriculture—such as analysis of soils, agricultural chemistry, &c.—and place them where they can obtain such information, with suitable pay for their maintenance. Take them if you please from the plough, as such young men are far to be preferred to mere literary professors, that have already gained a reputation. And I suppose it is not to be doubted that our government is willing to make an appropriation sufficient to buy a section of land near the capital, to be used as an experimental farm, where all foreign seeds can be naturalized, soils can be analyzed, and where every American can obtain such information in relation to crops, and all other information in relation to experiments on the best breeds of cattle, swine, and best method of making butter and cheese, and preserving them, whilst his son may be permitted to enter the institution of learning that shall be erected on this beautiful spot, and where his chance for an education shall be as great or

greater than at any other institution in this country, and at as cheap a rate. The student here gets theory and practice, and when he comes home to the old homestead he sows his good seed broadcast, and the result is beyond all calculation. If men had been intended for farmers without using any reasoning powers, God in his mercy would have given them the perfect instinct to accomplish in a right way whatever fell to their lot to do. The other day an ancient agricultural gentleman, and a member of our board of agriculture, while attending a meeting of this board at the State-house, said he believed that the great reformations in the construction of our ploughs were entirely a matter of accident. The State Agricultural Society offered large premiums for ploughing at their show at Brighton, near Boston, more than 30 years ago, and the object was to bring out the strength and action of our oxen; and in those days it required great labor to draw the old wooden plough; but the plough-maker was in the field, and what did he do but go home to his workshop and put his thinking powers to work, and soon gave us the very thing we wanted; and so it would be if we could establish agricultural schools and experimental farms in each State of the Union, where all of the useful experiments could be made, and where the farmer could have free access at all times, and especially where his sons could obtain the foundation of a useful, practical education; where he could go out with his class each day and learn the best method of handling tools of all kinds—to the stable, and there learn, by a lecture from a practical herdsman, the good and bad qualities of cattle and horses, sheep and swine; thence to the garden and orchard, and so back to the school room, where he may be taught at least chemistry, geology, botany, and the physiology of animals, and a thorough knowledge of agricultural book-keeping. And thus, whilst he is laboring (rich or poor) one half of each day with his class with a a practical farmer, he is all the better prepared for the school-room the other half; where he should remain until he shall have obtained an education suited to his wants, or such a one as shall fit him for a national school or college as we hope to have soon. The legislatures of Massachusetts and New York have been talking for years upon this subject, and I have no doubt that something acceptable to the farmers will be accomplished; though in this object we have strong prejudices to contend with. The old class of farmers have taxed the land to the utmost, and think they have done well because they got what they term a good living and put some money in their pockets. This class do not wish to exchange their old harness for a new one. They were slow to adopt the cast-iron plough, for fear they should break a point occasionally; and the horse rake they did not believe would rake clean; and the threshing machine was out of the question with them, as they had flails, and nothing else, for winter work. But a little experience with these new fangled notions has worked wonders. They now find it convenient and easy to use this kind of machinery; so that the more enterprising among them have time, after the hay and grain crops are out of the way, to reclaim some of their swamp land by ditching and carting on sand; while others are draining their clayed hill soils, and, much to their surprise, have found their account in, and all this time saved on account of using labor-saving machines. It might readily be supposed that, if an institution of this character would be the means of greatly increasing our products, and at the same time greatly regenerating our worn-out soils, each indidividual State would embrace the opportunity at once, and thus our representatives and senators in Congress would be instructed to see that an institution that should do credit to the whole country and world be established immmediately. At a late meeting of our Board of Agriculture, intimations were given out that the funds required for such an institution must necessarily be large. (This was for a State or home institution, preparatory to a national.)

Well, the question is, how large? I, for one, would be satisfied with an appropriation of one hundred thousand dollars, which would put the farm, and school rooms, and all necessary buildings, well stocked, in running order, for at least seventy-five scholars; and, if more funds were required before the end of the first experimental year, we could surely depend on rich men in Boston and elsewhere, whose whole heart is engaged in this matter, to assist by liberal donations. What if you fail in accomplishing your desired object in educating your young men for practical farmers? Why, if we do, the first outlay will go back to the State, and we be disgraced for our folly for asking for such an institution a whole half century too soon. But there is no such word in the farmer's dictionary as failure, with the young farmers of old Massachusetts. They were born upon Plymouth rock, and cradled in her storms, and how can they fail if knowledge is power, and they get knowledge? Want is said to be the parent of invention; and as it happened, last fall, I had a few head more of cattle on hand than I had convenience for wintering, and so it occurred to me that, as the hay crop was large, I could get some of them wintered on reasonable terms, and I soon found enough good practical feeding farmers that would be glad to take them; and, when the price per week was named for keeping on good hay, the different farmers varied so much in price per head, by the week, that it put me to thinking, and so I inquired what good English hay was worth per ton at the barns; and all agreed at once that it was worth about ten dollars, and that they should be glad to take my steers to winter, as they wished to spend all their products on the farm; that they wanted to fill their barn cellars with manure, and were willing to spare their surplus hay in this way, and should be willing to give their labor of tending for the manure. What will you charge per week for keeping? Don't know; what would be right? My steers are two years old, past, and weighed this morning, before drinking, two thousand pounds; were put into the stable, and they drank seventy pounds of water; and now if you know what per cent. of good hay such cattle eat per day, on their live weight, we can agree on the price I shall pay per week for keeping. Mr. A. said he thought they would eat about one per cent., or twenty pounds to the pair, per day, or one hundred and forty pounds per week. Mr. C. thought about two per cent., or forty pounds, per day, or two hundred and eighty pounds per week; but Mr. B. said he could tell all about it; they would eat three per cent., or sixty pounds, per day, or four hundred and twenty pounds per week. Finding so great a discrepancy in these men's minds, and fearing he might have fixed his sum too low, which would be seventy cents for the two steers per week, and not feeling willing to pay Mr. B. $2 10 per week, or thinking it would prove a ruinous business to pay $2 10 per week for twenty weeks, which time cattle in this climate are required to be at the stable, making a sum total of forty-two dollars—in such a case what was to be done? Why, I went on with my inquiries, and asked as many as a dozen what their opinions were; and their answers were all within the above markings, namely, from one to three per cent. on live weight; so that one man's guessing opinion was that it would cost fourteen dollars to winter them; another, twenty one dollars; and the last one, forty-two dollars; and none of these men were ignorant; no such thing.

Our farmers, I will be bound to say, are as well posted up as any in the United States. Thus you see I was left in a bad fix. These being a beautiful pair of North Devon steers, I came to the conclusion that I would go home and make room for them in a convenient stable by themselves, and that I would try a thorough experiment on their feed for a length of time, that should satisfy all doubts upon this question. After getting the steers each in his place, the thought occurred to me that I would regulate my experiment in accordance with the directions of a private individual, a thinking, enterprising gentleman, who spends annually from 80 to 100 tons of hay, and much time, thought, and money, for the advancement of agriculture. And this proposition I find at the bottom of a long list of premiums by the Worcester County Agricultural Society. The above-described gentleman offers this premium of $50, and has put the money into the treasurer's hand, without giving his name, (but I know who he is,) under the following regulations, namely: The trial to be made with at least two animals, their condition to be as much alike as practicable; the time of trial to continue at least 8 weeks, divided into periods of two weeks each; one animal to be fed with cut when the other is fed with uncut hay; and the feed of each to be changed at the expiration of each two weeks; and so on, alternating each two weeks during the trial. If any other food than hay be given, (such as roots or meal,) the same quantity to be given to each, that the result in relation to the cutting of the hay may not be affected by other food. The animals should be kept in the same stable, that they may be in the same temperature, the average degree of which is to be stated; if the trial is made with cows, the time of having the last calf must be given, and also the weight of the milk given by each cow during each period of the trial; each of the animals to be weighed at the commencement of each two weeks, and at the end of the trial; and the statement must give an account of their condition, age, and every other circumstance that can have any influence upon the decision of the question. And that the experiment may produce the most satisfactory results, the same kind of hay (what is usually called English hay) should be used during the whole time. The time of giving the food and drink should be regular, and also the milking. The time of weighing should be in the morning, and before the animals have been allowed to drink. The statement must also give the quantity of hay, whether wet or dry, and other food given to each animal, and of each kind, during each period of the trial, and to be forwarded and received by the recording secretary of the Worcester County Agricultural Society on or before the 15th day of March, 1852, to be laid before the committee appointed for their adjudication. The steers I have been speaking of have been strictly on this trial for the last three weeks; have not been permitted to go out of the stable only to be weighed; the water and food have all been weighed, and their nature and health, and aptitude to fatten, are so similar—being only five pounds difference in weight—that I consider them the best two animals to experiment on that have ever come under my observation. Several experiments of the same nature are now being tried in different parts of Worcester county, the result of which will prove most beneficial, and no doubt will be published, as the gentleman offering $50 for the experiments is public-spirited, and will have no desire to keep any information hid that will be of benefit to the agricultural community.

The same kind of questions were put to the intelligent farmers in our county—such as, What is milk worth in your vicinity to be manufactured into butter, butter being worth 20 cents the pound? How many quarts of milk does it take for a pound of butter? Is there any great difference in the milk of our common native cows for butter? Is it sure that the cow giving the richest milk for butter will make the fattest calf? Ought cows to give milk and butter in proportion to their live weight? Do cows consume food in proportion to their live weight and the milk and butter made from them? How many quarts of milk and pounds of butter does your whole dairy give in nine months? Is there any difference in the milking qualities of your cows, according to their weight?

To the above questions I have not found one in a hundred of our practical and otherwise intelligent farmers that could answer, from knowledge, one of these common-sense questions; nor do I believe they can be answered by one in a thousand throughout the whole of the dairying districts of the country. But the question has been asked, and answered with some degree of accuracy, (namely,) Can the present stock of cows that have come under your observation be made, *by selection* alone, and without any change in feed or extra labor from such as is now bestowed on them, to improve in their milking properties, so as to increase their milk 2 quarts per day for 9 months in the year? It is understood by this proposition that the next generation of cows shall be selected, when calves, from the best half of our cows, as one-half are as many calves as are raised in New England. Further, it is proposed to give a good bull for each 50 cows, instead of indifferent and some decidedly bad ones, as at present, and allowing the good bulls to cost $50, and that the present bad ones would sell for no more than $20 each. And the answer in most cases has been, that they thought it could be done by taking a little more thought and some action. Now it occurred to me, if this could be done, it would pay, in part at least, the outlay that we are asking our legislature to appropriate for an agricultural school and pattern or experimental farm; and, as I was in Boston, I stepped into the secretary of State's office, and carefully took down the number of cows as returned to that department in May, 1850, and found the number from Worcester county alone to be 35,594, and the two-year-old steers and heifers to be 17,837. Now we will suppose these cows, by wise thought and attention, to be increased in their milking properties 2 quarts per day for 9 months, or 270 days in the year; and that milk is worth, in all parts of Massachusetts, 2 cents per quart for manufacturing butter—here it is: 35,594 cows, at the above reckoning, would make $10 80 for each cow, or a round sum of $384,415 20. Add to this sum, as increased value on two-year olds over the old stock, say $35,674, which would make a sum total of $420,089 20; deduct from this $21,330 for good bulls over the old stock, and we have left $398,759 20—and this for Worcester county alone, with a population of 140,817, or about 1 cow to each 4 persons. The cows are supposed to yield at least 4 pounds of butter per week for

40 weeks in the year, and at least one-half of this butter is manufactured in so careless a manner that it sells for but 17 cents the pound, while good butter sells readily in any market in Massachusetts for 20; and as the bad butter requires the same amount of materials and labor as the good, here is another item of $78,296 80, caused entirely through ignorance and a general want of knowledge in its manufacture and preservation. Then there are our oxen, our one year olds, and calves in process of raising. I have not the statistics as to number, but, from an extensive acquaintance in the country, have no doubt they would more than equal in number and value the cows and two-year olds, and it is the opinion of some of our practical farmers that an equal amount could safely be placed to their credit. With the same advantage that we propose to give to cows and two-year olds, if this be true, we have a sum total on horned cattle alone to the amount of $797,518 40, besides the loss on badly manufactured butter, as above, to the amount of $78,296 80.

As large as these figures look, I believe, from personal observation, that it is far below the real loss on neat stock alone, by mere ignorance and inattention to the subject and knowledge of breeding and caring for our stock. I have taken up this one individual subject of neat stock, and on this small territory, (only about the tenth part of the State,) because, in the first place, I have a pretty good opportunity of knowing, from personal observation, the condition of stock pretty generally for the last twelve years, and of most other counties in Massachusetts; and should say, without prejudice, that more care and attention are bestowed on this one branch of farming in Worcester than in any other in the State; and would further add, that it is my conviction that no farmers in the State are better posted up, or more ready to adopt any substantial improvements, than the farmers of Worcester. I will leave others to judge whether our cattle, as they are, and have been for the last ten years, will not favorably compare with the other States in the Union? In purchasing several thousand head (for our market) from the farmers individually, in sections of all the New England States, for the last dozen years, and from a patient, continual inquiry, I believe it would more than compare.

As I have my stock-book before me, I will give a sample of the differences in prices paid last October by myself in Vermont: Lowest price paid for one-year olds, $6; highest price, $20 each; two-year olds, average $14; lowest price for any two head was $9 each, and highest price paid for any two was $40 each, and other ages in proportion. This was on a lot of 110 head, bought for what would be rated store cattle, to be wintered. Though, for various purposes, and with my present object in view, I spared no pains to inform myself of the reason of this great discrepancy in the prices of cattle in a single neighborhood, when I had found the same difference in the quality of stock for several years, all my observations and inquiries have resulted in this fact: The farmer that raised the cheap stock had expended very nearly as much feed and care as the breeder and grower of the high-priced stock, and should put the difference at $1 per head; while the farmer that made good cattle is never necessarily obliged to look up a market for his stock; whilst the farmer that keeps poor stock is obliged to sell for what he considers a low price and slow sale; and, perhaps, there cannot be found a more intelligent and thinking set of farmers in the United States than these Vermont farmers are; and I believe, from experience and observation, that this difference in the worth of good stock and bad will be found in all of the New England States, and certainly in northern New York. The grower of inferior stock says it is just the same kind of stock that has been on the farm for years, and he cannot afford to go into this high-priced stock, and finally has never thought much about it; whilst the breeder of good or improved stock says he cannot afford to have anything to do with bad stock; his father used to keep them; but he was on to the New York cattle-show a few years since, and was convinced, whilst there, that it was ruinous for him to pursue the old course; had brought home a good bull, and here was his stock. And then there is the same great difference in their horses, sheep, mules, and swine, which will swell the amount, as I have estimated them, to four times at least the amount stated on milch cows and two-year olds, in Worcester county; and this sum, great as it is, must be admitted to be a sample of the annual loss to a very large portion of our whole American farmers.

Admitting the above statements and observations to be true, and that this condition of things exists throughout the nation, I would ask if there would be any harm in urging this subject strongly upon the early attention of Congress, and insisting upon it, that appropriations shall be granted sufficient to establish an agricultural college, connected with a pattern and experimental farm, where young men may graduate with honor and great usefulness from all parts of this widely-extended country—where agriculture in its highest state may be studied, and sciences applied—where all the different breeds of cattle, from the short horn or Durham to the last Hungarian cattle, shall be experimented on, and their different qualities proved—the best and different ways of feeding stock and caring for them—where all the great variety of soils may be taken to pieces, and their good and bad qualities exposed—where veterinary surgery may be carried to perfection, and all the other arts and sciences carried to as high a state of advancement as they can be in any other country on the face of the earth? And this institution should be strictly American in all of its departments. If it is said we have no American agricultural science, it is high time we had; and young men enough can be found in all parts of the United States, with hearts beating high, and who have earned a reputation at home in following the plough and subjecting the noble ox to the use of man, and who have preserved and built up a strong constitution, and who have a longing and thirst for an improved American agriculture. Let such young men as these be immediately appointed to the different desired professorships, with annual pay sufficient for them to obtain the most complete education that can be obtained at home or abroad in the particular department of each; and as soon as an institution can be put in running order, they can be home, ready to take their respective situations and do lasting honor and good to all coming generations. Once started, we shall find enough talented young men that will be rapping at the door of agricultural science, and showing us that, with the one talent they had intrusted to them, they have gained ten other talents, and therefore have a just claim to come in.

I would not distrust the wisdom of our government; but, in reviewing fac-similes of letters from Gen. Washington to Sir John Sinclair, from 1792 to 1797, on agriculture, we can see with a single eye that he had his mind strongly upon this subject, and, strange as it may appear, more so than any Chief Magistrate, or perhaps other officer in our government, for this whole generation and a half. Whilst all other interests have been well cared for, this greatest of all interests has been strangely overlooked. The manufacturer, the mechanic, the merchant, and scholar have always had their particular advocates in Congress; whilst the farmer, who is the very father of our representatives and senators in Congress, stands afar off, and not so much as lifts up his voice in prayer (amongst his more clamorous sons that have left his peaceful fireside for other crafts) to Congress and insist, as he should, that, if the manufacturer needs protection, to him is the entire privilege of at least growing the raw materials, such as cotton and wool. The statistics in our trade in foreign wool surely look bad, when there is not a particle of doubt that this is the best country in the world for its production. Sheep husbandry is not depreciating in its tendencies, but, on the contrary, a great renovator of soils—no complaints, where the sheep ranges, of worn-out or hungry soils; but look on the other hand, and see the vast extent and hateful-looking waste lands that have been entirely impoverished by growing grain for the city and foreign countries. And whilst the unskilful manager of these (at present) unsightly soils has pocketed the cash for the skimmings, in the shape of corn at the East and West, and the grower of tobacco and cotton at the South, nothing has been brought back to feed these, Pharoah-like, hungry soils; and all the present unskilful cultivator of them can do, is to hand them down to his sons, to go through another fiery trial. But they refuse to give us more than twelve bushels of wheat, where they gave our fathers twenty-five. And our Anglo Saxon sons, who are well posted up in all other of the arts and sciences but that of systematic farming, say they cannot, they will not, take the proffered remnants of this old homestead; and it is left to the *worn-out fathers*, or perhaps widows, or weaker or discouraged sons, to till on, and own.

Whilst the Anglo-Saxon spirit of our fathers is being developed in our sons, whose passion was, and is, *land*—more land—and whose courage, energy, and activity have lost nothing by time, they start for the far West, where they can have land in quantity and quality to their heart's content; and as they want nothing but the axe and plough in that region of fertility to go on with the same principle of skimming that has been taught them in their fatherland, it cannot be expected that their present farms under this system will last longer than their fathers' did in the old States. It is West, and more land, until we have already reached the great waters of the Pacific. Now, I would ask, has the time not arrived that we may expect some of our leading men connected with the government will lend a hand for this object? I am presuming that many, if not all, of the several different States will soon form themselves into what may be called a board of agriculture, and after being duly organized will make it their first business to gather all the statistics on all the different branches of agriculture in their respective States, and report to their monthly meeting; and they will not have to go far before they will find causes enough to petition their legislatures to establish an agricultural school and an experimental farm, calculated at least to prepare young men in all its branches to enter the establishment for agricultural education that shall be founded by the national government. If any man in the whole country doubts the propriety or necessity of this undertaking, let him go to work and pick up the statistics for his own town, county, or State in the same way that it has been done in Worcester county as above, and he will find that he will be safe in contracting with our government to put one establishment in each State in working order, and permanently endow it with professorships, and hire and maintain practical farmers enough to man it in all its departments for any term of years. If they will agree to pay him one-half the present loss on milch cows and two-year old cattle resulting from ignorance and thoughtlessness in selecting and breeding alone, the contractor may go further, and pledge himself that a spirit shall be awakened within five years from the opening of these agricultural institutions that shall convince every reasonable man of their usefulness.

You have the figures as above for Worcester county; loss as above on cows and two-year olds annually $398,759 20, from ignorance and thoughtlessness in the management. On oxen, one-year olds, and calves as much more, which we agree to improve without any pay; besides all other domestic animals usually kept on the farm. And now we will look for a moment to the economy in the making, preserving, and applying of manures: a lack of knowledge of the wants of our soils, as well as their natural capacity for the production of profitable crops, and of the most economical way of feeding out crops to the best advantage, and preserving and increasing the fertility of our land. After the best estimate that can be made on the losses annually sustained in this county alone, and all added to the loss on cows and two-year olds, put all these losses together, which, at the lowest estimate, would amount to more than one and a half million of dollars annually, or fifteen millions for Massachusetts. Are we calling for a remedy at too early a day, or at too high a cost? If the statistical information is correct which has been gathered from all parts of the United States, and published by your department, which has been the means of doing much good, it shows at a glance that Massachusetts is not behind any of the other States in its agricultural department certainly? But, for convenience sake, we will call them equal, and compare the statistics as above with the other States in the Union, and make figures for the loss they annually all sustain for the want of agricultural knowledge; and your book will be full. The estimates will then fall further short of what would be realized with this knowledge than Dr. Franklin did in stating that it was his conviction that the United States mail, within half a century from that time, would go through from Philadelphia to Boston in twenty days. Old Virginia, with one of the best natural soils and climates in this country, reports that her tobacco crops for the last half century have depreciated her soil to so great an extent, that her wheat and corn crops come down to a very low mark—so low, that her sons cannot afford to stay at home any longer, and so they go further south. Shall old Virginia be forsaken? I answer, No. Her soil must be regenerated, her crops changed, her wasted manures saved, her ploughings deeper, and she, too, must be saved. And is this not a fair sample of all the old tobacco, cotton, and sugar growing States of the South? Can we do without her products? No. Then should not they also study the nature and wants of their soils which are required to produce her valuable staples? Have not they, as well as we at the North, an abundance of fertilizing matter at home, locked up in hills and valleys? And is there anything but the key of agricultural knowledge wanted to bring them to light, and cause them to act like leaven in a measure of meal? There are one hundred thousand barns in Massachusetts alone; and would it not be reasonable to suppose that ten dollars' worth more of manure could be made and preserved than now is in each, annually making a loss of one million of dollars a year? So far as my personal observations have gone, the figures are altogether too low; and I would add as much more in way of loss by the annual misapplication of these manures, besides the great want of knowledge in the natural compositions of our soils and their wants; and to illustrate this general want of knowledge, I would state one circumstance which occurred on my own farm:

In the fall of 1849 I had determined to underdrain a portion of land which had been in former times subdivided into lots, containing from one to three acres, by heavy walls, composed principally of small stones; and as a part of these lots were in cultivated fields, and the other parts in unsightly, bushy pasture land, I had determined to throw several of these lots into one, making one lot of 23 acres—this land being what we term high-hill land, being located within one half mile of the river, and still more than 500 feet above its banks, and is what is generally termed a loamy soil, with a stiff clay sub-soil. My plan of operation was to dig a dike close along by the side of these squalid and ancient walls, which ditches swallowed up about one half of the wall, and the balance of these walls was taken to fill other interior ditches, which were cut 3 feet deep by 2½ wide, one in every 5 rods, with cross ditches to carry the surplus water into the principal ditches. These ditches swallowed up all the stones of the old partition walls, as well as all the surplus stones on the surface of the land, and they were filled within 8 inches with stones, and carefully covered with much brush or leaves, and a sufficient quantity of the soil put back to come to a level; and the balance of earth from the ditches was used for grading any low spots that were to be found; and to show the trouble I got into by not employing a practical engineer to lay out my work, and from my own ignorance of the matter, I will state that this plot of land has a gradual, uniform descent of about two degrees to the north, until it strikes the road leading east and west, and which road about equally divides my farm. Below the road I have about the same kind of land as where I had been ditching above. In the spring of 1850 the water which accumulated in about 400 rods of these drains was emptied into the main drain, and then into one prepared at the side of the road for the purpose of being carried off through what I supposed to be a natural channel, and through land belonging to one of my best neighbors; but in this I was mistaken. In the first place, my ditch by the side of the road would not hold more than one-fourth of the water which was collected in the drains above; and the consequence was, that the road was badly washed, to the great injury of myself and the public, and my neighbor objected to its being turned on to his pasture in such unnatural quantities; and not wishing to injure the public, nor my neighbor, what was to be done in this case no one could tell. For my own part I began to fear, and some of my friends were ready to join me, that I had commenced a rash undertaking without looking at the results; that water enough to drive a saw-mill on high and apparently dry land was not so easily managed. In this dilemma I inquired of the president of our agricultural society what could be done, knowing that he had handled much water in the way of irrigation on his river land, and he told me at once to turn the water across the road, and throw it over some mowing lots below the road, where the descent was more rapid—say 5 or 6 degrees. This was done, and to the utter surprise of every one, 7 loads of hay were cut in July, where 4 loads of like dimensions were the extent that was ever cut before. This was from the hay harvest of 1850; in that of 1851, the difference in favor of the crop of hay was still larger. I have 12 acres more, next adjoining this, and I propose irrigating these also. Is there not something strange in all this: that water can be taken from these drains, and, after running one hundred rods in an open ditch, then be used for irrigation on similar lands? It is passing strange to me, and yet I should be loth to part with this water for what my ditches cost, which were only intended for under draining above. Would not a thorough knowledge of irrigation and application of water to most of our lands pay many millions annually? Are not our thirsty American soils better adapted to irrigation than those of Europe? Their atmosphere is more moist than ours; but Europeans pay greater attention to this subject than we do. Indeed, in this country, not one in a thousand uses water even when it can be had from natural streams.

I will here state that, in opening or digging these drains, my attention was called to different materials which were thrown out; for instance, here was red clay, and there was a fine gritty sand, and all sorts of materials; and land of similar appearance on the surface. If a chemist could have been obtained, I should have had these soils taken to pieces, and there is no doubt in my mind but what the result would have been greatly in my favor for present and future operations; as it is, I am no better informed of the wants of these soils than before the land was broken. But one circumstance is certain, and that is, that my crops have been more than doubled on this under-drained land for the last year. And what has done it? Was it under-drainage? I, for one, will not undertake to decide this question, if it was. Millions of acres in New England stand as much in need as mine. Many experiments are quite too costly for individual enterprise; and they should be carried to perfection by our State and national governments upon experimental farms. And the same may be said of the great subject of cattle-breeding in this country. Individual breeders cannot succeed in this important science; first, because no man has ever began early enough, or lived long enough to perfect his plans. Individual American breeders we have, it is true, and men of the very first stamp, who have done and are doing much; but they labor under great disadvantages. Besides, we have but few men in this country who can afford to go further than what is for their individual interest, and they have no neighbors with whom to compare notes. Mr. A. goes for short-horns, and Mr. B. for the Devon, whilst Mr. C. is for the Ayrshire. Each one advances his own opinions and is generally in favor of his own particular shire. This branch of business should be carried out by our government also, and could and would be done on the experimental farm, and great and lasting good would be the result to this whole nation.

Yours, truly,

HARVEY DODGE.

Hon. Thomas Ewbank,
Commissioner of Patents.

AGRICULTURAL EDUCATION.

***Extract from an Address before the Agricultural Society of Essex county, Massachusetts, in 1851; delivered by* Milton P. Braman.**

1. The system of popular education should enlist our ardent sympathy and support. Three fourths of the people of the United States are said to be engaged in the labors of the field. These three fourths reside in the country, and are receiving their education principally from the common schools. A very small proportion extend it beyond the means which these seminaries afford for mental cultivation. So far as the influence of the school is concerned, they owe the direction and discipline of their minds, and the information with which they are stored, to these sources of instruction. They are three times of as much consequence to the farmer as to all the other classes of community; so far as relates to the numbers connected with them, besides the importance which they derive from the fact that such kind of education is for the most part acquired in them, without the additional aid of academic and other higher institutions. It is the concern, then, of every farmer, and of all others who feel interested in the improvement of this class of our citizens, as well as in the progress of the noble art to which they are devoted, to render these instruments of popular education as efficient and useful as possible.

Aside from any considerations connected with the advance of agriculture itself, to which the present remarks are particularly directed, it cannot be denied that those institutions, in which so large a part of the youthful portion of the community are receiving almost all the training which is acquired from professional teachers, deserve the highest attention and support. The common school is eminently the farmer's school; it is not only the primary school, but the academical institution, and the college in which he takes his degrees, and whose influence contributes so much to form character and fit well, or imperfectly, for exercising those rights of citizenship, which, always most important in any circumstances, assume a most transcendent and fearful consequence when we consider the preponderating numbers of the class with which he is associated.

But I have particularly in view the influence of education in fitting him for a more successful prosecution of his employment. There are some persons who think little of agricultural seminaries and scientific farming, but place great reliance on the observation and experience of practical men. From the value of the maxims of experience I would not detract a particle. But all must allow that the observations of some men are worth infinitely more than those of others, and that, if the agricultural interest is to depend chiefly on observation for its progress, we need wise observers. If we must place principal reliance on the opinions of practical men, we should have intelligent practitioners. Every agency which strengthens and expands the powers of the mind fits a person for a keener and wiser observation in any department of labor to which he has addicted himself; and, other things being equal, the best reader, grammarian, and arithmetician in the common school will be the most intelligent and successful cultivator of the ground. An inactive and torpid mind will make no observations, institute no comparisons, deduce no inferences. The mind of the farmer is as much better fitted to gain useful practical knowledge by cultivation and discipline as his arm is to labor by having a strong muscle and bone.

It is a matter of congratulation that those who cultivate the soil in New England enjoy such advantages for early education. It was once a common complaint in England that the farmers were men of dull and sluggish minds. Wesley said that he could do nothing with farmers—an observation of course to be understood with reasonable limitations. While the colliers, and manufacturers, and the degraded populace of London could give a quick response to the tones of his stirring eloquence, the mind of the farmer was comparatively unsusceptible and impenetrable. Our free-schools and other public institutions have made a difference in favor of this class of persons among us. And through the extension of the same influences, particularly those of school education, which have produced this diversity, every farmer can be made a wise observer, skilful to compare results, sagacious in deducing conclusions, and able to be a useful contributor to the common stock of information and improvement. But this is not all we need.

2. Agricultural schools on the plan of those in Europe, taught by men versed in all sciences connected with the cultivation of the soil, and to which lands are attached for the purpose of experimental and practical farming. The attention which this subject can receive in the common school must be of quite an elementary and general character.

Whilst the knowledge gained in this way is useful as far as it goes, it does not meet the present demand. The common school is already so crowded with studies which are thought to be indispensably important branches of education, that there is a strong tendency to want of thoroughness in the manner of teaching those which are of the first necessity and lie at the foundation of all knowledge and mental discipline. Besides, among the thousands of teachers who resort to school-keeping, as a mere temporary employment in the younger period of life, with minds comparatively immature and unfurnished, and upon whom our common schools must depend for an indefinite period, how many are qualified to teach any more than the mere rudimental and general parts of the science, from meagre text-books prepared for the purpose, without the aids of experiment and practice which will be furnished by the proposed schools, and are of such vast importance to complete the preparation of those who are destined to the employment of husbandry? The system of common schools must undergo a complete revolution, and become very different from what it is now, or will probably become within any period of reasonable computation, before it will meet the exigency of the case and satisfy the demands of agricultural education. There can scarcely be conceived anything more impracticable and visionary than the projects of some who propose to employ our present system of free-schools as an instrument to diffuse the necessary degree of agricultural science among the people. They might as well be metamorphosed into colleges and universities, into schools of law, medicine, or theology, to teach the whole circle of the sciences and prepare young men for the three professions, as to take the place of those agricultural seminaries, for which there is such an imperative call in the community.

The proposed schools offer the following advantages: 1. The teachers will be men exclusively devoted to investigations connected with

an improved state of cultivation. We have few or none of this description among us. We have learned professors of chemistry, mineralogy, and botany, whose profound researches into sciences which it is their business to illustrate have been of inestimable advantage to the concerns of agriculture; but if we could have gentlemen of equal intellectual character and attainment placed in situations whose duties require them to pursue the study of these sciences with reference to the cultivation of the soil, they would contribute in a much greater degree to the improvement to which the present occasion is devoted. There is, it is true, great complaint that the recommendations and theories of scientific men are frequently of no value to the farmer, because they will not stand the test of experiment; and so practical agriculture, as it is called, is set infinitely above the speculations of learned theorists. Now the proposition is to establish schools in which the theoretical and practical are combined. Every new deduction of scientific research will be subjected to actual experiment, and tested by successful results, before it is patented for the public use and benefit. It is also fair to put the question within the recommendations of learned men, who oftener fail in experiment, than the suggestions of merely practical men. A person has only to read an agricultural paper containing the opinions of those who are fresh from the field—he has only to attend a meeting for dicussion in which he hears modes of tillage advocated by gentlemen who confidently lay claim to have put them to the proof of successive trial, and see how common it is for them to be in direct conflict with each other, and for one to overthrow what another asserts to have been established on the firmest foundations of experience, to be convinced that practice has its uncertainties as well as science. A hundred practical men will earnestly advocate a mode of agriculture which they have proved, by the demonstration of experiment, to be the best mode in the world, which a hundred other men, as experienced and wise as they, will in the same manner make it clear is of no value at all. If science and practice often disagree, neither does practice agree with practice. Practical men have no right to throw this imputation on science until they have wiped the reproach from themselves. If all the theologians of the United States were convened in one place to discuss their points of faith, and all the agriculturists to discuss their points of practice, I doubt whether it would not come out that there was nearly as much disagreement in the one assembly as in the other. This I confess to be a strong assertion. How much do practical men differ about the disease of the potato? There have been as many theories about the source of that extensive malady as have been broached respecting original sin; and what one recommends as an infallible specific, another declares, on the faith and knowledge of a practical man, to be inert and powerless. One objection to agricultural schools, which some assert with much confidence, is, that they will afford their advantages to but a portion of the people—they will not be democratic and diffusive enough in their influence, and while a few will be gathered within their walls to reap their fruits, the great mass of the people will be left unprovided for and unbenefited. In reply to this, it may be said that the number of schools of this description will be limited only by the patronage which the public are willing to afford them. They may be multiplied to as great a number as the demands of the people require, and if all the agricultural class choose to enjoy the advantages of such institutions, they can provide themselves accordingly. The additional profit which they would soon be the means of conferring on tillage would afford the amplest means to erect and sustain them in sufficient numbers to meet all the wants of the community. But it is not to be expected, for the present at least, that any more than a portion of the agriculturists will feel an inclination to participate in the superior benefits of such establishments. Nevertheless, the whole mass of the people will be as really profited by comparatively few schools as though they were multiplied to a sufficient number to include every individual within their limits. Every part of the country will be represented by those who resort to them; and when they have completed their course of preparation, and retire to their respective homes to enter upon the pursuits which they have chosen, they will exhibit an example of correct and successful tillage which will excite curiosity, attract imitation, and raise the standard of agriculture in all their vicinities. Their new methods of cultivation, their communications with those around them, will stimulate inquiry, gradually diffuse correct and useful ideas, and extend the influence of the school in every part of the community. It is probable, also, that a multitude of useful publications will issue from the pens of those who are devoted to teaching agricultural science, which, popular in their form, will have extensive circulation; and thus, in one form or another, there will emanate from these institutions an influence which shall penetrate among the masses, and beneficially reach thousands who have never placed themselves within the sphere of their immediate operation. They will be so many lights, which will shed their rays not only upon those who are brought into immediate contact, but diffuse their beams abroad, illuminating remote places, finding their way into obscure recesses, and, in a thousand forms of direct emanation, and reflection, and refraction, pouring out their splendor to the utmost limits of the horizon.

3. Another advantage is, that they will give new attraction to agriculture as an employment. I have alluded to a class of young men who seek what they think to be a more elevated pursuit than the tillage of the field. They have an ambition of rising in life, and they very naturally conclude that the further they get from the ground the higher they fly. Those who unite a thirst for knowledge with aspiring views, and some who do not, are inclined to betake themselves to the university; and the door which admits them within its walls shuts out the vulgar toils of the field forever. It is a common observation, that the dullest boy in the family is selected to follow the father's pursuits on the ancestral grounds; while the one which appears most vivacious and active is singled out for the college, or some more tasteful, supposed dignified, vocation. Now, let the road to the best-conducted agriculture be through a scientific institution; let classes of youth go out annually from the tuition of learned instructors, versed in those sciences which are connected with the culture of the earth; let them enter upon the business of farming as young men enter the professions after graduation at the college, and it would contribute much to raise agriculture to that position which it ought to hold among the other vocations of life; and many who are now a burden to the professions, and are wrecked in the fluctuations of merchandise and commerce, would be found pursuing a safe, happy, and useful course of life. President Hitchcock saw, in

some of the agricultural schools which he visited in Europe, young men from families distinguished by their opulence and position in life habited in frocks, and performing cheerfully some of the most coarse and uncleanly labors connected with the establishment. Perhaps these individuals were drawn thither by the dignified associations which, in their view, science and education had thrown around their employments, and, in other circumstances, would have disdained such menial offices, as they would deem them, and have crowded into more elevated and congenial pursuits. Another desirable effect would follow: When commercial men in our large cities have acquired opulent fortunes, and are possessed of taste and fondness for display, they seek often to gratify their inclinations in costly equipages, works of art, and magnificent architecture. There is no objection to such expenditure when properly directed and bounded by reasonable limits. When men of great means divert a portion of their resources to the patronage of the arts, of statuary, and painting, and other products of genius and taste, they are devoting wealth to some of its noblest uses; they are counteracting the tendency which a close application to commercial occupations has to foster contracted and sordid propensities; they are imparting refinement and elevation to their own feelings, and contributing to diffuse, through a community sufficiently devoted to the love of gain, a healthful and liberalizing influence. But the taste for fine arts and magnificent display may become excessive and misdirected.

If some men of wealth, who now expend a hundred thousand dollars on the erection and fitting-up of a dwelling, would limit the outlay to fifty thousand, and reserve the remaining half to purchase some unproductive and waste land, whose tillage is too difficult and costly for persons of small means to undertake, on which to gratify their taste, and cover it with the beauty of a luxuriant and ornamental vegetation, they would contribute to the promotion of agricultural improvement, and at the same time indulge a taste as much nobler than that which they gratify now as the beauties of Nature transcend those of human device. Why is not a fine landscape as worthy an object of admiration as the painting which exhibits its imitation to the eye?—and why has not the Divine skill, which exhibits its wonders in the exquisite structure of plants, and the ornaments with which it gilds the flowers of the field, and the rich forms and foliage with which it invests the trees, as high claims to the homage of taste, and the expenditure of resources, as the art which hews the rock into the resemblance of the human form, but can confer no life to utter its expression through the rigid features? To a person whose susceptibilities of gratification are directed by right principles, the process by which a sterile and uninviting surface is converted into a rich and waving field, which causes the wilderness to blossom, and turns the foul morass into a smooth and verdant lawn, conveys as much pleasure as that which causes palaces to spring out of the rough stones of the quarry. There are those whose well-directed sentiments lead them in this direction; and the land which they have subdued to tillage, and adorned with loveliness, whilst it has been a noble monument to their taste and magnificence, has excited emulation, diffused more correct and useful ideas, and has been a subject of study and improvement to surrounding admirers. Some opulent men, of extensive information and liberal views, have, by their intelligent and advanced modes of cultivation, conferred immense benefit on a large region. The spot which they have selected as the subject of their operations, and upon which they have bestowed their successful skill, has been a school of instruction to a whole community. In proportion as farming assumes a higher rank, and becomes invested with new attractions, such instances will be multiplied; and we shall see those splendid monuments of wealth and intelligence adorning the surface of the country.

Mr. Webster might have expended the funds which he has devoted to his farm of fifteen hundred acres at Marshfield to the erection of a splendid mansion in Boston. But the farm is a nobler monument to his republican and old Roman taste than would be a palace in the metropolis whose architecture should surpass all Grecian fame.

Lastly. As a necessary consequence, farming would become more productive and profitable, particularly in the old parts of the country.

I have alluded to the influence of slavery in this country in producing a constant deterioration of the soil. But the land has become much exhausted in the free States also. If, as it is confidently asserted, a thousand millions of dollars are required to repair the effect of injudicious and wasting culture, and to restore the lands to their original fertility, it is high time that an improved system should be introduced. Be it remembered that this deterioration has arrived at its present point under the labors of practical farmers, so called—those men of whom it has been said that they possess all the knowledge which is of any value to field culture. If the only valuable knowledge which we possess on this subject produces no better effects than these, then may we expect that the older regions of the country will cease to remunerate the cultivators, the rural districts of New England will become a wilderness and be abandoned to perpetual sterility, and the plodding labor which has drawn out the fine gold from her bald hills will be exchanged for a search after the dross of the California mountains. But the evil admits of a remedy. The downward process can be arrested and stopped at the point which it has reached. It is only for the community to awake to the nature and responsibilities of the crisis, and comprehend the right source of relief. It is only for the national and State governments to extend, in suitable ways, their fostering and efficient care to this great interest of the country, and aid in bringing the lights of profound research to the guidance of agricultural labor, and the same science which directs the track of the mariner in remote seas, and almost communicates the power of thought to the ponderous and ingenious machinery that executes the labors of millions of human hands, which has brought the poles of the earth together by rapidity of motion, and transmits ideas on the wires of lightning along nerves of steel, will cause vegetation to spring from arid sand, and convert the wilderness into a fruitful field, and that field into the garden of the Lord. Massachusetts has always been distinguished for that wise and liberal care which she has taken to develop the internal resources of the State and promote her prosperity. It is most earnestly to be hoped that she will not overlook that interest which constitutes the source and strength of all others—that contributes to the support and comfort of her citizens, and that the next legislature will give the crowning grace to all former splendid achievements, and respond to the loud voice which resounds from her remote borders, by lending its mighty aid to a system of agricultural education. You are assembled,

gentlemen, on another anniversary, with no signs of abatement in the interest which has attended former occasions. On this beautiful autumnal day, at the close of a favorable agricultural season, amidst the crowds which have come from all quarters of old Essex to exhibit their interest in your objects and proceedings, surrounded with the noblest specimens of industry and skill, you are prepared to render thanks to Him who has given the earth its fertility, rewards the labor of the husbandman, and has declared that seed time and harvest shall never fail. It is fit that, amidst these scenes of interest and congratulation, we should remember the dead. You miss one* from your assembly and counsels, who has long been a zealous and able coadjutor in your worthy object, and has given his most earnest thoughts and devotion to secure its highest prosperity. His wise and useful labors have been withdrawn from the interest which he loved so well, and whose magnitude he appreciated in its just light. You can show no higher honor to the dead than to promote, with undiminished zeal, that most noble enterprise to which he consecrated so much of his living energies. May all public and private duties be performed with such pure motives and faithful assiduity as to secure the gracious approbation of the Lord of the harvest and the Judge of the world!

PLAN FOR AN INDUSTRIAL UNIVERSITY.

BY PROF. J. B. TURNER, JACKSONVILLE, ILL.

There should be connected with such an institution, in this State, [Illinois,] a sufficient quantity of land, of variable soil and aspect, for all its needful annual experiments and processes in the great interests of agriculture and horticulture.

Buildings of appropriate size and construction for all its ordinary and special uses; a complete philosophical, chemical, anatomical, and industrial apparatus; a general cabinet, embracing everything that relates to, illustrates, or facilitates any one of, the industrial arts; especially all sorts of animals, birds, reptiles, insects, trees, shrubs, and plants found in this State and the adjacent States.

Instruction should be constantly given in the anatomy and physiology, the nature, instincts, and habits of all animals, insects, trees, and plants; their laws of propagation, primogeniture, growth and decay, disease and health, life and death; on the nature, composition, adaptation, and regeneration of soils; on the nature, strength, durability, preservation, perfection, composition, cost, use, and manufacture of all materials of art and trade; on political, financial, domestic, and manual economy, (or the saving of labor of the hand,) in all industrial processes; on the true principles of national, contitutional, and civil law; on the true theory and art of governing and controlling, or directing the labor of men in the State, the family, shop, and farm; on the laws of vicinage, of the laws

* Hon. Asa T. Newman, of Lynnfield, late a vice president of the Society.

of courtesy and comity between neighbors as such; and on the principles of health and disease in the human subject, so far, at least, as is needful for household safety; on the laws of trade and commerce, ethical, conventional and practical; on book-keeping and accounts; and, in short, in all those studies and sciences, of whatever sort, which tend to throw light upon any art or employment which any student may desire to master; or upon any duty he may be called to perform, or which may tend to secure his moral, civil, social, and industrial perfection, as a man.

No species of knowledge should be excluded, practical or theoretical; unless, indeed, those specimens of "organized ignorance," found in the creed of party politicians and sectarian ecclesiastics, should be mistaken by some for a species of knowledge.

Whether a distinct classical department should be added, or not, would depend on expediency. It might be deemed best to leave that department to existing colleges, as their more appropriate work, and to form some practical and economical connexion with them for that purpose; or it might be best to attach a classical department, in due time, to the institution itself.

To facilitate the increase and practical application and diffusion of knowledge, the professors should conduct, each in his own department, a continued series of *annual experiments*.

For example: let twenty or more acres of each variety of grain (each accurately measured) be annually sown, with some practical variation on each acre as regards the quality and preparation of the soil; the kind and quantity of seed; the time and mode of sowing or planting; the time, and modes, and processes of cultivation and harvesting, and an accurate account kept of all costs, labor, &c., and of the final results. Let analogous experiments be tried on all the varied products of the farm, the fruit-yard, the nursery, and the garden; on all modes of crossing, rearing, and fattening domestic animals, under various degrees of warmth and of light; with and without shelter; on green, dry, raw, ground, and cooked food, cold and warm; on the nature, causes, and cure of their various diseases, both of those on the premises and of those brought in from abroad; and advice given, and annual reports made on those and all similar topics. Let the professors of physiology and entomology be ever abroad at the proper seasons, with the needful apparatus for seeing all things visible and invisible, and scrutinizing the latent causes of all those blights, blasts, rots, rusts, and mildews which so often destroy the choicest products of industry, and thereby impair the health, wealth, and comfort of millions of our fellow-men. Let the professor of chemistry carefully analyze the various soils and products of the State, retain specimens, give instruction, and report on their various qualities, adaptations, and deficiencies.

Let similar experiments be made in all other interests of agriculture, and mechanic or chemical art, mining, merchandise, and transportation by water and by land, and daily practical and experimental instruction given to each student in attendance, in his own chosen sphere of research or labor in life. Especially let the comparative merits of all labor-saving tools, instruments, machines, engines, and processes be thoroughly and practically tested and explained, so that their benefits might be at once enjoyed, or the expense of their cost avoided by the unskilful and unwary.

It is believed by many intelligent men that from one-third to one-half the annual products of this State are annually lost from ignorance on the above topics. And it can scarcely be doubted that in a few years the entire cost of the whole institution would be annually saved to the State in the above interests alone, aside from all its other benefits, intellectual, moral, social, and pecuniary.

The apparatus required for such a work is obvious. There should be grounds devoted to a botanical and common garden; to orchards and fruit-yards; to appropriate lawns and promenades, in which the beautiful art of landscape gardening could be appropriately applied and illustrated; to all varieties of pasture, meadow, and tillage needful for the successful prosecution of the necessary annual experiments. And on these grounds should be collected and exhibited a sample of every variety of domestic animal, and of every tree, plant, and vegetable that can minister to the health, wealth, or taste and comfort of the people of the State; their nature, habits, merits, production, improvement, culture, diseases, and accidents, thoroughly scrutinized, tested, and made known to the students, and to the people of the State.

There should also be erected a sufficient number of buildings and out-buildings for all the purposes above indicated, and a repository, in which all the ordinary tools and implements of the institution should be kept, and models of all other useful implements and machines from time to time collected, and tested, as they are proffered to public use. At first it would be for the interest of inventors and venders to make such deposites. But, should similar institutions be adopted in other States, the general government ought to create in each State a general patent office, attached to the universities, similar to the existing deposites at Washington; thus rendering this department of mechanical art and skill more accessible to the great mass of the people of the Union.

I should have said, also, that a suitable industrial library should be at once procured, did not all the world know such a thing to be impossible, and that one of the first and most important duties of the professors of such institutions will be to begin to create, at this late hour, a proper practical literature, and series of text-books for the industrial classes.

As regards the professors, they should, of course, not only be men of the most eminent practical ability in their several departments, but their connexion with the institution should be rendered so fixed and stable as to enable them to carry through such designs as they may form, or all the peculiar benefits of the system would be lost.

Instruction, by lectures and otherwise, should be given mostly in the colder months of the year, leaving the professors to prosecute their investigations, and the students their necessary labor, either at home or on the premises, during the warmer months.

The institution should be open to all classes of students above a fixed age, and for any length of time, whether three months or seven years, and each taught in those peculiar branches of art which he wishes to pursue, and to any extent, more or less. And all should pay their tuition and board bills, in whole or in part, either in money or necessary work on the premises—regard being had to the ability of each.

Among those who labor, medals and testimonials of merit should be given to those who perform their tasks with most promptitude, energy, care, and skill; and all who prove indolent or ungovernable excluded at first from all part in labor, and speedily, if not thoroughly, reformed from the institution itself; and here again let the law of nature, instead of the law of rakes and dandies, be regarded, and the true impression ever made on the mind of all around—that WORK ALONE IS HONORABLE, and indolence certain disgrace, if not ruin.

At some convenient season of the year, the commencement, or annual fair of the university, should be held through a succession of days. On this occasion the doors of the institution, with all its treasures of art and resources of knowledge, should be thrown open to all classes, and as many other objects of agricultural or mechanical skill, gathered from the whole State, as possible, and presented by the people for inspection and premium on the best of each kind; judgment being rendered, in all cases, by a committee wholly disconnected with the institution. On this occasion all the professors, and as many of the pupils as are sufficiently advanced, should be constantly engaged in lecturing and explaining the divers objects and interests of their departments. In short, this occasion should be made the great annual gala day of the institution, and of all the industrial classes, and all other classes in the State, for the exhibition of their products and their skill, and for the vigorous and powerful diffusion of practical knowledge in their ranks, and a more intense enthusiasm in its extension and pursuit.

As matters now are, the world has never adopted any efficient means for the application and diffusion of even the practical knowledge which does exist. True, we have fairly got the primer, the spelling-book, and the newspaper abroad in the world, and we think that we have done wonders; and so, comparatively, we have. But if this is a wonder, there are still not only wonders, but, to most minds, inconceivable miracles, from new and unknown worlds of light, soon to break forth upon the industrial mind of the world.

Here, then, is a general, though very incomplete, outline of what such an institution should endeavor to become. Let the reader contemplate it as it will appear when generations have perfected it, in all its magnificence and glory; in its means of good to man—to *all men of all classes;* in its power to evolve and diffuse practical knowledge and skill, true taste, love of industry, and sound morality—not only through its apparatus, experiments, instructions, and annual lectures and reports, but through its thousands of graduates in every pursuit in life, teaching and lecturing in all our towns and villages—and then let him seriously ask himself, is not such an object worthy of at least an effort, and worthy of a State which God himself, in the very act of creation, designed to be the first agricultural and commercial State on the face of the globe?

Who should set the world so glorious an example of educating their sons worthily of their heritage, their duty, and their destiny, if not the people of such a State? In our country we have no aristocracy, with the inalienable wealth of ages, and constant leisure and means to perform all manner of useful experiments for their own amusement; but we must create our nobility for this purpose, as we elect our rulers, from our own ranks, to aid and serve, not to domineer over and control us. And this done, we will not only beat England, and beat the world, in yachts, and locks, and reapers, but in all else that contributes to the well-being and true glory of man.

I maintain that, if every farmer's and mechanic's son in this State could now visit such an institution but for a single day in the year, it would do him more good in arousing and directing the dormant energies of mind than all the cost incurred, and far more good than many a six months of professed study of things he never need and never wants to know.

As things now are, our best farmers and mechanics, by their own native force of mind, by the slow process of individual experience, come to know at forty what they might have been taught in six months at twenty; while a still greater number of the less fortunate or less gifted stumble on through life almost as ignorant of every true principle of their art as when they begun. A man of real skill is amazed at the slovenly ignorance and waste he everywhere discovers on all parts of their premises; and still more to hear them boast of their ignorance of all "book farming," and maintain that "their children can do as well as they have done;" and it certainly would be a great pity if they could not.

The patrons of our university would be found in the former, not in the latter class. The man whose highest conception of earthly bliss is a log hut in an unenclosed yard, where pigs of two species are allowed equal rights, unless the four-legged tribe chance to get the upper hand, will be found no patron of industrial universities. Why should he be? He knows it all already.

There is another class of untaught farmers who devote all their capital and hired labored to the culture, on a large scale, of some single product which always pays well when so produced on a fresh soil, even in the most unskilful hands. Now, such men often increase rapidly in wealth, but it is not by their skill in agriculture, for they have none; their skill consists in the management of capital and labor; and deprive them of these, and confine them to the varied culture of a small farm, and they would starve in five years where a true farmer would amass a small fortune. This class are, however, generally the fast friends of education, though many a looker-on will cite them as instances of the uselessness of acquired skill in farming; whereas they should cite them only as a sample of the resistless power of capital even in comparatively unskilful hands.

Such institutions are the only possible remedy for a caste education, legislation, and literature. If any one class provide for their own liberal education in the State, as they should do, while another class neglect this, it is as inevitable as the law of gravitation that they should form a ruling caste or class by themselves, and wield their power more or less for their own exclusive interests and the interests of their friends.

If the industrial were the only educated class in the State, the caste power in their hands would be as much stronger than it now is as their numbers are greater. But now industrial education has been wholly neglected, and the various industrial classes left still ignorant of matters of the greatest moment pertaining to their vital interests; while the professions have been studied till trifles and fooleries have been magnified into matters of immense importance, and tornadoes of windy words and barrels of innocent ink shed over them in vain.

This, too, is the inevitable result of trying to crowd all liberal, practical education into one narrow sphere of human life. It crowds their ranks with men totally unfit by nature for professional service. Many of these, under a more congenial culture, might have become, instead of the starving scavengers of a learned profession, the honored members of an industrial one. Their love of knowledge was indeed amiable and highly commendable; but the necessity which drove them from their natural sphere in life in order to obtain it is truly deplorable.

But such a system of general education as we now propose would, in ways too numerous now to mention, tend to increase the respectability, power, numbers, and resources of the true professional class.

Nor are the advantages of the mental and moral discipline of the student to be overlooked; indeed, I should have set them down as most important of all had I not been distinctly aware that such an opinion is a most deadly heresy; and I tremble at the thought of being arraigned before the tribunal of all the monks and ecclesiastics of the Old World, and no small number of their progeny in the New.

It is deemed highly important that all in the professional classes should become writers and talkers; hence they are so incessantly drilled in all the forms of language, dead and living, though it has become quite doubtful whether, even in their case, such a course is most beneficial, except in the single case of the professors of literature and theology, with whom these languages form the foundation of their professions and the indispensable instruments of their future art in life.

No inconsiderable share, however, of the mental discipline that is attributed to this peculiar course of duty arises from daily intercourse, for years, with minds of the first order in their teachers and comrades, and would be produced under any other course if the parties had remained harmoniously together. On the other hand, a classical teacher, who has no original, spontaneous power of thought, and knows nothing but Latin and Greek, however perfectly, is enough to stultify a whole generation of boys, and make them all pedantic fools like himself. The idea of infusing mind, or creating, or even materially increasing it by the daily inculcation of unintelligible words—all this awful wringing to get blood out of a turnip—will, at any rate, never succeed except in the hands of the eminently wise and prudent, who have had long experience in the process; the plain, blunt sense of the unsophisticated will never realize cost in the operation. There are, moreover, probably, few men who do not already talk more, in proportion to what they really know, than they ought to. This chronic diarrhœa of exhortation, which the social atmosphere of the age tends to engender, tends far less to public health than many suppose. The history of the Quakers shows that more sound sense, a purer morality, and a more elevated practical piety can exist, and do exist, entirely without it, than is commonly with it.

At all events, we find, as society becomes less conservative and pedantic, and more truly and practically enlightened, a growing tendency of all other classes, except the literary and clerical, to omit this supposed linguistic discipline, and apply themselves directly to the more immediate duties of their calling; and, aside from some little inconvenience at first, in being outside of caste, that they do not succeed quite as well in advancing their own interests in life, and the true interests of society, there is no sufficient proof.

Indeed, I think the exclusive and extravagant claims set up for ancient lore, as a means of disciplining the reasoning powers, simply ridiculous when examined in the light of those ancient worthies who produced that literature, or the modern ones who have been most devoted to its pursuit, in this country and in Europe. If it produces infallible practicable reasoners, we have a great many thousand infallible antagonistic truths, and ten thousand conflicting paths of right, interest, duty, and salvation. If any man will just be at the trouble to open his eyes and his ears, he can perceive at a glance how much this evasive discipline really does, and has done, for the reasoning faculty of man, and how much for the power of sophistical cant, and stereotyped nonsense; so that, if obvious facts, instead of verbose declamation, are to have any weight in the case, I am willing to join issue with the opposers of the proposed scheme, even on the bare ground of its superior adaptation to develop the mental powers of its pupils.

The most natural and effectual mental discipline possible for any man arises from setting him to earnest and constant thought about the things he daily does, sees, and handles, and all their connected relations and interests. The final object to be attained with the industrial class is to make them *thinking laborers;* while of the professional class we should desire to make *laborious thinkers*—the production of goods, to feed and adorn the body, being the final end of one class of pursuits; and the production of thought, to do the same for the mind, the end of the other. But neither mind nor body can feed on the offals of preceding generations. And this constantly-recurring necessity of reproduction leaves an equally honorable, though somewhat different, career of labor and duty open to both; and, it is readily admitted, should and must vary their modes of education and preparation accordingly.

It may do for the man of books to plunge at once amid the catacombs of buried nations and languages, to soar away to Greece or Rome, or Nova-Zembla, Kamschatka, and the fixed stars, before he knows how to plant his own beans, or harness his own horse, or can tell whether the functions of his own body are performed by a heart, stomach, and lungs, or with a gizzard and gills.

But for the man of work thus to bolt away at once from himself and all his pursuits in after-life, contravenes the plainest principles of nature and common sense. No wonder such educators have ever deemed the liberal culture of the industrial classes an impossibility, for they have never tried, nor even conceived of, any other way of educating them, except that by which they are rendered totally unfit for their several callings in after-life. How absurd would it seem to set a clergyman to ploughing and studying the depredations of blights, insects, the growing of crops, &c., &c., in order to give him habits of thought and mental discipline for the pulpit! Yet this is not half as ridiculous, in reality, as the reverse absurdity of attemping to educate the man of work in unknown tongues, abstract problems and theories, and metaphysical figments and quibbles.

Some, doubtless, will regard the themes of such a course of education as too sensuous and gross to be at the basis of a pure and elevated mental culture. But the themes themselves cover all possible knowledge of all modes and phases of science, abstract, mixed, and practical. In short, the field embraces all that God has made, and all that human art has done; and if the created universe of God, and the highest art of man, are too gross for our refined uses, it is a pity the "morning stars and the sons of God" did not find it out as soon as the blunder was made. But, in my opinion, these topics are of quite as much consequence to the well-being of man, and the healthful development of mind, as the concoction of the final nostrum in medicine, or the ultimate figment in theology and law, or conjectures about the galaxy or the Greek accent; unless, indeed, the pedantic professional trifles of one man in a thousand are of more consequence than the daily vital interests of all the rest of mankind.

But can such an institution be created and endowed? Doubtless it can be done, and done at once, if the industrial classes so decide. The fund given to this State by the general government, expressly for this purpose, is amply sufficient, without a dollar from any other source; and it is a mean, if not an illegal, perversion of this fund to use it for any other purpose. It was given to the people, the whole people of this State—not for a class, a party, or sect, or conglomeration of sects; not for common schools, or family schools, or classical schools; but for "a university," or seminary of a high order, in which should, of course, be taught all those things which every class of citizens most desire to learn—their own duty and business for life. This, and this alone, is a university in the true, original sense of the term. And if an institution which teaches all that is needful only for the three professions of law, divinity, and medicine is, therefore, a university, surely one which teaches all that is needful for all the varied professions of human life is far more deserving of the name and the endowments of a university.

COMMON SCHOOLS IN THE UNITED STATES.

There is no subject in which the American people have a deeper interest than in *common schools.* Believing that a few pages of this report cannot be better filled than by statistics and the remarks of eminent citizens relating to common-school education, we give place to the following:

Extract of the annual message of Governor George F. Fort to the Legislature of New Jersey, January 14, 1852.

Prompted, therefore, by the highest impulses of duty by our responsibility to our constituents, and to the cause of human improvement, let us heartily co-operate to place our common-school system on a basis which cannot be shaken, and thereon enact a superstructure of wisdom, learning, and truth—the admiration of the present and succeeding generations, which shall bid defiance to the assaults of ignorance and superstition, and endure as a monument of our successful devotion to the cultivation of the mind.

The proper training of the human intellect is a momentous work. Too much attention cannot be paid to judicious methods of improving it. One great source of unsuccessful tuition is found in the incompetency of teachers in our public schools. This evil, in some sections of the State, has been suffered to exist to a great extent. In the ordinary business of life we require experience and skill in the workman we employ. How much more do we need such qualifications in him whose duty it is to direct the first operations of the juvenile mind, and fit his responsible charge for an active participation in the great concerns of life!

It is questionable, however, whether the demand for competent teachers is not fully equal to the supply. To remedy the evil, it has been proposed to establish one or more normal schools for the scientific training of teachers to the work of teaching. This plan has been adopted in some States, and has been generally approved. Whether a due regard to our immediate wants, our fiscal ability, and the state of public opinion would justify their institution at this time, are questions worthy of due consideration.

Teachers' institutes are not liable to the same objections. Strongly impressed with their necessity, utility, and effectiveness, I have no hesitation in recommending suitable provisions for their encouragement. They would awaken an increased interest in public instruction, and rapidly and effectually diffuse information among teachers in the theory and practice of teaching, and the government and discipline of schools. The young and inexperienced teacher, and he who has grown old in error, would here receive lessons in relation to their duties, derived from the most correct sources, the result of the accumulated wisdom of numbers and years devoted to the science of teaching.

In November last I had the pleasure of being present at a teacher's institute, held at Somerville, in this State. It originated with the enterprising citizens of Somerset, who take a deep interest in educational progress. Gentlemen of eminent attainments in teaching took charge of the institute, which was composed of some *seventy* male and female teachers. The proceedings were interesting and instructive, and imparted much valuable information which could not fail to be beneficial to those engaged in them.

There has never been a period so propitious as the present for further legislative measure to promote *free schools.* I still entertain the views expressed on the occasion of assuming my official duties, in relation to increased distributions from the treasury for that purpose. I would recommend that *the revenue annually derived from our public works be wholly appropriated to the cause of education.* If to this be added the distribution from the school fund, it would, with the interest accruing from the surplus revenue, be sufficient in amount to establish free schools in every district in the State. To supply any deficiency which might exist in any township or district, a small sum, *per capita*, might be imposed for tuition.

Should the judgment of the legislature accord with mine in regard to this matter, it will become necessary to raise an annual tax for the support of the State government. With our increased population, wealth, and resources, an ample revenue for all ordinary purposes might be raised, without producing any sensible increase of the burdens of the people. This mode of meeting the wants of the government would produce greater economy in expenditure, and prevent the squandering of public money in enterprises of doubtful expediency.

II.

CULTIVATION OF SPECIAL CROPS.

CULTIVATION OF BASKET WILLOW IN THE UNITED STATES.

[From Hunt's Merchants' Magazine, Jan., 1852.]

Garrison's Landing,
Putnam county, N. Y., Dec. 4, 1851.

Sir: Knowing something of your knowledge of the commercial affairs of the world, and of your desire to lay before your readers information calculated to benefit them, I have taken the liberty of addressing to you a few remarks touching the growth and cultivation of the ozier or basket willow.

From the best information I can obtain, there are from four to five millions of dollars' worth of willow annually imported into this country from France and Germany.

The price ranges from $1 to $1 30 per ton weight. The quantity imported may appear large, yet it is not sufficient for consumption. In view of this importation, and the large sums expended for willow, would it not be well for some of your wealthy readers and landholders to give a little attention to this subject. Loudon, in his *Arboretum*, (vol. 3,) gives an account and description of one hundred and eighty-three varieties of this plant.

Knowing nothing of botany, I will confine myself exclusively to the three kinds best adapted for basket-making, farming, tanning, and fencing.

The *Salix viminalis* is that specimen of all others best calculated for basket makers. An acre of this, properly planted and cultivated upon suitable soil, will yield at least two tons weight per year, costing about thirty-five dollars per ton for cultivating and preparing for market.

The importers discountenance the idea of cultivating it in this country, alleging as a reason that the flies will seriously damage the crop, and that labor is so high it will never pay.

To this I have to say that I have growing as good a quality of willow as is grown in any part of the world; that, from two acres cut last year, the proceeds, clear of expense, was the snug little sum of $333 75; and if any person requires stronger proof than this of the feasibility of growing willow profitably in this country, I can refer him to John Bevridge, esq., of Newburg, N. Y., and Dr. Charles W. Grant, M. D., of the same place, a practical botanist and thorough-going horticulturist, who has given much time and attention to this subject, and has the best and greatest variety of willow, and the largest quantity planted of any one in the United States. All his stock is imported, and in fine condition for propagating.

The people of England, like us at present, until the year 1808, relied entirely for their supply upon continental Europe. Their supply was cut off by the breaking out of the war between Great Britain and France, so that after that date they were compelled to rely upon their own crops, and many associations in England offered large premiums on the best productions of willow.

The late Duke of Bedford, one of the best farmers and horticulturists of that day, gave much attention to the subject, which is rigorously prosecuted by his son, the present Duke, and brother of Lord John Russell. His grace had one specimen which is extensively planted in and about the Park at Woburn Abbey, Woobùrn, Bedfordshire. In England this plant is highly prized for its beauty, rapidity of growth, outgrowing all other trees, and giving a fine shade in two or three years. This is the *Salix alba*, or Bedford willow. The bark is held in high estimation for tanning; the wood for shoemakers' lasts, boot-trees, cutting-boards, gun and pistol stocks, and house timber; the wood being fine-grained, and susceptible of as fine a polish as rose-wood or mahogany. An acre of this kind of wood ten years old, has sold in England for 155 pounds.

The next species is the Huntington willow, or *Salix capua*, which is also a good basket willow, and is used extensively in England for hoop poles and fencing by the farmers. Their manner of planting, when for fencing, is by placing the ends of the cuttings in the ground, and then working them into a kind of trellis-work, and passing a willow withe around the tops or ends, so as to keep in shape for the first two years. They cut the tops off yearly and sell them to the basket-makers, thus having a fence and crop from the same ground.

Another description of fence is also made from the *Salix capua*, known in England by the name of hurdle fences, which may be removed at the pleasure or discretion of the proprietor.

The *Salix alba* is extensively used by retired tradesmen who build in the country, for the purpose of securing shade in a short time, and by the nobility around their fish-ponds and mill-dams, and along their water-courses and avenues. This is the principal wood used in the manufacture of gunpowder in England.

It has also been asserted by several English noblemen that their fish succeeded much better in ponds surrounded by willow (*Salix alba*) than in waters where other trees were contiguous.

The price of cuttings in England is as follows: one year old, £1; two years old, £2; three years old, £4; four years old, £5 10*s*; five years old, £6 10*s*.

For any kind of willow it requires about twelve thousand cuttings to plant one acre. Cuttings three years old will pay an interest the year after planting of about twenty-five per cent.; the second year of at least fifty; and by the fourth year the crop ought to yield about one and a half ton.

Capitalists are generally contented with an interest of ten per cent. per annum; while here is a business which will pay at least ten times that amount. There are hundreds of thousands of acres of land at present in this country not paying two and a half per cent. per annum, which might be planted with willow, and would yield an immense profit.

The facts stated by me are open to all who may think proper to investigate. We send clocks, corn, flour, shoes, and broom-corn to England, and I can see no reason why we cannot send willow there.

I am fully convinced that willow may be grown profitably in this country at $50 per ton weight. It may be asked and wondered why I do not go extensively into this business myself. The question is easily answered. I have not the capital, but am getting into it as fast as my limited means will permit. If I had the means, I would purchase lands and plant thousands of acres of willow, and find a ready market for it.

In conclusion, I have to say, that I have no cuttings for sale myself, but that I will cheerfully give any reasonable explanation to any inquiries by letter, post-paid.

I am, dear sir, very respectfully, yours, &c.,

WILSON G. HAYNES.

FREEMAN HUNT, Esq.

NORTH CAROLINA GRAPES.

[From the Wilmington (N. C.) Herald, Nov. 10, 1851.]

We received a letter very recently from a gentleman of Fayetteville, propounding certain interrogatories respecting the Isabella, Catawba, and Scuppernong grapes, and, in pursuance of a suggestion therein contained, handed the letter above named to Dr. Togno, a gentleman of extensive research and practical knowledge upon the subject of the grape and its varieties, with the request that he would furnish us with an answer for publication. The Doctor has very kindly complied, and we take pleasure in presenting his communication to our readers. It will be found interesting and explanatory on many points. We must confess, however, our disappointment at the result of his convictions with regard to the origin of the Isabella grape. It appears that he has come to the conclusion that this grape is not a native of this State after all, but a European one, possessing all the characters of such, and none of those of an indigenous production.

This, we believe, runs counter to the general impression and belief prevailing for many years in this State and other sections of the country. The Isabella was always classed, unless we are greatly deceived, among the natural products of our soil; and we confess we are loth, at this late date, to yield up a point which robs North Carolina of the maternity of this delightful fruit. So many years have intervened, and authorities lost, that it is almost impossible at this time to arrive at a certain conclusion; it is at best a matter of probabilities and impressions. While, therefore, we do not advance our own opinion in opposition to that of scientific gentlemen like Drs. McRee and Togno, we are free to acknowledge that, in the absence of more conclusive proof, we prefer remaining under our original belief. The question has been narrowed down to two points—the Isabella is either a North Carolina or a foreign production; no other State can lay claim to it. We therefore trust that northern writers will hereafter remember this fact, and not locate this vine at different points in the Union, as heretofore. As a not unfitting sequence to the above, and while we are discoursing upon grapes, and the purposes to which they are employed, we may state that a bottle of wine made in the adjoining county of Columbus, from the ordinary fox-grape, as it is called, (a small grape in clusters growing in great luxuriance in the woods,) has been sent to our office. On a trial we found it mild and pleasant; it has an agreeable taste, a light body, and is free from intoxicating effect. Our donor designs the experiment of age upon its quality, and to ascertain hereafter if it retains its original taste, it having been intimated that it would not. For our own part we do not see why good wines should not be made in this State, and become in time a profitable pursuit. Certainly we wish our esteemed friend, Dr. Togno, a full realization of his hopes, and a lucrative return for his labors at Diccoteaux, which presents, in its improved cultivation now, a striking contrast to its original wildness and unfruitfulness.

DICCOTEAUX, *November* 1, 1851.

DEAR SIR: In answer to the letter of your friend, Mr. J. M. Rose, of Fayetteville, North Carolina, communicated to me this day by you, I may briefly state, for his edification and his Ohio friend, that his queries are as many historical problems, not easily settled, owing to the blunders and confusion worse confounded of the writers in the various northern periodicals that have taken upon themselves to solve this moot-point—

> "Who, if they once grow fond of an opinion,
> They call it honor, honesty, and faith,
> And sooner part with life than let it go."—*Rowe.*

There is no doubt that the Skoupernong (Indian Sweet Water) is a native of the eastern portion of the State of North Carolina, and it is found wild in this region, as well as a purple variety commonly called with us Bullus. The Catawba, as its name designates, is also a native of this State, and it is to this day to be found wild on the Catawba river, in Lincoln county, and all over that neighborhood. I believe that it is from this locality that Mr. Adlum first obtained it in 1820, or thereabouts, and successfully cultivated it near Georgetown, D. C.

Mr. N. Longworth, of Cincinnati, in a letter to me, states of his having obtained the Catawba, that he now so successfully and profitably cultivates in that locality, from Mr. Adlum. I obtained last winter from Senator Hanks, of Lincoln county, cuttings of the "Lincoln grape," which, from the appearance of the wood, is neither more nor less than a synonym for the Catawba.

The history of the so-called "Isabella grape" is not so easily compassed, owing to diversity of opinion. I have taken great trouble to investigate its history, and, as yet, I have only obtained some links of this broken chain. And, first, is the "Isabella" a native or a foreign grape? Dr. James F. McRee, of this place, whose high scientific attainments and observations in the natural sciences impart to his opinion and statement of facts great certainty, and his testimony is entitled to great weight in settling this first question. He states that he distinctly remembers, as far back as 1810, when the Laspeyre grape (the *Isabella* of William Prince) was sold in the market of Wilmington by Mr. Laspeyre, who cultivated it in Bladen county, and that he perfectly remembers that Mr. Laspeyre had stated it to be a European variety, and not only sold it as such, but it was never doubted by Dr. McRee and others that the vine had all the characters of a European variety; and, what makes it still more certain, is, that even in this congenial climate it frequently rots, and did rot with the first cultivator of it. Mr. N. Longworth has entered the same complaint against it to me. Dr. McRee states also that he heard, as early as he can remember, that the said grape had been imported by Mr. Laspeyre, and that a Catalonian, having seen the grape here, claimed it as being a grape common in Spain, his native country. Of course Dr. McRee has never considered the grape an indigenous one, but a European, possessing, as it does, all the characters of a European grape and none of our native grapes. This is also my own conviction. In the whole of this neighborhood the said grape is to be found in gardens, and everywhere its origin is referred to the liberal distribution of cuttings by Mr. Laspeyre; so that Mr. Laspeyre must have planted his grape-vines at east five years before he brought to this market his grapes from Bladen county. This would carry us back to 1805, a period far anterior to all the dates of the supposed cultivation of the "*Isabella*" mentioned by Mr. Allen in Mr. Downing's "Horticulturist."

These northern writers, doubting not, on a superficial examination of the case at many hundred miles distance from the scene, have undertaken to settle for the good people of the State of North Carolina that which, even *here* on the spot, has required the most assiduous diligence to ferret out the facts in the case; and even then, prudence and caution have caused me to be very circumspect how I come to a conclusion. So much for this point. Now for the history of the so-called "*Isabella*" grape:

On the authority and positive statement of Mr. R. W. Gibbs, son of Mr. R. Gibbs of this place, and nephew of Col. Geo. Gibbs, after whose wife (Mrs. Isabella Gibbs) the "Isabella" grape was named by Wm. Prince, he states that his father, Mr. R. Gibbs, at the time he purchased Woodford plantation on Cape Fear river, in Brunswick county, N. C., found a vine planted in the garden by the previous owner, which vine was taken up, root and branch, some time between 1810 and 1813, (he cannot positively say, but he knows that it must be at this time, as we shall soon see,) and sent to Col. Geo. Gibbs, who was then a merchant in New York, and who resided at Brooklyn, in whose garden he planted it. Soon after, (1815,) the narrator, Mr. R. W. Gibbs, then a boy, was sent to school at Brooklyn, and resided with his uncle two and a half years, and found the vine there in a flourishing condition, and he helped to take care of it every winter by laying it down and covering it with earth, &c. When General Swift inhabited the same house he still found the vine in the garden, and it is there that Mr. Wm. Prince first saw the vine, and named and propagated it, as he himself has published. So far so good; but still the identity of the stock sent to Brooklyn and the Laspeyre grape is not completely made out, except in their general resemblance and habits; and the still greater reason of their identity is, that the "*Isabella*" had its origin in a county where the Laspeyre grape was in very great repute, and was very generally cultivated at that time.

Comte Odart, in his celebrated work on the description and classification of the known grape vines in the world, alluding to the "Isabella," says: "Although the presidents of several vineyardist congresses have called it excellent, and have recommended its cultivation, and though the Marquis Ridolfi, a distinguished agriculturist and director of an agricultural institute in Tuscany, has praised its supposed advantages, I still unite with many French vineyardists who think, like myself, that this grape, with a flat and medicinal taste, is good for nothing, neither for making wine nor for the table. However, we cannot deny to it the advantage of being pretty productive.

"But here is one more recommendable—we mean the Katawba, which is easily known by its berries, very slightly red; and its taste has a peculiar and agreeable flavor, slightly vinous. In this respect it is much preferable to the 'Isabella,' which has been brought from the same country.

"The Katawba has appeared to me rather unproductive, and its grapes do not reach so easily their maturity as those of the stocks of this chapter, though it blooms first. Its bunches, slightly elongated, are rather fine, and keep a long time; the berries are covered with bloom, which deadens its red color; they are big, round, and well-spaced. Its wood is of a uniform reddish-brown color; its leaves large, round, curling under, and their under surface is cottony, which imparts to it a white color."

Be it as it may, one of two things of this dilemma must be true; and this is an important conclusion in either case, namely: that, if we suppose it a European variety, it goes to prove that some kinds of European vines can be acclimated and naturalized in this country. If, on the other hand, we consider the Isabella to have originated from one of our native vines, its present improved condition gives great hope of being able to improve our native stocks by long-continued and careful cultivation. I do not come to this conclusion from one or two isolated facts, but from the positive knowledge of eye witnesses and undeniable documents. A solitary fact, here and there, without connexion, would only lead us into error, as was the case with Mr. Allen in the "Horticulturist," noticed by you. It is only by a continuous series and combination of facts that we can positively arrive at the truth of anything. I have tried my best to obtain the candid truth of this case. I am convinced that the related facts are entirely satisfactory.

Your friend,

JOSEPH TOGNO,
Wilmington Vine-Dresser Model School.

MR. BURR.

CAMELINA SATIVA—A NEW OIL PLANT.

This is a curious plant, usually enumerated among our indigenous plants, though—as it does not long propagate itself with us spontaneously, and is found only in cultivated fields, chiefly among flax, with whose seeds it is often introduced from abroad—there is good ground for presuming that it is not in reality a native.

In some parts of the world it is cultivated for its stems, which yield a fibre applicable for spinning and for its oleiferous seeds. Merat and DeLans say that it is cultivated for these purposes in Flanders.

These seeds are sometimes called sesamum seeds, *(semina Sesami vulgaris,)* but they must not be confounded with the genuine sesamum or teel seeds, the produce of *Sesamum orientale*.

Mr. William Taylor, F. L. S., has recently drawn the attention of agriculturists and others to the *Camelina sativa* as an oil plant, adapted for feeding cattle, and for other purposes. He says that the soils best adapted for its cultivation are those of a light nature; but a crop will never fail on land of the most inferior description. It has been found to flourish this year on barren sandy soils, where no other vegetable would grow; and, independent of the drought, the plants have grown most luxuriantly, yielding a large and certain crop. When grown upon land that has been long in tillage and well farmed, the crop will be most abundant. The best time for putting in the seed is as early as possible in the spring months—say from the middle of March or the middle of April to June, and for autumn sowing in August; and the quantity per acre required fourteen pounds, and may be either drilled or broadcast, but the drilled method should be preferred. If drilled, the rows must be twelve inches apart.

As soon as the plants have grown five or six inches high, a hand or horse-hoe may be used to cut up the weeds between the rows, and no further culture or expense will be required.

If sown early, two crops may frequently be obtained in one year, as it is fit for harvesting in three months after the plant makes its first appearance. Or another important advantage may be obtained: if seed is sown early in March, the crop will be ready to harvest in the beginning of July, and the land fallowed for wheat or spring corn; also, when barley or small seeds cannot be sown sufficiently early, this may be put in with great success. It is a plant that may be cultivated after any corn crop, without doing the least injury to the land, and may be sown with all sorts of clover; the leaves of the gold of pleasure, being particularly small, afford an uninterrupted growth to any plant beneath it; and, the crop being removed early, the clover has time to establish itself.

The grower of this invaluable production is in all seasons secure of his crop, inasmuch as it is not subject to damage by spring frosts, heavy rains, and drought, and, above all, the ravages of insects, more particularly the cabbage-plant louse, *(aphis brassica,)* which so frequently destroys rape, turnips, and others belonging to the cruciferæ order, when coming into blossom. The seed is ripe as soon as the pods change from a green to a gold color. Care must then be taken to cut it before it becomes too ripe, or much seed may be lost. When cut with a sickle, it is bound up in sheaves and shocked in the same manner as wheat. The process of ripening completed, it is stacked, or put in a barn and threshed out like other corn. The expense of these crops cannot be very great either in the preparation and culture of the land or in the management in securing the produce afterwards; but, when grown with care and in good season, the produce will mostly be very abundant, as high as thirty-two bushels and upwards to the acre.

The cultivation of this plant for the seed would repay the farmer. An abundance of chaff would be produced, which would be of infinite service for horses or for manure; but in a grazing country like England, where vast sums are annually expended for foreign oil-cake, the gold of pleasure will soon be found an excellent substitute under manufacture, and consequently a grower would find a good remuneration on cultivating the seed.

The plant may be considered a valuable production of the earth. A fine oil is produced for burning in lamps, in the manufacture of woollen goods, in the manufacture of soaps, for lubricating machinery, and for painters. The oil-cake has been found highly nutritious in the fattening of oxen and sheep, as it contains a great portion of mucilage and

nitrogenous matter, which, combined together, are found very beneficial in developing fat and lean.

From the experiments above related, it is abundantly proved that it does not suffer from the severest frosts, its foliage not being injured. It is not infested by insects, nor does it exhaust the foil. The gold of pleasure has been cultivated by several practical agriculturists, who highly approve of the new plant. For all these reasons, it is to be hoped that every farmer will avail himself of this valuable discovery as a remunerating rotation crop.

Mr. Taylor adds that one acre, cultivated with these plants, yields thirty-two bushels of seed, from which 540 pounds of oil are obtained; so that the camelina seems to exceed the flax in its produce of seed, oil, and cake per acre. The seed is extremely rich in nutriment: I know of no seed superior to it for feeding cattle. The oil obtained by expression is sweet and excellent, especially for purposes of illumination. From the very small quantity of inorganic matter in the seed, it will be evident that the seed cake must be of a very nutritious character, being merely the seed deprived of a portion of its water and oily matter.

We have examined some of the oil obtained from the seeds of the camelina sativa, and which has been recently sent to several medical men by Mr. Taylor, under the belief that it possesses valuable medicinal properties. It is of a yellow color, and smells something like linseed oil. Finding it beneficial in relieving the incessant cough and retching of a cat, Mr. Taylor has extended its use to the human subject, and states that it has done a "world of good," and cured several persons afflicted with diseased lungs and asthma.—*Phar. Journal.*

CULTIVATING FORESTS.

At a recent sitting of the French Academy of Sciences, M. Chevandier developed a portion of the results of five years' study and experiments upon the *manuring of forests,* and the augmentation of their annual yield. This question has an interest in France which can hardly be understood in America, where the difficulty is rather to clear the ground of its woody growth than to stimulate it to greater fruitfulness. M. Chevandier commenced his experiments in 1847, believing it as possible to assist trees in their growth as flowers, grass, and annual plants. Why could not art interfere to restore to the soil the mineral substances withdrawn from it by the roots of the trees, and by them conveyed to their trunks and branches? Because woods spring up of themselves, and appear to flourish without the aid of man, was it not, nevertheless, probable that a system of amelioration of the soil might urge them to a more luxuriant vegetation? The great difficulty in the way of such attempts was the length of time necessary to devote to them. When Franklin wished to convince his fellow-citizens of the good effects of plaster of Paris upon soil deficient in lime, he simply sprinkled in the midst of a meadow a quantity of powdered plaster, tracing several words in huge letters. A few weeks afterwards the lime had sunk into the soil, but the words traced upon the meadow stood out from the rest by the richer color and the double height of the vegetation. But, in order to convince oneself in silviculture that such or such a manure or substance acts favorably or otherwise, study for whole years, and application of the system to a very large extent of land, were indispensable. After five years' steady devotion to this specially, M. Chevandier communicated the substance of his discoveries to the academy. He commenced his experiments by choosing, among the substances that cheapness rendered accessible, such as could restore to the soil the elements of the azote or salt withdrawn from it for the support of the forest. As sources of azote, he employed the salts of ammonium; as sources of mineral substances, he used wood ashes, which contain the whole mineral portion of the wood before its combustion. He also tried lime, the salts of potash and of soda, the phosphate of bone-lime, plaster, and the sulphate of iron; and earthy substances, the residue of factories, of salts of potash and soda, (*oxy-sulphuret of calcium,*) which had already been, and with advantage, tried in the valleys of the Vosges. It would be impossible to transcribe the tabular view drawn up by M. Chevandier, which gives the individual history and the bill of health of 5,530 subjects—pines, cedars, oaks, beeches, larches, &c., &c. I have only room for the general conclusions, which may be divided into four categories:

1st. Substances whose fertilizing action was more or less marked. These were the oxy-sulphuret of calcium, the chlorohydrate of ammonia, plaster of Paris, wood ashes, sulphate of ammonia, lime, non-calcined bones, and proudrette.

2d. Substances whose fertilizing effect was slightly marked or doubtful. These were the carbonate of potash, coagulated blood, calcined bones, an equal mixture of nitrate of potash, non-calcined bones, sulphate of iron, and carbonate of lime, and an equal mixture of nitrate of potash and non-calcined bones.

3d. Substances which seemed to have no effect at all—the carbonate of soda, the nitrate of potash, and sea salt.

4th. Substances which seemed to have had an injurious effect—the sulphate of iron, and equal mixtures of sulphate of iron with lime, or of sulphate of iron with carbonate of lime.

The residuum of soda and potash works, known by the name of the oxy-sulphuret of calcium, generally supposed to be utterly useless, has been proved by M. Chevandier's experiments to be the most wonderful substance ever employed for fertilizing purposes. It augments the growth of forests over 100 per cent. In the neighborhood of soda works there are huge piles of it, the accumulation of years. At Marseilles it is thrown into the sea, while there are, throughout the department, vast pine plantations upon which it might be applied with great advantage.

ON THE TALLOW TREE.

[Communicated by the author in a letter from Ningpo, China, to the Commissioner of Patents.]

Uses of the Stillingia Sebifera, or Tallow Tree, with a notice of the Pe-la, or Insect-wax, of China. By D. J. Macgowan, M. D., Corresponding Member of the Agricultural and Horticultural Society of India.

The botanical characters of this member of the *Euphorbiaceæ* are too well known to require description, but hitherto no accurate account has

been published of its varied uses; and, although it has become a common tree in some parts of India and America, its value is appreciated only in China, where alone its products are properly elaborated.

In the American Encyclopædia, it is stated that this tree is almost naturalized in the maritime parts of South Carolina, and that its capsules and seeds are crushed together and boiled, the fatty matter being skimmed as it rises, hardening when cool.

Dr. Roxburgh, in his excellent *Flora Indica*, says: "It is now very common about Calcutta, where, in the course of a few years, it has become one of the most common trees. It is in flower and fruit most part of the year. In Bengal it is only considered an ornamental tree. The sebaceous produce of its seeds is not in sufficient quantity, nor its quality so valuable as to render it an object worthy of cultivation. It is only in very cold weather that this substance becomes firm; at all other times it is in a thick, brownish, fluid state, and soon becomes rancid. Such is my opinion of the famous vegetable tallow of China."

Dr. Roxburgh was evidently misled in his experiments by pursuing a course similar to that which is described in the Encyclopædia Americana, (and in many other works,) or he would have formed a very different opinion of this curious material. Analytical chemistry shows animal tallow to consist of two proximate principles—*stearine* and *elaine*. Now, what renders the fruit of this tree peculiarly interesting is the fact that both these principles exist in it separately in nearly a pure state. By the above-named process, stearine and elaine are obtained in a *mixed* state, and consequently present the appearance described by Roxburgh.

Nor is the tree prized merely for the stearine and elaine it yields, though these products constitute its chief value; its leaves are employed as a black dye; its wood, being hard and durable, may be easily used for printing-blocks and various other articles; and, finally, the refuse of the nut is employed as fuel and manure.

The *Stillingia sebifera* is chiefly cultivated in the provinces of Kiangsi, Kongnain, and Chehkiang. In some districts near Hangchan, the inhabitants defray all their taxes with its produce. It grows alike on low alluvial plains and on granite hills, on the rich mould at the margin of canals and on the sandy sea-beach. The sandy estuary of Hangchan yields little else. Some of the trees at this place are known to be several hundred years old, and, though prostrated, still send forth branches and bear fruit. Some are made to fall over rivulets, forming convenient bridges. They are seldom planted where anything else can be conveniently cultivated—in detached places, in corners about houses, roads, canals, and fields. Grafting is performed at the close of March or early in April, when the trees are about three inches in diameter, and also when they attain their growth. The *Fragrant Herbal* recommends for trial the practice of an old gardener, who, instead of grafting, preferred breaking the small branches and twigs, taking care not to tear or wound the bark.

In mid-winter, when the nuts are ripe, they are cut off with their twigs by a sharp crescentric knife, attached to the extremity of a long pole, which is held in the hand and pushed upwards against the twigs, removing at the same time such as are fruitless. The capsules are gently pounded in a mortar to loosen the seeds from their shells, from which they are separated by sifting. To facilitate the separation of the white sebaceous matter enveloping the seeds, they are steamed in tubs, having convex open wicker bottoms, placed over caldrons of boiling water. When thoroughly heated, they are reduced to a mash in the mortar, and thence transferred to bamboo sieves, kept at a uniform temperature over hot ashes. A single operation does not suffice to deprive them of all their tallow; the steaming and sifting are therefore repeated. The article thus procured becomes a solid mass on falling through the sieve; and, to purify it, it is melted and formed into cakes for the press. These receive their form in bamboo hoops, a foot in diameter and three inches deep, which are laid on the ground over a little straw. On being filled with the hot liquid, the ends of the straw beneath are drawn up and spread over the top, and, when of sufficient consistence, are placed with their rings in the press. This apparatus, which is of the rudest description, is constructed of two large beams placed horizontally, so as to form a trough capable of containing about fifty of the rings with their sebaceous cakes; at one end it is closed, and at the other it is adapted for receiving wedges, which are successively driven into it by ponderous sledge-hammers wielded by athletic men. The tallow oozes, in a melted state, into a receptacle below, where it cools. It is again melted and poured into tubs smeared with mud to prevent its adhering. It is now marketable, in masses of about eighty pounds each, hard, brittle, white, opaque, tasteless, and without the odor of animal tallow. Under high pressure it scarcely stains bibulous paper; melts at 104° Fahrenheit. It may be regarded as nearly pure stearine; the slight difference is doubtless owing to the admixture of oil expressed from the seed in the process just described. The seeds yield about eight per cent. of tallow, which sells for about five cents per pound.

The process for pressing the oil, which is carried on at the same time, remains to be noticed; it is contained in the *kernel* of the nut, the sebaceous matter, which lies *between* the *shell* and the *husk*, having been removed in the manner described. The kernel, and the husk covering it, is ground between two stones, which are heated to prevent clogging from the sebaceous matter still adhering. The mass is then placed in a winnowing machine precisely like those in use in western countries. The chaff being separated, exposes the white oleaginous kernels, which, after being steamed, are placed in a mill to be mashed. This machine is formed of a circular stone groove, twelve feet in diameter, three inches deep, and about as many wide, into which a thick solid stone wheel, eight feet in diameter, tapering at the edge, is made to revolve perpendicularly by an ox harnessed to the outer end of its axle, the inner turning on a pivot in the centre of the machine. Under this ponderous weight the seeds are reduced to a mealy state, steamed in the tubs, formed into cakes, and pressed by wedges in the manner above described; the process of mashing, steaming, and pressing being repeated with the kernels likewise.

The kernels yield above thirty per cent. of oil. It is called *tsing-yu*, sells for about three cents per pound, answers well for lamps, though inferior for this purpose to some other vegetable oils in use. It is also employed for various purposes in the arts, and has a place in the Chinese Pharmacopœia, because of its quality of changing gray hair black, and other imaginary virtues. The husk which envelopes the kernel, and the shell which encloses them and their sebaceous covering, are used to feed the furnaces, scarcely any other fuel being needed for this purpose. The residuary tallow-cakes are also employed for fuel, as a small quantity of it remains ignited a whole day. It is in great demand for chafing-dishes during the cold season, and, finally, the cakes which remain after the oil has been pressed out are much valued as a manure, particularly for tobacco fields, the soil of which is rapidly impoverished by the Virginian weed.

Artificial illumination in China is generally procured by vegetable oils; but candles are also employed by those who can afford it, and for lanterns. In religious ceremonies no other material is used. As no one ventures out after dark without a lantern, and as the gods cannot be acceptably worshipped without candles, the quantity consumed is very great. With an unimportant exception, the candles are always made of what I beg to designate as vegetable stearine.

When the candles, which are made by dipping, are of the required diameter, they receive a final dip into a mixture of the same material and insect-wax, by which their consistency is preserved in the hottest weather. They are generally colored red, which is done by throwing a minute quantity of alkanet-root (*Anchusa tinctoria*, brought from Shangtung) into the mixture. Verdigris is sometimes employed to dye them green. The wicks are made of rush, coiled round a stem of coarse grass, the lower part of which is slit to receive the *pim* of the candlestick, which is more economical than if put into a socket. Tested in the mode recommended by Count Rumford, these candles compare favorably with those made from spermaceti, but not when the clumsy wick of the Chinese is employed. Stearine candles cost about eight cents the pound.

Prior to the thirteenth century, beeswax was employed as a coating for candles; but about that period the white-wax insect was discovered; since which time that article has been wholly superseded by the more costly but incomparably superior product of this insect. It has been described by Abbé Grossier, Sir George Staunton, and others; but those accounts differ so widely amongst themselves, as well as from that given by native authors, as to render further inquiry desirable. From the description given by Grossier, entomologists have supposed the insect which yields the *pe-la*, or white wax, to be a species of *coccus*. Staunton, on the contrary, describes it as a species of *cicada* (*Flata limbata.*) As described by Chinese writers, however, it is evidently an *apterous* insect; hence the inference either that there are two distinct species which produce white wax, or that the insect Staunton saw was falsely represented as the elaborator of this beautiful material.*

This, like many other interesting questions in the natural history of this portion of the globe, must remain unsolved until restrictions on

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* A few particulars regarding the Himalayah wax-insect, (*Flata limbata*,) by Capt. Hutton, are published in the Journal of the Asiatic Society of Bengal, vol. xii. After alluding to Sir George Staunton's and the Abbe Grossier's account of the wax-yielding insect of China, and to various authorities, Captain Hutton observes: "From all these statements, therefore, we arrive at the positive conclusion, that, as this deposite (the deposite of *F. limbata*) will neither melt on the fire *per se*, nor combine with oil, it cannot be the substance from which the famous white wax of China is formed; and we are led to perceive, from the difference in the habits of the larva of *Flata limbata*, and that of the insect mentioned by the Abbé Grossier, that the wax is rather the produce of a species of *coccus* than of the larva of *F. limbata*, or even of the allied *F. nigricornis*."

foreign intercourse are greatly relaxed, or wholly removed. In the mean time, native writers may be consulted with advantage. It is from the chief of these—the Puntsau and the Kiangfangpu, two herbals of high authority—the subjoined account has been principally derived.

The animal feeds on an evergreen shrub or tree—*Ligustrum lucidum**—which is found throughout Central China, from the Pacific to Thibet; but the insect chiefly abounds in the province of Sychuen. It is met with, also, in Bunan, Hunan, and Hupeh. A small quantity is produced in Kinhwa, Chehkiang province, of a superior description. Much attention is paid to the cultivation of this tree; extensive districts of country are covered with it; and it forms an important branch of agricultural industry. In planting they are arranged like the mulberry, in rows about twelve feet apart; both seeds and cuttings are employed. If the former, they are soaked in water in which unhusked rice has been washed, and their shells pounded off. When propagated by cuttings, branches an inch in diameter are recommended as the most suitable size. The ground is ploughed semi-annually, and kept perfectly free from weeds. In the third or fourth year they are stocked with the insect. After the wax, or insect, has been gathered from the young trees, they are cut down just below the lower branches, about four feet from the ground, and well manured. The branches which sprout the following season are thinned, and made to grow in nearly a perpendicular direction. The process of cutting the trunk within a short distance of the ground is repeated every four or five years, and, as a general rule, they are not stocked until the second year after this operation. Sometimes the husbandman finds a tree which the insects themselves have attained; but the usual practice is to stock them, which is effected in spring with the nests of the insects. These are about the size of a "fowl's head," and are removed by cutting off a portion of the branch to which they are attached, leaving an inch each side of the nest. The sticks, with the adhering nests, are soaked in unhusked rice-water for a quarter of an hour, when they may be separated. When the weather is damp or cool, they may be preserved in jars for a week; but if warm, they are to be tied to the branches of the trees, to be stocked without delay, being first folded between leaves. By some the nests are probed out of their seat in the bark of the tree, without removing the branches. At this period they are particularly exposed to the attacks of birds, and require watching.

In a few days after being tied to the tree, the nests swell, and innumerable white insects, the size of "nits," emerge, and spread themselves on the branches of the tree; but soon, with one accord, descend towards the ground, where, if they find any grass, they take up their quarters. To prevent this, the ground is kept quite bare; care being taken also that their implacable enemies, the ants, have no access to the tree. Finding no congenial resting-place below, they re-ascend, and fix themselves to the lower surface of the leaves, where they remain several days, when they repair to the branches, perforating the bark to feed on the fluid within.

From "nits" they attain the size of "*Pediculus homi.*" Having compared them to this, the most familiar to them of all insects, our authors

* The Himalayah insect is not confined to a *ligustrum*.

deem further description superfluous. Early in June the insects give to the trees the appearance of being covered with hoar frost, being "*changed into wax;*" soon after this they are scraped off, being previously sprinkled with water. If gathering be deferred till August, they adhere too firmly to be easily removed. Those which are suffered to remain to stock trees the ensuing season secrete a purplish envelope about the end of August, which at first is no larger than a grain of rice; but as incubation proceeds, it expands and becomes as large as a fowl's head, which is in spring, when the nests are transferred to other trees, one or more to each, according to their size and vigor, in the manner already described.

On being scraped from the trees, the crude material is freed from its impurities—probably the skeleton of the insect—by spreading it on a strainer, covering a cylindrical vessel, which is placed in a caldron of boiling water. The wax is received into the former vessel, and on congealing is ready for market.

The *pe-la*, or white wax, in its chemical properties, is analogous to purified beeswax, and also spermaceti, but differing from both; being, in my opinion, an article perfectly SUI GENERIS. It is perfectly white, translucent, shining, not unctuous to the touch, inodorous, insipid, crumbles into a dry inadhesive powder between the teeth, with a fibrous texture resembling fibrous feldspar; melts at 100° Fah.; insoluble in water; dissolves in essential oil; and is scarcely affected by boiling alcohol, the acids, or alkalies.

The aid of analytical chemistry is needed for the proper elucidation of this most beautiful material.* There can be no doubt that it would prove altogether superior in the arts to purified beeswax. On extraordinary occasions, the Chinese employ it for candles and tapers. It has been supposed to be identical with the white wax of Madras; but as the Indian article has been found useless in the manufacture of candles, (Dr. Pearson, Philosophical Transactions, vol. 21,) it cannot be the same. It far excels also the vegetable wax of the United States, (*Myrica cerifera.*)

Is this substance a secretion? There are Chinese who regard it as such; some representing it to be the *saliva*, and others the excrement, of the insect. European writers take nearly the same view; but the best authorities expressly say that this opinion is incorrect, and that the animal is changed into wax. I am inclined to believe the insect undergoes what may be styled aceraceous degeneration; its whole body being permeated by the peculiar product in the same manner as the *coccus cacti* is by *carmine*.

It costs at Ningpo from 22 to 35 cents per pound. The annual product of this humble creature in China cannot be far from 400,000 pounds, worth more than 100,000 Spanish dollars.

NINGPO, *August*, 1850.

* Some interesting particulars on this subject are contained in a Memoir in the Philosophical Transactions for 1848, by Mr. B. C. Brodie, entitled, "On the Chemical Nature of a Wax from China." Mr. Brodie states that, although in appearance the substance resembles stearine or spermaceti more than beeswax, it comes nearest to purified *cerin!* The *Comptes Rendus* for 1840, tome x, p. 618, contains a communication by M. Stanislas Julien on the China wax, and the insect which yields it. The wax insects are there stated to be raised from three species of plants: these are *Niu-tching*, (*Rhus succedanea*,) *Tong-tsing*, (*Ligustrum glabra*,) and the *Choui-kin*, supposed to be a species of *Hibiscus*. *Rhus succedanea*, or a nearly allied species, occurs in the Himalayah.

CULTURE AND PREPARATION OF SUMACH.

PALERMO, *May* 30, 1850.

DEAR SIR: In reply to your letter of yesterday's date, on the subject of the mode of cultivation of *sumach* in Sicily, I beg to submit the following remarks:

Sumach is an article of commerce of great importance to the Sicilians, as it is also with the Americans. And it is my opinion that this article, so valuable for manufacturing purposes, for tanning, &c., can be produced in the United States in sufficient quantity to *supply the world*, if the mode of its culture be understood and proper attention be paid to it. I have no doubt that it is the same kind that grows in the United States, which *there* runs to the size of trees. In Sicily they plant the roots or small plants from two to three feet apart, not always in regular rows, as we do Indian corn; hills about three feet apart, rows about four, so that the plough or harrow can save the hand labor of the hoe. They hoe it two or three times before the rains finish in May, and gather it in July and August. The leaves are the only parts made use of. After being separated from the twigs by threshing, (or in this country both ways—by threshing and by treading off with oxen or horses,) the leaves are then ground to the state of fineness in which you see it in the United States, being passed through sieves or bolting-cloths of sufficient fineness, and put into bags of one hundred and sixty pounds each.

The proper season for planting the roots or plants is in November, December, and January. When the season is rainy, the plants take root better. The root or stump is cut off from four to six inches above ground. The scions or sprouts spring up four to six out of each root; and when at maturity, which in this island is in July or August, they are all cut off at the stump, and laid in small handfuls (not spread out much, as the sun will turn the leaves yellow) to dry—say for a day or so—great care being taken that no rain falls on them. Perhaps in this country it may answer to plant nearer together than would be advisable in America, on account of the greater heat of the sun here, and thus shade the ground better.

The leaves are ground in mills mostly by horse-power; but water or steam power would be much cheaper and better. The perpendicular running stones weigh nearly three thousand pounds; they run double or single round an upright shaft. The nether or foundation stone is heavier and one-third greater in diameter than the running stones. The grinding surface of these latter is slightly rough, being occasionally touched with the pick or cold chisel. Hard granite stones answer; here they use a volcanic stone, which is as hard as marble. There follows round the running stones a little piece of wood, that keeps the leaves always under the stones. When ground fine enough, it is sifted or bolted in a large tight room, with a door to enter and fill the bags. In Sicily the article is more or less adulterated with spurious stuff, such as other kinds of leaves, and an article called *brucca*, which resembles the juniper bush in New England; this has no value in itself.

I believe the first year they do not cut off the sprouts. In the second and following years a curious freak of nature produces a single plant a foot or so distant from the original root; and this little plant it is which

they usually make use of to transplant. Now the plough or harrow would prevent these from growing, as they would be in the track; and this may be the reason why they hoe it. Still I think the plough or harrow must be used in our country, and some way or other contrived to save these little plants, if wanted. I would recommend you to let me engage to begin with this mode of cultivating sumach. Let one or two young Sicilian farmers be hired to go to Virginia for two or three years, who understand the cultivation not only of sumach, but also of lemons, oranges, grapes, and olives, as well as other productions of Sicily. Their wages in Sicily are from twenty-five to thirty-three cents per day, and find themselves; it should perhaps be half a dollar a day in the United States. Their passage to the United States would be about $25, or a little over; or perhaps our Government would deem it of importance enough to give them a passage either in a merchant or a United States vessel. They should take with them all kinds of Sicilian wheat and other grains, and sumach plants. I can always obtain in the proper season—say December and January—20,000 if required; cost, a trifle. If the lemon and orange trees of this place were introduced—say into Florida, they would stand the cold much better than those already introduced from Cuba, which are not of a hardy kind. I can obtain all that may be wanted for an introduction, and Sicilians to cultivate the trees. The exports of sumach to the United States last year were 65,000 bags. Lemons and oranges, 350,000 boxes from Sicily; more than three-fourths from this port. Such is the trade in these articles alone, besides large quantities of other productions. If I can serve you or my country in any way beneficially, it will give me great pleasure to do so.

I am, dear sir, your obedient servant,

JOHN M. MARSTON.

W. D. PORTER, Esq.,
U. S. N., Washington.

The soil of Sicily generally is a limestone formation—a reddish soil, which I think corresponds with the land in Maryland, Virginia, North and South Carolina, and the States west of those named. In Sicily, sumach is cultivated in the valleys or level grounds, or on the sides of the mountains; it requires no rain for two months before harvesting it. The soil of Sicily is so fertile that I do not think they manure the ground at all for sumach.

We suppose that the reason of the superiority of Sicilian sumach over that of other countries lies in the mode of cultivating it. All the leaves are the productions of the *young sprouts* that spring up from the stump every year. Being so young, the leaves are full of life when cut, and have not decayed, like those of old trees. This, with a dry climate in the latter part of the season, and the soil suiting the plant, gives it the reputation it has all over Europe and America.

J. M. M.

III.

CATTLE BREEDING.

ON THE PHILOSOPHY OF FATTENING CATTLE.

[From the London Plough.]

Next to understanding properly the chemical analysis of soils, the application of proper manures, and the crops which should be grown from the land by proper tillage, there are but few subjects more deserving the attention of the practical agriculturist than a knowledge of the proper connexion which exists and should be duly preserved between the members of the animal and vegetable kingdoms. As I observed in my lectures on the "Philosophy of Agriculture," so may I now repeat man is an omniverous animal—he is so destined by the Almighty, who has so created his masticatory and digestive organs that he can live and flourish under a compound diet of animal and vegetable food; we are also told by Divine authority that "man shall not live upon bread alone;" consequently, as it is necessary that he should have recourse to substances of a different nature to use in combination, so is it equally of paramount importance that he should direct his care, skill, knowledge, and attention to the management of cattle, so that they should be able to afford him the greatest possible amount of nutritious food, and at the least possible expense in money to himself, and waste or loss, or both, in the preparation of the same.

It is my intention in the present lecture to make a few observations on this subject, to show you the wisdom that experience has taught us, and which I have drawn from many sources—the results of the labors of practical men. To some I may have the pleasure of addressing, the theme I shall discuss may appear novel; while I doubt not that many who are here present will be able to confirm many of the truths which I shall utter.

The existing link between animals and vegetables forms one of the most beautiful chains in nature, and one which cannot be dissolved; it is one of the greatest value to the practical farmer, because it so materially affects his operations in breeding, rearing, and feeding his cattle.

In considering this subject philosophically, we must first of all examine what are the substances which enter into the office of nutrition, and ascertain by what means, as far as our limited knowledge extends, nourishment is afforded to the animal. The vegetables upon which not only cattle but ourselves are fed, consist of two portions, viz: an organic and an inorganic; and upon instituting a chemical analysis, we find that the inorganic is chiefly composed of a considerable quantity of water, much carbonic acid in combination with the salts of ammonia, and nitric acid; the inorganic portion is entirely derived from the soil from which they grow, and the science of chemistry informs us that it consists almost entirely of saline constituents and earthy particles, which, upon incineration or burning, constitute the ashes of the plants. I refer you to what I stated in my lecture on the "Philosophy of Agriculture," as to the manner in which these particles are absorbed by the plants, and which you will find published in Nos. 1 and 2 of "The Plough," detailed at length; but I may here briefly remark, that these substances are taken into the texture of the vegetable by means of the leaves and roots, which, under the chemical action and influence of the light from the sun, are decomposed—the oxygen becoming returned to the atmosphere which originally gave it; while the elements of water, with the carbon, unite to form starch, sugar, gum, or woody fibre, and, with the elements of ammonia or nitric acid, constitute albumen, casein, or gluten. Thus the plant derives its food almost entirely from the inorganic kingdom; while the animal, on the contrary, from its anatomical conformation, can only exist upon organic matter.

During the present century such great discoveries have been made in the science of organic chemistry, particularly by the discoveries of the late Sir Humphrey Davy, Dr. Edward Turner, Professor Brande, Drs. Faraday and Gregory, and last, though not the least, those of Baron Justus Liebig, of Giessen—to whom may be added the labors of a rising young chemist, Dr. Lyon Playfair—that much valuable knowledge has been imparted to the philosophical and agricultural world upon the physiology of animal life, and the manner by which the system is nourished and supported.

We now, therefore, can well comprehend why one species of diet is found to possess a greater quantity of nourishment than another—why the inhabitant of the frozen regions of the north, as I have seen in the persons of the Esquimaux and Greenlanders, should require great quantities of train-oil with his daily food. And why? His stomach will digest the rancid flesh and blubber from their rancid whales and seals; while the same species would not only be disgusting to us, but actually prove both physically and mentally injurious to the inhabitants of more congenial and warmer climates. We also understand from the same source how it is that we cannot feed animals or exist ourselves upon a diet wholly composed of sugar, starch, gum, or gelatine; and, although we cannot live upon any one of these substances, yet, when they are all properly combined, strange as it may appear to some, it is of all these materials, when properly united, that our daily food is composed. The great office of chemistry, as applied to this department of human knowledge, is to point out the peculiar wants of animal bodies, and how these are duly supplied in the food we and they daily consume. Anatomy informs us that, like the vegetable, an animal body is composed of two portions: the organic particles form a considerable portion of the flesh or softer tissues of the body; and also an inorganic portion, which Professor Berzelius, of Stockholm, Guy Lussac, Vauquelin, Thenard, and Fourcroy, with Dr. Magendie, of Paris, and other experimental chemists, have demonstrated also to constitute a small portion of the softer parts; but it is in the bones, which constitute the skeleton, that they are principally found; and these are directly derived in the *herbivora* (or vegetable-feeding animals) from the vegetable diet upon which they subsist, while the *carnivora* (or flesh-eating tribes) obtain it indirectly from the blood and flesh of the herbivorous animals upon which they prey.

These remarks naturally lead us to a proper consideration of those substances which form chiefly the food of those animals which are bred, reared, and supported by the farmer either for agricultural labor or as food for man, and in many cases for both. Strange to say, they are principally herbivorous in their nature. Examine chemically, therefore, any article which they consume—no matter whether it is wheat, beans, peas, cabbage, carrots, or turnips—we shall soon find that, besides water, it has gum, sugar, starch, and a considerable quantity of woody fibre, in union with a small portion of a fatty matter; all these constituents, as I observed in my former lectures, will be found to be composed only of three elements, viz: oxygen, carbon, and hydrogen, which exist combined in nearly the same proportions. But we likewise find that there are many other substances contained in vegetables which contain nitrogen; and this is in addition to those elements which compose starch, gum, &c., and are known to the chemist by the appellations of gluten, vegetable albumen, and casein. Now, if we take a small quantity of fine wheaten flour, mix it with water into a paste, and well wash it upon a sieve, by pouring a stream of cold water over it while it is kneaded with the hand, all the sugar, starch, and gum will pass away through the sieve with the water, and the substance left behind will resemble bird lime, being of an equally tenacious nature; this is, therefore, the gluten which the wheat contained, and when dried, the water which it possessed being evaporated, it resembles horn, being a hard, brittle mass; and if burnt, it emits a similar unpleasant effluvia to burnt horn, feathers, or other animal matter. The gluten which is obtained from peas, beans, or the fibrin and vegetable albumen procured from the expressed juices of the carrot, turnip, or cabbage, all possess analogous properties to those found in wheat, with this exception, that they are all soluble in cold water; whereas the gluten which is obtained from wheat is not. If we submit these substances to the test of chemical analysis, we speedily discover them to be all composed of the same constituents, and also that they are likewise identically the same as those composing the flesh and blood of animals generally; but you must please to bear in mind that this remarkable identity does not consist in their containing azote or nitrogen, in combination with oxygen, carbon, and hydrogen, in the same, or nearly the same, proportions as in animal flesh and blood; but it extends to the existence of a small quantity of sulphur and phosphorus, which is found to be associated with the muscular flesh, forming one of the soft tissues of the animal. Hence we may very properly assert, as a physiological axiom, that the flesh and blood are, by the great Author of Nature, found actually ready prepared and elaborated in the vegetable. The plant it is which elaborates and duly prepares all the elements of water, carbonic acid, and ammonia, which constituent particles are found to be identically the same as the muscular animal flesh; consequently the animal has nothing more to do than to apply them to his own use for the purposes of nutrition, secretion, and the vivification of life.

The following table, adopted by my talented friend, Professor Gyde, of Painswick, will give the reader an idea of the actual identity of composition existing between these substances:

TABLE I.

Elements.	Gluten from flour.	Casein from peas.	Ox blood.	Ox flesh.
Oxygen	22.4	23.0	22.2	22.3
Hydrogen	7.5	7.2	7.5	7.5
Carbon	54 2	54.1	54.3	54.1
Nitrogen	15.9	15.9	15.8	15.7

Every animal body momentarily undergoes some physiological change; every motion, thought, and action is of course performed at the expense of some, and many of almost every, part of the body. These incessant alterations and action cause the great demand for food which nature constantly requires to repair the waste that is continually taking place. You may speedily ascertain the truth of this fact by noticing its illustration in those animals which have long been kept without food, or had but a scanty supply, or where it did not possess sufficient nutritious properties; and also in those animals which have undergone great exertion and bodily fatigue, when contrasted with those but little fatigued, and whose food was good in quality and sufficient in quantity. The fine horses formerly attached to our well-appointed coaches, before the construction of railroads and the employment of giant steam power, and which vehicles will ere long only be remembered by being recorded in the pages of history, among the phenomena that have been and are passed away—the fine horses I have named were almost exclusively fed upon oats and beans, which are two of the most nutritious kinds of all species of vegetable food; while, on the other hand, those horses performing but a small amount of laborious work will supply the natural waste of their bodies from the very small comparative quantity of gluten which is to be contained in hay or clover, or both.

I have already informed you that the food of all classes of animals consists of two kinds of distinct species of matter, viz: the one which possesses a great proportion of azote or nitrogen as one of its principal constituents, and which the table I have referred to tells us is identified with the blood and muscular flesh of the animal. The other portion is destitute of nitrogen, but consists of gum, starch, sugar, and woody fibre. Now, every one of these different materials answers two quite distinct, but very important purposes in the economy of the animal body. The first, or the nitrogenous constituents, supply the waste which has occurred in the fluids and tissues of the body, and, as Dr. Magendie very properly states, may justly be termed the elements of nutrition. The last, which are the non-nitrogenous portion, act, if I may apply the expression, as fuel for combustion in the lungs, in order to keep up the due supply of animal heat, and, under some peculiar circumstances, also, will contribute to the formation of fat. These elements may likewise be arranged under two great heads, viz: those which are necessary to the function of nutrition, and those affecting that of respiration.

I respectfully call your attention to the following table, wherein they are exemplified:

TABLE II.

1. *Elements of nutrition.*	2. *Elements of respiration.*
Gluten.	Gum.
Albumen.	Starch.
Casein.	Sugar.
Flesh, or muscular fibre.	Oil or fat.
Blood.	Alcohol.

The elements of nutrition (No. 1) must of necessity exist in combination with every substance which experience has taught us to be capable of supplying food to the animal; but, ere it can impart the nutritious properties, numerous important mechanical and chemical changes must take place. The grand process of digestion must be performed, by which I mean the manner by which the nutrient particles may be rendered soluble, and not only capable of entering, but even of forming new blood. A brief detail of the manner in which this is performed may not be uninteresting to some of my present auditory. It is accomplished in the following manner: the food, when received into the mouth, is broken down by the teeth, where it becomes mixed with the saliva which is secreted by the glands that are situated near the angle of the jaw, and beneath the tongue; when the process of mastication is completed, the morsel is collected into a ball at the base of the tongue, and by the act of deglutition, or swallowing, it is carried past the pharynx into the œsophagus, or gullet, down which it passes into the stomach, where it enters at the cardiac orifice; it remains there for a short time, according to the nature both of the animal and the food it has partaken of (in man it is supposed to be about two hours). The chemical and mechanical action that now takes place is technically called, in physiological language, the process of *chymification;* when this is perfected, the orifice at the opposite extremity (denominated the pylorus) becomes dilated, and the chyme passes into the first of the small intestines, anatomically named the *duodenum*, where it becomes mixed with the bile from the liver and the fluid from the pancreas, or sweet bread. This being accomplished, the process of *chylification* now commences: a series of small, minute vessels, named lacteals, whose mouths open on the mucous (or villous) coat of the bowel, or intestine, absorb the nutritious portion of the food (which resembles milk in appearance; hence it is named *chyle*). This fluid, being conducted by numerous branches, passes into one great reservoir, called the thoracic duct, which ends in a large vein near the heart, (the left subclavian,) and there it is mixed with the blood; but being loaded with carbon, which is inimical to the due preservation of human life, the blood passes from the heart to the lungs, where it becomes oxygenized, and fit for all the purposes of the animal economy. The non-nutritious portion, from which the chyle has been extracted, passes through the last of the small intestines (the *jejunum*) into the whole course of the larger part of the alimentary canal, viz: the *cæcum*, *colon*, and *rectum;* and from the last they are finally ejected from the body, ultimately again to re-enter it in another form, in consequence

of its forming manure, and therefore affording food for plants, in the manner detailed in my former lectures.

But independent of the simple fact, that the salivary fluid, when commixed with the food, renders the digestion of the aliment far more easy, yet Baron Liebig imagines that it possesses the peculiar offices of enclosing and combining air in the form of froth; the oxygen which it contains enters into union with the constituents of the food, while the nitrogen is again evolved through the medium of the lungs and skin. This philosopher is likewise of opinion that, in many of the herbivorous quadrupeds, their rumination (as the oxen and sheep, for example) has for one of its principal objects a complete renewal with the repeated introduction of pure oxygen into the animal's stomach; and that, unless this takes place, the function of rumination cannot be duly perfected in the stomach. I have given you a brief outline of the manner in which digestion is accomplished; but in doing so I omitted to observe that, attached to the mucous or villous coat of the stomach, are a series of minute glands, which secrete what is denominated the gastric juice, or fluid, and which, among other matters, contains a quantity of pure mucus, in combination with a small quantity of free hydrochloric or muriatic acid, (called, in common language, spirits of salts,) with a peculiar principle known to chemists under the appellation of pepsin, and which has been confirmed by Dr. Sylvester, of Clapham, to be, in itself, a most active and virulent poison, but whose noxious properties are chemically neutralized in the stomach and intestines during the function of digestion.

I have stated that hydrochloric acid is always present in the stomach, and particularly so during the digestive process. For the discovery of this curious but important chemical fact, we are indebted equally to M. Tiedman Gmelin, of Germany, and Dr. Prout, of London. This acid may be artificially obtained by the decomposition of chloride of sodium, or common table salt (which is only a combination of pure muriatic acid and soda). The acid is of great service in promoting the function of digestion in the stomach, while the soda, as an alkali, copiously enters into the formation of bile. Thus it is that a certain proportion of salt is necessary to digestion in every species of animals—at least as far as our knowledge extends in the classes of quadrupeds and birds; and although chemistry tells us that it is an essential ingredient in the burnt ashes of the vegetables, yet we very rarely find it existing in a sufficient quantity to form a regular supply of either in the acid or soda which is required for the due performance of the function of healthy digestion; and, therefore, not only should we ourselves partake of a certain quantity daily with our own food, but should place some within the reach of both birds and cattle under our management in the farms we are connected with. Nature is the philosopher's best monitor, and the scientific farmer cannot do better than to obey her axioms. We find that all classes of animals have, if I may use the expression, an instinctive love for salt, and seek for it as for a portion of their diurnal food. It is well known that the pigeon tribe of birds, if they cannot obtain it elsewhere, will even have recourse to the mortar which cements the bricks of houses together. They have been frequently known to fly to the sea-coast in order to procure it; and pigeon-fanciers who are not so honest as to mind borrowing their neighbors' birds will allure them by means of what is known as a salt-cake, placed in or near the dove-cote, wherein muriate of soda forms an essential ingredient. This nefarious practice is now forbidden, very properly, by an act of Parliament, which awards a punishment of seven years' transportation upon conviction. It, however, confirms the important physiological fact I have just noticed.

In the ruminating tribe of the class *mammalia*, as the ox and the sheep, the important process of digestion differs but little from that which I have stated, and their stomachs are of the simplest construction, being little else than a mere membraneous bag; but in the *ruminantia* we find their stomachs considerably more complicated, in order that they may be enabled to extract the due proportion of nourishment which they require from the food which they eat; as in the case of grass, by way of example, which we find by chemical investigation contains but very little nourishment in proportion to the bulk. Let us now philosophize for a moment, and see the manner in which the ox and those of his class perform the functions of mastication and digestion. In these creatures the grass is cropped from the surface of the earth by means of the fore teeth, and, after being but very slightly masticated, is swallowed. This process continues until the first stomach is filled,* when the animal lies down apparently well and perfectly contented; but it is now that the curious process of rumination commences. In the first stomach the food is mixed with a secreted fluid not dissimilar to the saliva, and in a kind of semi pulpy mass it is returned into the mouth, in small detached portions, where perfect mastication takes place, and during this process the animal is in a recumbent position; after the second and perfect mastication is completed, the food passes into the second stomach, denominated by comparative anatomists *omasum;* from this it passes into the third stomach, the *abomasum;* in these last two it undergoes very important changes, and whence it passes into the fourth or really true stomach. It is in this last portion of the curious but complicated species of apparatus that the function of digestion is ultimately and perfectly performed; and the last processes of extracting the nutriment from the food are exactly similar to that which I have described as occurring in man and those animals having simple membraneous stomachs. The vital fluid of all animals is commonly denominated the blood, in which, as Holy Writ truly observes, "*is life;*" this fluid is either formed from vegetables, as in the *herbivora*, or from flesh, as in the *carnivora;* yet in both tribes of animals the composition and essential constituents are the same, both in their physical effects upon the system and as portrayed by chemical analysis. We find it circulating throughout not only the principal organs in the living animal, but by means of vessels as fine as the human hair; so extremely delicate are they that they will not admit the thicker coloring particles of the blood itself; yet the properties which the blood possesses are most surprising; it replenishes the fluids and solids which are diminished by the waste, wear, and tear of the body; it places osseous or bony matter in the skeleton for its growth and support; forms fleshy fibres for soft muscular tissue, by which the motions of the body are performed; and from the blood are all the different bodily secretions which are necessary for the healthy existence of the animal secreted and performed; the blood supplies carbon to the lungs for keeping up the animal heat, with fat and oily fluids deposited in the softer tissues, as well as in the very substances of the bones themselves, as a store from which nature can extract a due supply when necessity compels her; lastly, the blood is the true moving power by which the whole animal machine is put into motion, just as steam is to the steam engine, and coals as fuel to the fire.

* We should here observe that the lecturer exhibited drawings of the stomach, as found in both tribes of animals.—*Ed. Plough.*

As far as I have proceeded I have only spoken of that part of the food from which animal flesh is naturally formed; *i. e.*, the gluten extracted from the vegetable, the albumen, and the casein. My self imposed task, however, is not yet complete. I have now to take into consideration the offices which are fulfilled by the sugar, starch, gum, oil, or fat, which we find, by examination, constitute so large a proportion of the food of man and the principal of the lower orders of animals. Now, we find from observation that every animal has a temperature above that of the surrounding atmosphere; and physiologists have denominated it the animal heat, which, in those animals domesticated by man, is found to be, on an average, about 100 deg. of Fahrenheit's thermometer; in man it is about 70 deg., and we find that it continues much the same under every kind of circumstance, whether we live beneath a tropical sun, a more temperate region, or the frozen climes of the North.

The animal heart originates in the body; it is created by the chemical combination, or, if I may employ the term, the combustion of the elements which enter into the formation of starch, with the other non-nitrogenous constituent particles of the food, united with the oxygen of the air, which is received into the lungs during the function of inspiration; and likewise by a portion that is absorbed through the skin.

Upon examining the atmospheric air which we breathe, we find, upon submitting it to a chemical analysis, that it is composed of twenty-one parts of nitrogen, with so small a quantity of carbonic acid gas that its amount cannot be calculated in a given quantity of air; yet of course an immense proportion must exist, for it is supposed that the atmosphere extends forty-five miles at least in height, and presses at the ratio of fifteen pounds upon every square inch. This was discovered by Torricelli and Galileo in the seventeenth century. However, when the air we have inspired has been expelled from the body, we find that it has undergone but little if any change; the oxygen, however, has disappeared, and been replaced by an equable quantity of carbonic acid gas, with a small quantity of aqueous vapor. The proportion of animal heat which attends this chemical change is consequent upon the amount of carbon and hydrogen which is consumed. The heat which is thus produced is occasioned by exactly the same chemical action as that which causes the combustion of wood in a stove, or the fat of a lamp or candle, and the products of which are exactly the same; the carbon and the hydrogen of the food combine with the oxygen that is supplied by the atmosphere, and heat is generated in the body in proportion to the quantity which is consumed. In the stove or lamp the same changes take place, the fuel being composed of similar elements entering into the composition of the food; and the results of the combustion are precisely the same, the combination being less energetic in the body than in the stove or lamp.

Now, how is it in man? In a full-grown adult, if we take the weight of the carbon which is disengaged in the excretions from the weight of the carbon contained in the food that is consumed during the twenty-four hours, we shall soon find that the remainder will amount to somewhere about fourteen ounces, and this is assimilated with the component parts of the body; the weight of which, however, does not increase, for it is a well-known philosophical axiom, that fourteen ounces of carbon will require thirty-seven ounces of oxygen* for its transformation into carbonic acid, which passes off from the lungs and skin. Thus, in this simple manner, we can easily comprehend how it is that the enormous quantity of oxygen which is introduced into the animal body by the progress of inspiration, and the great proportion of carbon which is derived from the food consumed, are removed from the body; and, likewise, how it is that the food required for supporting the animal in its normal condition is in exact proportion to the quantity of oxygen that is absorbed. Now we find that a horse consumes daily, in his food, upon an average, eighty-nine ounces of pure carbon, and a cow seventy ounces; the former requires $212\frac{1}{2}$ ounces, the latter $186\frac{1}{2}$ ounces of oxygen, in order to transform the consumed carbon into carbonic acid. I have already stated that, in addition to the constituents which I have named, the vegetable is found, upon chemical analysis, to contain a small quantity of fatty matter in addition to the earthy and saline substances of which it is composed. The question is now to be answered, What are the purposes which they answer in the animal economy? Every animal that is in a state of sound health has a layer of fat, which is situated between the skin and the muscles, and likewise between the muscles themselves, by which means they have great freedom of motion. Fat is also deposited in the body of the animal, particularly in the neighborhood of the bowels, also attached to a portion of them, and enveloping the kidneys, (where it is vulgarly called by butchers the suet). In the *carnivora*, or flesh-eating animals, the fat which is contained in the food they eat is consumed in the lungs for the purpose of preserving the proper quantity of animal heat, and consequently in these creatures we but very rarely find the body of the carnivorous animal to contain much fat. M. Darwin, in his Journal of Researches into the natural history of the countries visited during the voyage of the Beagle, informs us that the Gauchos, or simple countrymen in the Pampas, South America, lived for months together upon flesh; but he observed that they ate large quantities of fat. And Dr. Richardson, in speaking of these people, has also remarked "that, when they have fed for a long time solely upon lean animal food, the desire for fat becomes so insatiable that they can consume a large quantity of unmixed and even oily fat without nausea." This instinctive desire for fat in man and animals living on flesh arises from the imperative demands which are daily made upon the body for carbon to keep up the proper amount of animal heat, and which is contained in the fat that is consumed as an article of diet.

Thus far in the omnivorous and carnivorous animals; but in the herbivorous creatures it is widely different. The supply to the lungs is derived from the starch, sugar, and gum in the vegetable, while the fat which exists in the food is in a great measure laid up as fat in the animal body; therefore it is that we find the bodies of herbivorous quadrupeds generally much fatter than the *carnivora*. But if the supply of the starch in the food is inadequate to the demands of respiration, then the elements

* One ounce of oxygen equals 1,416.5 cubic inches.

of the fat become consumed in the lungs, exactly as it is in the carnivorous animal; the sugar, gum, and starch become speedily transformed into aqueous vapor and carbonic acid in the animal system. These are the first consumed; and if this supply proves to be inadequate for the purpose required, then the fat, next the fat of the animal body, and, finally, the tissues themselves, are placed under contribution; the animal becoming thin, feeble, and emaciated, and ultimately dying from starvation.

REDUCING THE FOOD OF CATTLE BEFORE GIVING IT.

As I have just concluded the experiments you wished, I hasten to forward you the results, which are as follow: Two horses in good health, in daily work, and as nearly as possible equal in size and age, were selected for the experiment. They were each allowed 5 lbs. of oats, 42 lbs. per bushel, and a sufficiency of good hay, of which they consumed about 17 lbs. per diem each horse. The only difference in the feeding consisted in one horse having the oats thoroughly crushed, and the other being allowed the oats uncrushed. On the fourth day of the above mode of feeding the solid excrements of each horse were examined; 100 parts of the dung from the horse fed on crushed oats were found to be deprived of all the nutricious matter contained in the food, and to consist of woody fibre, mixed with the animal secretions and some salts; while 100 parts of the dung from the horse fed on uncrushed oats were found to contain one-quarter per cent. of nutritive matter, consisting of starch and gluten, which had not been acted on by the stomach, mixed with the ordinary constituents of the solid excrements of the animal—this arising from the inability of the horse to perform perfect mastication, and must vary with circumstances, such as age and rapidity of feeding. The same horses were then fed with cut and uncut food, consisting of hay cut into chaff and hay uncut. At the expiration of the third day the excrements were examined, but no chemical difference in their composition was detected; the food, in both instances, was found to be equally exhausted of its nutritive matter. The shorter period occupied by the horse in filling its stomach, and consequently greater amount of rest obtained, and the means of mixing food and preventing waste by cutting it into chaff, require no observation from me, but will be material points in this mode of feeding.

A. GYDE.

SHEEP.

I received, a short time since, a copy of the printed Agricultural Circular issued from the Patent Office. Several points in the inquiries have attracted my attention, but I can only devote a leisure hour to a response to that relating to "sheep." The subject is so full of interest and so important, that a volume would be necessary to approach an adequate examination of the various topics it involves. I will attempt to compress in a small space some prominent considerations which are founded upon the experience and reflection of years. I think sheep husbandry in many sections of the country eminently profitable. The extent of this depends of course upon the scale in the prices of wool. A medium price now prevails, and in those districts appropriated to the purpose, few occupations to the farmer can be more attractive or remunerative. It should always be recollected, in forming an opinion on this subject, that lands of little value, and worthless for most agricultural purposes, are those best adapted to a summer range for sheep. Luxuriant pasturage is afforded to them by the scanty herbage that springs up in the fissures of the rocks and the gorges of mountain nooks, and by the briers and bushes which mantle their cliffs. Sheep range and fatten upon precipitous crags inaccessible to cattle and horses. Sandy plains are in the highest degree congenial to the health and habits of sheep. They are often relieved from epidemic and hereditary diseases, contracted in cold and moist pastures, when transferred to a range upon light, dry lands. They feed with great avidity upon the sprouts and bushes, the spontaneous products of sandy soils. This vegetation, and the rank and coarse herbage which infest these lands in their native condition, are extirpated by the sheep, and white clover rapidly introduced. This clover always indicates the presence of sheep, and is, perhaps, the most delicate and nutritious grass for pasturage. It springs early, and affords an early and enduring feed. It is of immense importance in the renovation and fertilizing of these lands. Its fibres spread gradually a massive net-work over the entire surface, that binds the soil together, protects it from the sun and winds, and affords, in tillage, a rich basis for agricultural operations. Neat cattle or horses would starve upon a tract of sandy soil where sheep will thrive and fatten, whilst they maintain the land in constant progression in value and fertility. The continual and gentle pressure of their feet consolidates, without penetrating, the earth. The light and diffused droppings of sheep fertilize the soil, when the copious excrements of larger animals destroy vegetation and rapidly deteriorate pastures by the introduction of coarse and worthless herbage. In my personal experience I have known pasture ranges occupied for dairies become, from this cause operating a few years, totally infested by bushes, johnswert, and other noxious weeds, and of little practical value. The introduction of sheep in two seasons has thoroughly subdued this rank vegetation and dotted the earth with a rich and delicate growth of nutritious clover. When the great value of sandy lands in sheep husbandry becomes understood, vast tracts of barren and desolate wastes, which are now unoccupied and deform our country, will be appropriated for sheep ranges, and with the most profitable results. The immense and beneficial influence of this system—not alone on the wool-growing interest, but upon the wealth and producing capital of the nation—can scarcely be appreciated. Each class of these lands, specially adapted to sheep, may now be purchased at almost a nominal price. Sheep will nearly maintain themselves during the winter whilst they have access to the earth, or good opportunity of browsing, and uniformly long after other stock have demanded vigilant care and incurred heavy expense. They have been known to subsist in vigor and health an entire winter with no food or protection other than the boughs and limbs of the pine. They eat greedily, and are sufficiently nourished by the poorest hay mingled with ferns and bushes. A great proportion of the winter fodder of hardy sheep may consist of bean and pea straw, with other refuse of the barn. No animal known to the economy of our agriculture can be maintained with so much ease and so little expense. These remarks apply to this branch of husbandry when there is occupation of the lands I have underrated, which are peculiarly adapted to sheep. Low and damp loam or clay are not congenial to their health. Lands of great value, from their locality or productiveness in tillage, can more profitably be appropriated to other purposes. Another prominent fact must be regarded in an estimate of the advantages of sheep husbandry.

Horses, as they become aged, grow worthless. The ox and swine can only be prepared for the shambles with great toil and expenditure; but the sheep, when turned off at his maturity, is ready for market, with no other expense or charge than his ordinary pasturage. The summer-grazing of sheep upon appropriate lands is a trifling consideration in calculating their disbursements. One ton of hay, under ordinary circumstances, will keep ten sheep through a winter in the meridian of New England. The average value of hay in that district is $8 per ton. The incidental expenses of the ten sheep, particularly if no credit is given to their manure or fertilizing effect upon pastures, cannot exceed $2 in addition. With proper management, and the usage, which should uniformly prevail, of turning off sheep in a vigorous maturity, that estimate will cover the usual contingent loss from disease and accident. An average yield per head of full-blooded merinos should reach 3¼ cents of wool. The price of the current year is probably a fair medium, and presents for that grade of wool a minimum of about 40 cents. The ten sheep will average three lambs, worth at least three dollars when weaned. The account may, I think, be stated thus:

Dr.	Ten sheep, to one year's keeping		- - -	$10 00
Cr.	By	do. 32½ lbs. wool, at 40 cents	- - -	13 00
	By	do. 3 lambs, at $1 each	- - - -	3 00

Leaving an excess of $6, the annual profit of ten sheep. I think facts and observations will sustain this calculation. I can more readily illustrate my views by a brief statement of the management and profits of a single flock, with which I am familiar. This flock consists during the winter of about 350 sheep of all classes. The manager selects annually about 100 choice young ewes, not under two years old, for breeding. He usually raises as many lambs as he appropriates ewes to breeding, twins often more than equalizing any occasional losses. He turns off each autumn fat sheep, equal in number to the lambs which he raises. The sheep are at the period of their full vigor and highest value, and command from $1 25 to $1 75. The flock averages 3½ cents of wool, which at the present season sold for 44½ cents per lb. The casual loss in this flock is so insignificant as scarcely to enter into the estimates of the manager. I am aware that this case exhibits remarkable results, but none that cannot be attained by an exercise of the same judgment and skill. The only peculiar features of this management are those which I have already referred to in the habit of disposing of the refuse of the flock before they become deteriorated by age or disease, and their careful protection from the changes and severity of the climate. The sheep, particularly the feebler portion of the flock, are studiously housed throughout the winter. They are supplied with running water by pipes within the building, which they only leave an hour or two each day for air and exercise. They consume much less fodder by this arrangement, and are protected from the alternations of wet and cold, generally so fatal to the health and lives of these animals.

In determining the relative value and profit of fine and coarse, or large and small sheep, regard must necessarily be had to the fact, whether the primary object of the cultivator is wool-growing or mutton. A few general suggestions will convey my views on this subject, and incidentally embody replies to several other points embraced in the inquiries. An opinion, formed many years since—that pure merinos were better adapted to the severe and fluctuating climate of our northern latitudes, and in general more profitable, than Saxon sheep—has been corroborated and confirmed by all subsequent observation. The former are more hardy in constitution, larger, and more vigorous. They excel in beauty, yield better mutton, and heavier fleece, which, in fineness and texture, often closely approximates to the latter. There has occurred so constant an intermixture of the breeds, that it is exceedingly rare to find a flock of pure and exclusive merino extraction. Many breeders have designed, and with occasional success, to preserve this purity. I am able to indicate numerous flocks of highly pure merino blood, and all are pre-eminently remunerative. These flocks are uniformly distinguished for compact fleeces, with long fibres of wool, white, and pure from gum. Their clip will average, in different flocks, from four to six cents per head. I cannot believe that such flocks can be essentially improved by an infusion of a foreign stock, whose great peculiarity seems to be a gummy, matted fleece. These imported animals may be favorably combined with flocks of short, loose, and open wool. Immense progress has been attained by judicious breeding in the last few years in the quality and value of our wool, and equally in the size and beauty of our animals. These improvements may be extended to almost an indefinite degree of perfection by the exercise of judicious skill and intelligence. Small and fine woolled sheep yield more wool in proportion—and of more value—to their size than the large and coarse sheep. They consume less food, but require more care and expense in their attendance and keeping. The mutton of the large, coarse sheep is much preferred, and bears a higher price in market; and as they should range on cheap pasturage in fattening, the difference in the expense from their increased consumption is an unimportant consideration. The conclusions I adopt from these views are, that merinos are the most appropriate breed in the northern section of the Union, where designed for wool-growing, and that large and coarse sheep are the most profitable where the primary object of the breeder is mutton.

The original coarse-woolled sheep, which prevailed in the country previous to the importation of merinos, have become extinct; but several varieties of long and middle-woolled sheep, and infinitely superior animals, have been, since that period, introduced. These sheep have all been propagated in Europe on account of the high and peculiar excellence of the mutton they afford. They are all, for this purpose, most valuable and desirable acquisitions. Among these varieties I assign the preference to the "South Downs." I think they unite the greatest combination of excellent qualities. They are beautiful in form and appearance, vigorous in constitution, sufficiently large, apt to fatten, affording mutton of rare and exquisite flavor, and yielding a heavy and compact fleece of wool, equal in fineness and value to half-blood merino. They are peculiarly docile and domestic in their habits. The grades of this breed are most valuable animals. The cross of a South Down ewe with a merino buck unites as many desirable qualities as can be reached for the combined object of wool and mutton. They unite size and beauty with a heavy fleece and a fair quality of wool. The South Down and their grades may be raised with great success in every section of the country accessible to markets and adapted to sheep husbandry.

ON SHEEP BREEDING.

BY P. A. BROWNE, LL. D.

There are, doubtless, some persons who imagine that they have no interest in the breeding of sheep and raising of wool; if there are any such among our readers, we have a few preliminary remarks to make to them. Every one who eats *mutton* or wears *cloth* coats and pantaloons, or *flannel* or *worsted* under-clothing, or who in winter sleeps under a *blanket*, is *directly* interested in our subject. *Hunger* and *nakedness*, to a considerable degree, would be the results of *totally* neglecting to grow wool; and these, it must be acknowledged, are *formidable opponents* in any community. But we are all willing to admit that we take an *indirect* interest in what concerns any great class of the society to which we belong; and in the breeding of sheep and raising of wool, the *agriculturist* has a deep and abiding interest. The farmers and planters form a large proportion of the voters, the tax-payers, the producers and consumers of all agricultural, and the consumers of all manufactured products. It is calculated that there are in the United States four millions of agriculturists; and how can anything which intimately concerns so large a portion of our relatives, friends, acquaintances, and fellow citizens be unimportant to one of us? Agriculture is the elder sister of commerce and manufactures; which naturally lean upon her for support and maintenance; hence, every commercial and manufacturing community is bound to support the farmer and planter, as they are bound reciprocally to aid and assist the merchant and the mechanic. How many thousands are engaged in the transportation, stapling, and manufacture of wool, and in the transportation and sale of woollen fabrics? And their interests ought not to be neglected. We have not implicit faith in newspaper published statistics. In one which recently appeared, it is stated that the pounds of wool *used* in the United States are 70,762,829, and that the value of the raw material is $25,755,988; which would be allowing a fraction more than thirty-six cents for the value of each pound of wool. Now, if from the 70,762,829 pounds *used* in the United States, we deduct 18,000,000 of the imported, annually, it will leave 52,762,829 for the quantity *raised* in the United States; which, allowing an average of three pounds per sheep, would give 17,594,276 sheep in the United States; whereas there are many persons, who are deemed competent judges, who estimate them as high as thirty-five or forty millions.

But whether the amount of wool used in the United States be over or under-rated, it has to be transported, stapled, and manufactured, and the fabrics transported and sold; and if you will add to the sum of agriculturists and farmers the number of these transporters, staplers, manufacturers of wool, and transporters and venders of woollen fabrics, the amount of persons interested in one subject will be greatly increased. Again, the United States *manufacture* wool; but, under the present imperfect system of sheep-breeding and wool-growing, we do not raise wool enough for the manufacturers, but, on the contrary, import annually about eighteen millions of pounds. Instead of doing this, we ought, after supplying our own manufactories, to export more than double that amount, raised by our own people, upon our own lands. And this we *can* do, and *will*, if those the most interested in this branch of industry, and their representatives, will only do their duty. American sheep-breeders and wool-producers possess eminent advantages over any other people engaged in the same business, for they have the best lands for the purpose at a very low price; a sheep may be maintained in some of our western and southwestern States at an annual expense of twenty-five cents, and will yield from two to four pounds of wool, worth, if of the proper kind, from forty to fifty cents a pound, not to mention the profit from the increase of lambs. The sheep-breeders of some other countries have yet to experiment upon the *kind* of sheep best calculated for their climate and soil; *here* that experiment has been made, but the result has not been fairly put before the public. In some places they can raise only *one species* of sheep; *here* we can produce *two*, being all that is necessary for the growing of fleeces. We have more than one thousand millions of acres of land capable of producing sheep, and there could not be a more useful measure devised than to encourage the hundreds and thousands of *emigrants* who are daily seeking an asylum upon our shores to settle on some of them, and turn their attention to this important branch of industry.*

It is thought by many agriculturists that by unskilful farming the fertility of our soil is gradually diminishing; and there appears to be great good sense in this opinion. If by suddenly taking everything away and returning nothing to the soil again, we would deprive it of those ingredients in the propagation of grain that are absolutely necessary for its growth, the argument will hold good where this is done *gradually*, except that a longer time is consumed in the destruction: the one is a *paralysis*, the other a *consumption*. But by the raising of sheep we return to the soil a portion of the precious ingredients of organization; for it is a well-known and acknowledged fact that sheep improve the land upon which they are pastured and fed. The raising and breeding of sheep has, in point of practical profit, another advantage over the raising of grain; it costs three times more to produce a bushel of corn upon *poor* land than it does upon *rich;* but this is not the case with sheep, for they can be maintained upon the *poor* land quite as well as upon a *rich* soil. Some of the finest wool in our collection was produced upon worn-out tobacco land of Virginia! Everything must be taken in connexion with the modern improvements of our country, or our calculations will be behind the age and useless. This is the age of *railroads!* The construction of these improved means of conveyance encourages

* We are said to possess a territory of 3,221,595 square miles—a territory 95 times as great as the Island of Great Britain, more than 16 times as large as France, more than 12 times as large as all Germany; yet from these countries we import millions of pounds of wool each year!

the transportation to a distance from the place of growth of agricultural productions, owing to which the refuse is forever lost to the soil upon which they grow; and this being repeated from year to year, the fertility is constantly reduced, until at length the farm can no longer produce a crop. Now, we can, for the time being, no more directly arrest the progress of this draining system than we can, with our hands only, stop the locomotive in its onward career; but by introducing upon each farm a flock of sheep, whose wool *only* is carried to a distance, we can in a great measure retard, if not entirely prevent, this deleterious consummation. So that we find that sheep with railroads may succeed; while grain with railroads will be a failure in agricultural economy.

Believing the above to be fundamental truths, and desirous as much as in an humble individual lies to promote the good of our common country, we have collected from nearly all parts of the world where sheep are raised, specimens of their fleece. These we have subjected to the most rigid scientific examinations with the microscope, michrometer, and trichrometer, with the double view of ascertaining *what has been done* abroad and what *can be done in the United States* as regards the production of valuable fleece. The result of these investigations, although highly creditable to a number of intelligent and careful sheep-breeders in various parts of the Union, discloses the lamentable fact that a majority of agriculturists, for want of proper information, are pursuing a plan of propagation that can never furnish to them and to their country a permanent, self supplying race of sheep, possessing, equally, the properties of both their progenitors. It is confidently believed that Congress can do much to render the system of sheep-breeding more perfect, and the subject calls aloud for their attention; for if history is to be depended upon, no country has ever existed, where due regard was paid to the propagation of fleece, that has not become wealthy. In the mean time we will offer a few observations upon this important subject.

Of breeding and raising domestic animals.—Breeding and raising domestic animals includes not only the multiplication of individuals, but the preservation and improvement of their species, so as to insure some desirable end, which should always be kept fully in view.

The design in raising *sheep* should be to produce, with the least trouble and expense, the greatest quantity of the most valuable quality of fleece; and when this is done, and then only, is the system of sheep-breeding perfect.

We are aware that there are some who consider that the main object in raising sheep is to produce fine flesh for food; and that others entertain the opinion that wool and carcass are of *equal* importance, and equally deserving of care and attention. But we maintain that the matter which ought to absorb our undivided attention is the fleece, and that the production of good mutton will be a necessary consequence.

The most valuable properties of fleece, as regards its usefulness in manufactures and the arts, are its fineness, its ductility, and its flexibility and elasticity—indicating its softness, its strength, and either its capacity to felt and full in an eminent degree, or its being free from shrinking.

Therefore the greatest perfection in sheep-breeding and raising consists in being able to produce an animal whose wool is fine, soft, and strong, and will felt and full perfectly; or one whose fleece is fine, soft, and strong, and will not shrink. And we propose to show that *either* of these objects can be effected in the United States with *one stock,* and that *both* may be effected with *two* stocks, but that both cannot be done effectually and permanently with *one*.

Upon examining the above-mentioned properties of fleece, it is apparent that, inasmuch as these qualities depend upon specific differences of the animals, the same species cannot, by any management or skill of the breeder, be made to produce wool that will felt and full, and fleece that will not shrink ; but that to vary the peculiar specific properties of either within the range of the specific characteristics of each species is more or less under the control of the skilful breeder.

For instance: the *diameter* of wool taken from animals descended from the same parentage may vary ; so the ductility and elasticity of filament (and consequently the softness of the fleece) may differ, although the race is identical, and the strength of the fibres is doubtless subject to the same law ; but far different is the case with the property of felting, fulling, and shrinking, which depends upon the shape, direction, and inclination of the filament, and these upon its organization, all which in the fleece that will felt, full, and shrink, are different from those that will not—so much so that we have ventured to call the one *wool,* the other *hair ;* and so they are in the proper understanding of those terms; for—

1st. Hair is in shape cylindrical or oval ; but wool is eccentrically elliptical or flattened.

2d. The direction of hair is either straight, flowing, or curled ; but wool is crisped and frizzled, and sometimes spirally curled.

3d. Hair issues out of the epidermis at an acute angle ; but wool emerges at a right angle.

4th. The coloring matter of a *perfect hair* is contained in a central canal; but the most perfect wool has no such canal, the coloring matter being disseminated in the cortex, or the cortex and fibres.

5th. The scales of the cortex of hair are less numerous than those of wool; are less pointed, and smoother; and they embrace the shaft more intimately than those of wool ; causing wool to felt and full, while hair will not shrink. These things surprise on account of their novelty ; but when they are perfectly understood, no one will any longer marvel why we say that "there are two species of sheep." Let us, then, in the first place, examine the subject of

Felts and Felting.

The word *felt* is from the Saxon "felt"—from "fel," the hide or skin of an animal. The fabric is manufactured from wool of sheep or other animals, the filaments of which are entangled and matted together, so as, without spinning or weaving, to form a compact mass. There is no doubt but that felting was practised at a very early day. It is true that the first impulse of an uncivilized mind would be to cover the body with the skins of animals rudely stitched together.* "Unto Adam, also, and his wife did the Lord God make coats of skins, and clothed them."—

*The Hare Indians, occupying the valley of the river McKenzie, are clothed in rabbit skins tagged together. (United States Exploring Expedition.)

Gen., ch. iii, *v.* 21.* But it could not have long escaped observation that the filaments of the woolly covering of some animals, while yet growing upon their bodies, had a tendency to entangle and mat; and this *natural felting* was doubtless imitated by our earliest forefathers, probably long before spinning and weaving were known.†

Travellers tell us of Tartars manufacturing tent-covers and tent-carpets by spreading two or three layers of wool on the wet ground and treading them together, making a *felt;* but they have no idea of

The Felting Property.

Notwithstanding the great antiquity of felting, and the great perfection which it has attained as a mechanical and manufacturing art, it was not until very recently, comparatively, that the property in the filament of wool upon which it depends was known, or even suspected. Experience taught that hair would not felt, and that wool would; and from the same great teacher it was learned that among the last-mentioned integuments there were various degrees of this matting and mass-making power, it requiring more felting power to felt than to full; but to explain the cause, or describe the *modus operandi,* the learned and unlearned were equally at fault. The skilful operator has a mass of wool which with his magic bow he has formed into the desired shape; this fleece, "light as the thistle-down that floats on the air," with no other agency than a damp linen cloth and the pressure of his hands,‡ he in a few moments transforms into a firm cloth or felt; but neither he nor the scientific looker-on could explain the phenomenon. At length a filament of wool was placed under the *microscope,* and the mystery was revealed.§

It is the *scales* of the cortex of pile that cause the filaments to felt. They are circularly disposed; upon hair they are less numerous, smoother, rounder at the point, and embrace the stalk more intimately; upon wool they are more numerous, rougher, sharper at the point, and at their anterior extremities stand a little out from the shaft.

The scales upon the different wools should be drawn, described, and classified, to understand perfectly the felting power.

The first attempt to count the number of these scales was made by Mr. Youatt. He found upon the filament of Anglo-Merino wool 2,400 to a linear inch.

Let us here pause for reflection. If one inch in length of this wool has 2,400 scales, and it is (as Mr. Youatt tells us) in diameter $\frac{1}{750}$ of an inch, there are upon the whole area of its contour 23,040 scales, ever ready to hook and fasten into as many to be found upon every similar inch of filament with which it comes in contact!‖ Mr. Youatt afterwards

*And see Lucretius, Lib. xi, v. 1,011,

†Yet weaving seems to have been known in the time of Job; for he says, 'My days are swifter than the weaver's shuttle."—VIII, 6.

‡The nitrate of mercury is sometimes used to facilitate the felting.

§In an article published in the Plough, the Loom, and the Anvil, for 1850, we have given a history of the discovery of the cause of felting, and endeavored to do justice to the memories of those concerned in its discovery.

‖The following calculation was made for us by Ferdinand Hubbel, Esq. There are 2,400 points (which are the edges of scales) upon one inch in length in merino wool; assuming it to be of the same circumference, there are 2,400 in the contour, and multiplying 2,400 by itself will give 5,760,000 for the number of points on the one inch of cylinder. But the filament has a diameter of only 1-750 of an inch: 7.22.1-250 : : 0,004 = 4-1,000 = 1-250. Divide 5,760,000 by 250, and you will have 23,040 for the number of scales upon one inch in length of a filament of wool that has a diameter of 1-750 of an inch.

counted the scales of other wools, from the result of which we have made the following table:

No. 1.	Saxony	2,720
2.	Ld. Weston's merino picklock	2,560
3.	Ryeland Herefordshire	2,420
4.	Ld. Weston's (common)	2,400
	Australasian M'Arthurs	2,400
5.	South Down	2,080
	Odessa	2,080
	New South Wales	2,080
	South Down picklock	2,080
6.	Australasian	1,920
	Irish long-wool	1,920
7.	Leicester	1,860
8.	Norfolk	1,600
	Wallachian	1,600
9.	East Indian (Deccan)	1,280
	Lincoln	1,280
10.	Van Dieman's Land, being slight and indistinct, were not counted.	

We must next speak of

The Shape and Position of the Scales.

It will be observed that, besides the *number* of the scales, their shapes and their positions upon the shaft may materially influence the felting power; for if the scales, although numerous, are smooth, rounded at their anterior extremities, and they adhere to the shaft, they will be less likely to entangle and mat together than under opposite circumstances. Hence the necessity of examining them under a microscope of high power, and of depicting and describing them as proposed to be done.

Of Fulling.

Wool, while being manufactured into cloth, is not felted, but scrubbled,* carded, spun, wove, and *fulled;* the latter process consisting in causing the filaments of the fleece, after having undergone all the other operations above enumerated, to enlarge and mat together, thereby giving more compactness to the fabric. It must be obvious that the same *property* in wool that causes it to *felt* must also cause it to *full.* But there is another peculiarity in wool, which is auxiliary to both these processes, namely, its tendency to form *spiral curls,* which must now be explained.

Of Spiral Curls.

It is one of the consequences of the eccentrically eliptical shape of wool to form these curls. If a filament of merino or Saxony wool be separated from the rest, it will be found to be contracted into these curls.

*The scrubbler consists of a large number of wooden cylinders, placed horizontally on a frame almost touching each other, with small cylinders placed above them. The cylinders are covered with iron teeth; which, as they revolve in different directions, tear the wool into minute proportions. After having been transferred from cylinder to cylinder, the wool is finally thrown off in a flake. It is then carded.

If it is extended until it is straight, and then set at liberty, it will spontaneously return to its original spirally curled condition. Now it is easy to conceive that filaments in this spirally curled state are more likely to entangle and mat together than they would have been were they straight or even undulated. But, preliminary to spinning, the wool has (as above stated) to undergo the operations of scrubbling and carding, by which these curled filaments are broken into minute curves or sections of rings, and these interlock still more than the entire spiral curls, as will be obvious to the reader; for these curves and sections of rings, having been tossed about in every direction by the scrubbing machine and cards, will present to the points of each other's scales opposite points of their own, which will be much more likely to interlock than when, on the unbroken filament, their points were all in one direction. Let us endeavor to make this still more plain by the aid of diagrams.

Suppose A and B to be spirally curled filaments of wool, presented to each other root to point. The points of the scales, being in opposite directions, confer a tendency to interlock. Now suppose these two spirally curled filaments to be broken into curves and sections of rings by the scrubbling machine and cards, at the places indicated by the horizontal lines upon the figure A B; the tendency to entangle is, in the first place, increased in proportion to the *number* of these curves and sections of rings. But suppose, again, that these curves and sections of rings are presented to each other (as they will be after the wool is scrubbled and carded) in the opposite direction of the points of their scales, as represented in figure C D; the tendency to entangle and the mass to mat will be still further increased, in proportion to the number of curves or sections of rings that are thus oppositely presented.

From all which we learn that, although the *scales* are the principal cause of felting, yet they receive considerable aid from the spiral curls. Having discussed so much at length the properties of the wool that will felt and full, it now becomes us to say a few words respecting

The Fleece for manufacturing articles that will not shrink.

Fleece that will not shrink (or will not do so in an appreciable degree) is exceedingly valuable for the manufacture of flannel, worsted,* blankets, hose, &c. Now we are to understand that *shrinking*, which is defined to be "the contracting into a smaller space," is only another word for "fulling," since it depends for its operation upon *precisely the same* properties of the *fleece.*† If wool possessing the felting property be manufactured into cloth, all but the fulling, it will afterwards, when used and washed in hot water, shrink; and so will *flannel, if made from the same material.* On the other hand, cloth which is made from a fleece *which has no felting property* will not full, and the only way to obtain flannel *which will not shrink* is to use that material. This is correct in theory, and will hold equally good in practice, as any one will discover who will try the experiment; so that nothing further remains to be

*Worsted is a thread spun of fleece that has been combed, and which in the spinning is twisted harder than ordinarily. Formerly, it was chiefly used to be woven into stockings, caps, gloves, &c. The name is derived from that of the town in England where it was first manufactured. (See Slater's Memoir, App. p. 440, where will be found some excellent remarks upon the manufacture of worsted.)

† The degree may vary.

known but whether the sheep breeder can at *pleasure produce a fleece that will felt and full*, or *a fleece that will not shrink;* and this question we propose to discuss.

Of Sheep.

Wool grows upon a great many animals, but our chief supply is obtained from the *sheep*. Sheep belong to the tribe of hollow-horns, of the order Ruminantia, and are distinguished from the goat principally by the direction of the *horns*.

We will not consume time by enumerating the different kinds of sheep, nor by noticing the vain endeavors that have been made to refer all the domesticated varieties to some wild species. They were domesticated as early as the time of Abel, for he was a "keeper of sheep;" but there were no doubt wild ones ever since, and even are at the present day.

Of the two Species of Sheep.

It is very evident to us that there are two distinct species of sheep, viz:

1st. The *hairy* sheep, and

2d. The *woolly* sheep.

The hairy sheep, when perfect, has no wool; and the woolly sheep, when perfect, has not a hair on it. We have already described hair and wool, and shown how the latter is admirably calculated for the manufacture of felts and all cloths which are required to full; and the former to the manufacture of flannel, worsted blankets, and hose, and all articles that are required not to *shrink*.

The fleece of the *hairy* sheep has sometimes been called "long wool," and that of the woolly sheep "short wool;" but the truth is, that the former is not wool at all, and these "long" and "short" names should be discontinued, being calculated to mislead. In the manufacture of fabrics that are required *not* to shrink, the hair should be *combed* and spun, but never scrubbled nor carded. The object is to preserve the same direction of filaments that they had on the body of the animal, where the scales are not opposed to each other, and where they have no tendency to entangle, even should they become loose.

But it will be objected that there are sheep that have on them both hair and wool. We admit it, and shall now proceed to show that the existence of such *mongrels* is no argument whatever against our division into two pure species. But, as the discussion of this point involves nearly the whole art of sheep-breeding, it is time that we should reduce what we have to say to order.

Rule the first. The sheep-breeder should never cross the two species of sheep, viz: the hairy sheep and the woolly sheep.

This is the most important direction we have to give; it is the golden rule—the *primatus principatus*—a rule the more necessary to be dwelt upon, as its adverse has been countenanced by authority, and has been acted upon by those whose example has been deemed worthy of being followed. Its discussion divides into two questions, viz:

1st. Whether the *hairy* sheep and the *woolly* sheep belong to *two* distinct species. And

2d. Whether, by the amalgamation of two distinct species of animals, *a permanent self-supporting race, possessing equally the properties of both parents*, can be produced.

The learned have not always agreed upon a definition of the term "species;" on the contrary, it has been used in different senses, according to the mode or subject, whether literary, popularly, logically, or zoologically and physiologically. In its zoological and physiological meaning it is, according to the Rev. Thomas Smith, "*a fixed* PRINCIPLE, founded upon the indefinite varieties of which animal life is capable." In regard to *proof*, he considers *common parentage* as the best evidence which the nature of the case admits; but, as this parentage could not always be traced, he does not exclude other proof.

We acknowledge that we prefer the definitions of species given, respectively, by Van Amringe and Mills; but we do not think that it would be hazarding too much to affirm that, under almost any other definition of it to be found in the books, the modification of an animal, from being *entirely covered with hair* to being *entirely covered with wool*, when *permanently native in its race*, is sufficient ground for a specific distinction. That this is the case with the most perfect kind of animals known, we think we have proven in "The classification of *Mankind* by the hair and wool of their heads," to which we refer; and if we have, the argument, from analogy, in regard to the two species of *sheep*, is irresistible. But, even if it shall not be considered that we have heretofore shown by the hair and wool that man is not confined to one species, we shall contend, and shall endeavor to prove, that there are *two species of sheep*.

"Species (says Van Amringe) is a constitutional organization in a race of animals producing a similarity of functions, in which they agree with all animals of the same genus in generic character, but differ from races of the same genus in modifications of generic character—in regard to form, color, instincts, or intellectual power—and which we have good reason to believe to be permanently native in the race."

Now, in considering the permanent modifications of generic character as regards form, let us see whether naturalists generally have not been influenced by discrepancies of a much less decided character than those which distinguish the hairy sheep from the woolly sheep. The general similitude between the horse and the ass is very striking—the difference between them (if we throw out of view a discrepancy in the dimensions of the head and ears) consisting in the *color* and *marking* of the *pile;* yet where is the naturalist who has put them in the same species? The zebra, which has pretty much the same form as the horse and the ass, is placed in another species on account of the singular disposition of the colors of his hair ("*Equus lineis transversis versicolor*," Lin.).

The quagga, the onagga, the dziggatai, between which and the horse and the ass there exist still slighter shades of difference, are all considered as distinct species. The two species of camel are distinguished by one having *one* and the other having *two* humps on the back, and they are never placed together.

There are two species of rhinoceros, one having *one* and the other having *two horns*.

There are several species of the deer kind, which are known mainly by the difference in the horns. Some species of monkey are distinguished by the presence and others by the absence of the *tail*. Sloths are separated into species by the number of their *toes*.

And in Peru there are two species of lizard, the only difference between which is, that the one has an orifice in the thighs, for the passage of a gland, which the other has not.

Why, then, hesitate to acknowledge *two* species of sheep; the race of one *permanently covered with hair*, and that of the other as permanently covered with *wool?*—especially if (as has been shown) the difference between these integuments is not merely one of color and marking, (as in the cases of the horse and the ass, and the horse and the ass and the zebra,) but where the shape, direction, and inclination of the pile are different; where the disposition of the coloring matter is remarkably different; and, above all, where the number, shape, position, and mode of adherence of the scales of the cortex are so entirely different as to render the one altogether unfit for felting and fulling, and not liable to shrink; while the other is admirably adapted to felting and fulling, and liable to shrink. Take all these things into consideration, and then say whether there is not, at least, as much ground for believing these two animals to constitute two species as there exists in regard to the unity or plurality of the humps of the camel, or of the horns of the rhinoceros. And then, again, remember that, to establish this modification, there must be a difference of organization—a difference in the functions which the apparatus of each kind have, respectively, to perform: for instance, the fibres and cortex of the wool, while they subserve all the ordinary purposes which they do in hair, are also the medium of conveyance for the coloring matter of the former integument; while that of the latter flows in a central canal. "Species of plants (says Mills) are not only *real kinds*, but are, probably, all of them, *real lowest kinds*, or *inferior species*." And he adds, "I say *probably*, (not certainly,) because this is not the consideration by which the botanist determines what shall or shall not be admitted as a species; but which, consistently with experience, *might* have been produced from the same stock.* So that in the present instance, (seeing that the same law prevails in the animal commonwealth,) where the inquiry is—"whether the hairy sheep and the woolly sheep are not two distinct species?"—we are not bound to show absolutely that they are descended from different parentage, but only that, consistently with experience, they *might have* been descended from different parentages. And after having shown the difference between hair and wool, and having pointed out the character of the discrepancies upon which zoölogists have been in the habit of erecting species, we would confidently inquire whether any naturalist, who had presented to him two newly-discovered wild animals, otherwise alike, but one of which always produced wool and the other one hair, would hesitate to consign them to two specific departments? And if he would not, then why, in the case now before us, should we allow habit, born in ignorance and nurtured in stubbornness, to prevail over the dictates of reason and experience?

Let it not be supposed, from what has been hitherto said, that too little attention has been paid to the laws of physiology; for we do not believe that the zoological and physiological, and even the embryological, meanings of the word *species* materially differ. The author last cited remarks "that it seems to be a law of physiology that animals and plants do really, in the physiological as well as in the popular sense, propagate their kind, transmitting to their descendants all the distinction of *kind* (down

*By the adoption of this rule no inconsistency is introduced, for (as this learned author shows) this distinction, in most (and probably in all) cases, happily accords with the other.

to the most special and lowest kind) which they themselves possess." Now surely one of the distinctions of kind of the hairy sheep is to produce hair, and one of the distinctions of kind of the woolly sheep "is to produce wool." In like manner Agassiz, (in Prin. of Zool., p. 43,) says: "The constancy of species is a phenomenon depending on immaterial nature. Animals (and plants also) produce their kind generation after generation. We shall hereafter show that all animals may be traced back, in the embryo, to a mere point upon the yolk of the egg, bearing no resemblance whatever to the future animal. But even here," he adds, "an immaterial principle, which no external influence can prevent or modify, is present and determines its future form; so that the egg of the hen can produce nothing but the chicken, and the egg of the codfish can produce only the cod. It may therefore be said, with truth, that the chicken and the cod existed in the egg before their formation." Now although this learned author has given us examples drawn from two *classes* of animals, viz: the chicken and the fish, it is fair to presume that he also meant his observation to apply to animals of different *species*, but of the same class and order; and therefore that the hair of the hairy sheep, and the wool of the woolly sheep, according to his notion, depend upon an immaterial principle, which no external influence can prevent or modify. The question of species is therefore one of *fact*, and Dr. Morton was right when he said "all circumstances which tend to establish analogies are proper and necessary for the determination." We admit, when common parentage can be traced with certainty, that it constitutes the best evidence which the nature of the case allows; but he who would reject secondary evidence, when primary cannot be obtained, would place himself in the position of one who would shut his eyes to all other light, because he cannot always bask in the rays of the noonday sun. Between animals of the same species nature throws *no impediment whatever to free sexual intercourse*, and the progeny form a permanent self-supporting race of animals, which inherit equally the properties of both parents. But with animals of different species, there is a natural abhorrence to amalgamate, which sometimes cannot be overcome at all, and with others exhibits itself in various ways and in various degrees; and the progeny are always incapable of securing a permanent and self-supporting race, in the proper sense of those terms. This is a most valuable rule for the determination of species, when properly understood and correctly applied; but, from inattention and inadvertence, it has been converted into a fruitful hot-bed of error, as will be hereafter shown in the proper place.

The common cow and the buffalo have a natural antipathy to each other; such is the fixed aversion formed between these creatures (as we are informed by Goldsmith) that the cow refuses to feed with the buffalo, which she nearly resembles. Wild asses (as we are told by the same beautiful author) live in herds, but they will not allow a horse to come among them; if, perchance, one strays into the boundary of their grazing ground, they fall upon him without giving him time to retreat; they kick and bite him until he is left exhausted on the spot. The babyroussa, or East India hog, is often seen with the wild boar, with which, however, he is never known to engender; and the peccary of South America, although he herds will the wild hog, which he so much resembles, has never been known to breed with him. This is the voice of nature, proclaiming, in unmistakable terms, her abhorence of the amalgamation of species.

How is it when man exerts the powerful influence of domestication? Sometimes even here all efforts to subvert nature are abortive. Buffon, for three years, kept a male water-dog and a she-wolf together, but they refused to have any intercourse. Goldsmith tells us that a similar experiment was tried with a fox and a dog; and the hare and the rabbit, though so nearly resembling each other in form and disposition, refuse to hold any communication. Buffon bred up several of both kinds together; but, from being at first indifferent, they soon became enemies, and they would sometimes combat until one was disabled or destroyed. How is it, it may be asked, with the horse and the ass? The mule, it is asserted, may be engendered by mixing either a horse and a she-ass or a jack and a mare. When the latter method, which is the one proposed, is resorted to, a horse is used as a teaser, and before the jack is brought forward the mare is hoodwinked. Is this the *free sexual intercourse* spoken of in the rule above quoted? But we have another question to ask in regard to this connexion, viz: Is the mule prolific? Is it capable of continuing the race? Goldsmith says, "that, from the great resemblance between the horse and the ass, one would be led to suppose that they are of the same species—that the ass was only a degenerate horse; but that they are perfectly distinct—an inseparable line having been drawn between them." He adds, "that it had been said by Aristotle* that the male mule was prolific; but that, after two thousand years' experience, this assertion had been modified; that others had said that in warm climates *female* mules are prolific; but that, upon examining the cases, it was found that such progeny were *incapable of continuing the race.*"

Fortunately, we have the reports of two cases which occurred in our own country; which, as they are exceedingly interesting, we will be excused for giving at large:

"John Thomson Kilby, of Springhill, Nansemond county, Virginia, was the owner of a female mule, which, on the 23d of April, 1834, was delivered of a male young one. She was not suspected of being with foal, and therefore it was not known what animal was the father; but suspicion alighted upon a three-year-old colt belonging to Mr. Kilby, which had been allowed to run with the mules on Sundays; also, the young one resembled the colt. When born it was very lean; but its mother (although she had a small udder) having plenty of milk, it throve pretty well until the 20th of October in the same year, when (having been previously weaned) it was taken sick, and died of lock-jaw the following day. Another (female) young one was born of the same mule, on the same plantation, on the 13th of August, 1835, and died on the 26th of August, 1836, after having been sick two or three days only. It was in fine order; ran with its mother, which was doing nothing, in good pasture. When taken sick it had every medical attention paid to it; but it was found impossible to effect a passage through it; and, upon a post mortem examination, all the food and medicine were found in the stomach, none having ever passed into the intestines."

We recollect how, at the time, these two births were dwelt upon as

* He died 322 years before Christ.

proving the mule to be prolific; but we ask the intelligent reader whether they do not fall far short of the mark? They exhibit no ground to believe that such progeny can ever be the foundation of a permanent self-supporting race; which, as we have seen, is one of the conditions of the rule above quoted.

We will next refer to some cases of intercourse, or supposed intercourse, between the goat and the sheep, premising that, although the evidence in these cases is somewhat contradictory, yet its weight will lead us to a similar result. Smith (in Hist. of Man, p. 117,) says that "goats and sheep intermix, producing *permanently fertile hybrids.*" But Bellchambers, in a note to Goldsmith's Nat. Hist. of Man, &c., p. 245, qualifies the above broad assertion as follows: "The sheep and the goat propagate. The buck goat is found to produce, with the ewe, an animal which, in *two or three generations,* returns to the sheep, and seems to retain *no marks of its ancient progenitor.*" How the breeding goes on during these "*two or three generations,*" we are not informed, but we take it for granted that the progeny are bred *towards the sheep.* Surely, no one would pretend, from this evidence, to aver that such hybrids were *permanently* fertile, much less that they constitute a *self-supporting race.* Now, let us see what the author of Illustrations of Nat. Hist., p. 151, with all these remarks before him, has to say upon the subject:

"Although the goat is a distinct *species*, and, possibly, further removed from the sheep than the horse is from the ass, yet the buck will propagate with the ewe. But although these intercourses happen very frequently, and are sometimes prolific, yet *no intermediate species* has ever been found between them." * * * "*No new* or *middle race has arisen* therefrom."

It seems, then, that all that we know with certainty is, that the goat and the sheep, in their domestic state, *frequently* have intercourse, and not that they have *free* intercourse, as exist between members of the same species; that this intercourse is "sometimes" (not uniformly) prolific, and that here the propagation, *per se*, ends. If you desire to continue the progeny, you must call in the aid of some one belonging to the original parents. And even this breeding is somewhat doubtful; for one of our correspondents, viz: Mr. Samuel Patterson, of Patterson's Mills, Washington county, Pennsylvania, in a letter to us upon this subject, says: "I have made inquiry, but have heard of no case of intercourse between the sheep and the goat being prolific. I have tried the experiment to some extent, myself, with the goat and the ewe, but without production. I have never seen the ram having intercourse with the she-goat, although I have had them running together at tupping time. Mr. Plummer, a neighbor of mine, has made the experiment more fully than I have, but with the same result. I am perfectly satisfied that the fine woolled sheep (the woolly sheep) and the goat will not mix. I know of no case where it has been tried with the coarse hairy sheep." From all that has been said, we feel warranted in believing that the best rule we possess of discriminating between species is, to inquire whether nature has thrown *any impediment* between the animals to *free sexual intercourse*, and whether the progeny form a *permanent, self-supporting race of animals*, which inherit equally the properties of both parents. And we feel confident that a trial of the hairy sheep and the woolly sheep by this law, in order to ascertain whether they are one and the same, or two distinct species, will result entirely in favor of the ground we have taken. Mr. Youatt, when speaking of the attempt in England to amalgamate the South Down sheep (which is itself a hybrid, being a mixture of the hairy and the woolly species) with the Leicester sheep, (which belongs to the hairy species,) pronounces it a *failure;* and he adds that the promised advantages to be derived from the South Down with the merinos WERE DELUSIVE. (See Essay upon Sheep, p. 233.) It is true that this author does not appear to be aware of the cause of this failure—one of the reasons why the expectations to which he has referred were delusive; but he has furnished us with the facts, and the inferences to be adduced from them, which are irresistible. Dr. Robert Knox, an English lecturer on anatomy, and corresponding member of the Natural Academy of Medicine in France, in a recent work upon the races of men, p. 52, says: "The theories put forth, from time to time, of the production of a new variety, permanent and self-supporting, independent of any drafts or supplies from the pure breeds, have been distinctly dispoved. It holds neither in sheep nor cattle." And again, on page 68: "But the statement in question is not even true of sheep; for by no effort, saving that of constant, never-ceasing intermixture, or draft on the pure breeds, can a mixed breed be maintained."

So Colonel Randall (in Sheep Husbandry in the South, p. 170) admits, that any attempt to unite the merinos and the Leicester by crosses is an *unqualified absurdity*. It is true that this last gentleman (incautiously, as we presume) advises the crossing of the South Down and the merino; but such a crossing of a hybrid, formed from an amalgamation of the two species with the pure race of one of the species, is no less an "unqualified absurdity;" although the reason may not at first be quite so apparent to every one. We have not only the pleasure to hope, but the vanity to anticipate, that Col. Randall, after further reflection upon this important question, will agree with us in opinion. If he does not, we would like to hear *from himself* why the crossing of the South Down and the merino merits his recommendation, while the mixture of the merino and the Leicester is so inconsistent with reason and common sense. Having satisfied ourselves that the hairy sheep and the woolly sheep are members of *two species*, the next step in the inquiry is, What is the consequence of their amalgamation? Will it promote or mar the great object of the American sheep-breeder? Considering the very great extent to which sheep are now raised in the United States, and the general prevalence of crossing, these are important questions. The grand desideratum of the American sheep-breeder is, to form and preserve either one permanent and self-supporting race of animals—which shall inherit equally the good qualities of both parents, which shall produce, with the least trouble and expense, either the greatest quantity of the finest quality of fine, soft, and strong wool, which will felt and full in the greatest perfection, or the greatest quantity of the finest quality of fine, strong, and soft fleece, that will not shrink—or two races, one answering to either of these requirements. Now, to perform either or both of these, he must, in each flock, confine himself to one species; for as often as the parents are of different species, the offspring will be hybrids; none of which possess the power of permanently fixing and self-supporting a race such as has been mentioned. Among all animals, intelligent and instinctive, there exists a natural abhorrence

to the amalgamation of species; but it is exhibited in different ways. Sometimes the antipathy is so potent as to amount to an entire prohibition, as we have seen in the cases of the cow and the buffalo, the barbarousa and the wild boar, the peccary and the wild hog, when in their native state; and the dog and the wolf, the dog and the fox, and the hare and the rabbit, even when domesticated. At other times the antipathy is partially subdued—in a few instances out of many—by association, as the rare cases of marriages between a white person and a negro. And here every one of us must have been witnesses of the almost universal feeling of abhorrence of the community disgraced by such an outrage; often followed by an outbreak. That this is the effect of the natural feeling we have described, we rely upon Professor Samuel G. Morton, who tells us that it is not only proverbial among all European nations, but it is evinced by Africans in their own country; and upon Duncan, who, in his travels in Western Africa, relates several instances of the negresses running away in apparent fright and *disgust* at the sight of a white man.

At other times this natural abhorrence is overcome, either by domestication alone, or by domestication aided by the artifices of man, as in the case with the jackass and the mare. In like manner, nature makes known her non-conformity to this mixture in various ways. Sometimes the issue is absolutely sterile; at others the product is so mal-conformed that it cannot survive the period of lactation, as was the case with both the foals of Mr. Kilby's mule. Now the progeny are capable of being continued, but only by new drafts or supplies from the pure breeds from which it sprung, as was the issue of the sheep and the goat mentioned by Bellchambers. Then the progeny multiply among themselves for two or three generations only, and even during that time show no constancy of character, as mentioned by Van Amringe, (in Natural History of Man, p. 429,) who says: "We have devoted much attention to this subject, have examined a number of mulatto families, and are satisfied that the children seldom exhibit the medium color of the parents;" and in a subsequent page, (431,) he adds, that "in large families of mulattoes, (of half-blood parents,) it is quite common to find several of the children as light-colored as if one parent was white, and another portion of the children as black as if one parent was a pure negro." All these different phases speak in different languages, but they all proclaim the same sentiment of natural abhorrence to the amalgamation of species; while by the connexion of two individuals belonging to the same species, the stock is uniform, permanent, indestructible, and ineffaceable; no change of time, food, climate, nor circumstances can materially alter it, much less sweep it away; as witness the cases of the Jews and Gipsies, whose races have outlived the records of the most ancient history. "It is by the exclusion of all foreign mixtures," says Humboldt, "that *species are preserved*." And even Dr. Prichard, who has shown such anxiety to reduce the white man and the negro to the same category, tells us, (in Researches, &c., vol. 2, p. 341,) that "*separate species* of organized beings *do not pass into each other* by insensible degrees." What Van Amringe has remarked in regard to the variation of the *color of the skin* of the children of mulattoes, we have found to correspond in the diversity in the organization of the pile, which, sometimes corresponding with that of one parent, and at others with that of the other parent, and at others still resembling the pile of both in different filaments, furnishes ample proof that there does not exist that *joint inheritance* of the characteristics of both parents, so remarkable where the progeny are derived entirely from one *species*. This experience ought to serve as a warning to the American sheep-breeder, whose object is to produce a race enjoying equally the good qualities of both parents. The natural disgust implanted in the minds of all animals to the mixture of species seems to have been wisely pre-ordained in order to *preserve* the purity and beauty of creation. By the *formation of species, order was proclaimed*; but it can be *maintained* by this natural feeling alone. Without such a feeling, the harmony of species throughout the immense varieties of created beings, which now people and beautify the earth, the air, and the sea, would be utterly destroyed, and the whole animal commonwealth would be converted into a disgusting assemblage of unsightly monsters. God has wisely and kindly given to each species of animals the intelligence, the instinct, and the organs exactly fitted for its respective station; but, by such a general amalgamation, his wisdom and kindness would be rendered entirely abortive, and his designs for the happiness of his creatures annulled. Organs would be taken away from animals to which they are invaluable, and conferred upon others to which they would be an incumbrance. Propensities which are the happiness of one species would be torn from them, to be possessed by another to make them miserable. It is no objection to our position that such crosses are sometimes allowed to be productive to a limited extent; for after the lapse of a few generations the progeny either pass over to the side of one or other of the progenitors, and the abnormal race is thus expunged forever from that polluted page of the fair volume of nature; or the breed, from the natural defect caused by this very amalgamation, runs out entirely, and is thus eventually lost. Every practising physician has had occasion to remark how much more mulattoes are liable to scrofulous and phthisical diseases, and similar wasting complaints, than either the whites or blacks, from whom they are descended; and we have no doubt but that the same law holds in regard to sheep when species are amalgamated. Now, this is destructive to the *permanency* of stock, which is one great object of the American farmer to insure. It little suits his purpose, after having paid for a high-priced ram, to have all his hopes of a stock blasted by an unwise crossing. It is true that, by a repetition of the same causes—that is to say, by similar amalgamations—new hybrids may sometimes be continually produced, as in the case of mulattoes and mules; but they are subject to the same laws of destruction, and are doomed to the same premature decay and demolition. "With the cessation of the supply of European blood, (says Dr. Knox,) the mulatto of all shades must cease. He cannot extend his race, for he has no race—there is no place for him in nature." And Colonel Smith (in Natural History of Man, page 119) says: "We doubt exceedingly if a mulatto family does exist in any part of the tropics continued to the fourth generation *from any one stock*—perhaps there is not one, even in five generations, of positive mulattoes, but that all actually require, for continuity at least, a long previous succession of foreign influences—of white, or negro, or mestizo, or quadroon, or sambo, or native Indian, or Malay blood—before the sinew and substance of a durable intermediate race can be reared." Then how can the American sheep-breeder reasonably expect, by crossing a Saxon ram with a common country ewe, to obtain a stock of *merino sheep*? We

know that sometimes hybrids are purposely produced, on account of an individual peculiarity which (notwithstanding their evanescent character) renders them, in some respects, more valuable than either of their progenitors. This is the case of the mule. But the same reason does not exist for producing the *hybrid sheep*, which possesses no such peculiarity, and is esteemed only in proportion to its similarity to its progenitor. In page 120, Colonel Smith says that "war and slavery are the elements of amalgamation, where mixed races spring up and are maintained until the impure fall a prey to the pure races—the former falling before the victors until they are exterminated, absorbed, and perish by a kind of decreasing vitality, and are entirely obliterated." From hastily reading the passage last cited, the reader might, perhaps, be led to infer that, in the end, no injury is done to the pure races, which are represented as swallowing up the impure ones; but this author adds: "Yet this *apparent* obliteration must ever affect subsequent forms and mental condition in the victors, which the physiologist ought to bear in mind when known, or indicate when only suspected." Therefore, let no American sheep-breeder flatter himself with the hope or expectation that by breeding *towards* a superior race he will ever be able entirely to obliterate the defects of an inferior one; if he does so, he will find, to his cost, a discomfiture—and that, perhaps, when he least expects it—that the obliteration is not real, but *apparent*, and that he has entailed a stigma upon his stock which no art nor time can wholly eradicate. In page 214, Col. Smith explains some of the names of hybrids from the crossing of white and black persons. He says: "A black and a white make a mulatto; a mulatto and a white make a quadroon; a quadroon and a white a mestee; a mestee and a white a *white*." But what kind of white is thus manufactured out of black and white? He tells us, "But this last has black and curly hair; nails dark and ill-shaped; feet badly formed, and much of the negro propensities." Now, Colonel Smith may call this a white if he chooses, but we would be very much afraid of marrying such a white, for fear of finding ourselves some day blessed with a *black heir*;* and we think that, arguing from analogy, it would not be hazarding too much to predict, that if the (so called) *full Saxon sheep* we read and hear of, manufactured by breeding from an impure to a pure race, were critically examined, the vestiges of their impurity would be found still lurking in their veins.

*Our learned friend, William F. Van Amringe, to whom we loaned the MS. of this chapter, returned it with the following valuable note: "*Black Heir.*—This unfortunate circumstance happened recently in ——. A gentleman of high respectability married a beautiful girl, whose first child was a *negro!* The fidelity of the wife was beyond suspicion; but, on investigation, it was discovered that her grandfather, or great grandfather, was a negro. Dr. White, a wealthy, educated physician, formerly of Dutchess county, in this State, [New York,] became possessed of a full-blooded Ayrshire cow, which, about 20 years ago, he put to a full-blooded Durham white bull. Subsequently, he bred continually in-and-in towards the cow, and boasted that he was practically disproving the decline of constitutional impairment by in-and-in breeding, notwithstanding my prediction that it would ultimately fail. It was remarkable, that for many years—say 12 or 15—the progeny uniformly leaned towards the cow, whose color and type were frequently reproduced; during which the color and type of the bull did not appear. Suddenly, a few years ago, the color and type of the bull exhibited themselves; and from that moment the impairment of constitution became manifest, and the extinction of the stock hastened. From this remarkable example I infer, that in crosses, so long as the constitutional energy of either parent predominates over that of the less vigorous parent, and manifests itself in the constitution of the progeny, propagation will continue; but the moment the constitutional energy of the predominating parent becomes reduced, to admit the alteration of the constitution of the less vigorous parent, the rapid extinction of the race is indicated."

It is not in the nature of things that adding to impurity begets purity. Gold added to copper never yet made *pure gold;* nor will pure blood added to impure make pure blood! "It is a law of nature (says Agassiz) that animals as well as plants are preceded by individuals of the same species only, and reproduction in animals is almost universally accomplished by an association of individuals of two kinds or sexes, male and female." But those who contend for the breeding we are now calling in question act upon the principle that *one kind only* can accomplish the reproduction—not only so, but they act upon the principle that they can select which of the two kinds (sexes) shall perpetuate its like; for if it is left to nature, and she selects the impure kind, then they admit that the stock is irretrievably destroyed. The law of species is so clearly laid down by Professor Wagner that we cannot withstand the temptation of transcribing a part of his essay: "Plants produced from different varieties of the same species are fertile; while *hybrids* either revert to the original character or become gradually less capable of reproduction, and within a few generations become entirely extinct." Doctor Prichard copies this passage into his Natural History of Man, followed by the remark that "the same law prevails in the animal kingdom," and Van Amringe confirms the opinion in the most unqualified manner. So you perceive that it is the acknowledged law of God, who has conferred on man, and other animals, the power of producing *others of their kind*, and of thus perpetuating their species, but not of *forming a new race.* "And God made the beasts of the earth *after his kind*, and cattle *after their kind*, and every thing that creepeth upon the earth *after his kind;* and God saw that it was good." The word *kind*, here found repeated, corresponds with the term *species.* Thus it appears that God saw that it *was good to create all animals in species.* It is God's attribute to create—man's to mar and destroy! Such artificial varieties as we have been condemning are natural deformities. Specific uniformity is beauty, and belongs to nature—emanates from her laws, and is the work of her hands. Every deviation from nature's type must necessarily be a *deformity.* It is one which she (if left to herself) will throw off—cast from her, as unworthy of support; but if the deviation is persisted in, it terminates in chaos. As sometimes it is allowed to argue from extremes, let us suppose, for a moment, that nature were to resign the reins of creation to man, what a picture would soon be presented: cows rioting in blood, while lions and tigers were grazing and chewing the cud; fishes clambering up trees, or building and inhabiting three-story brick houses; turkeys in uniform, strutting at the head of regiments of geese and fowls; hogs dressed in brocades and adorned with pearls and diamonds; while woman—lovely woman—is grunting Italian airs as she lies wallowing in mire!

And lastly, we must anticipate an objection which may, possibly, be made to our two-fold division of sheep—into the hairy sheep and the woolly sheep—viz: that there are sheep which are covered with both hair and wool. Now, suppose our opponents were able to demonstrate that these sheep belonged to a *third species.* This would, by no means, invalidate the position we have advanced. But we believe that the true answer to such an objection would be, that the hairy and woolly sheep are hybrids; like the mulatto, before noticed, exhibiting integuments bequeathed, respectively, by both their progenitors. It has been said that sheep taken from one climate to another will partly change their coats—portions of the hair of some falling out and being replaced by wool, and portions of the wool of others falling out and being replaced by hair; for no one in his senses would contend that a single filament of either of these integuments can be transformed into the other.* Now, this change of coat never happens to either the *pure hairy sheep* or the *pure woolly sheep*, but is a condition of those hybrids which have already hair and wool. From all which we are decidedly of opinion that the American sheep-breeder—whose object is to lay the foundation of a permanent self-producing stock, (or, if he will, of two such stocks,) inheriting, respectively and equally, the good qualities of both their parents—should abstain from mingling together the hairy sheep and the woolly sheep. He ought to do so as a means of prudence, were it only that he incurred the *risk* of injuring the flock *a multo fortiori*, after we have positively proved that such crosses are unmitigated evils.

Are crosses of hairy and woolly sheep recommended to save expense of outfit? No outlay of capital can justly be considered as extravagant which has for its object to preserve a permanent purity of stock. Is it to save time? It is time *lost*, and not time saved, to commence by such abnormal crossing. When an architect is about to erect a noble superstructure, which may last for generations, he commences by laying a perfectly solid foundation, regardless of a moderate expenditure of time and money. The breeding and raising of sheep, and the producing of fleece, promise to be, in this country, a great and important undertaking. Let us not injure it by a hasty and inoperative plan of breeding.

We hope it will not be inferred from anything urged in this essay that we advocate *breeding in-and-in.* All that we contend for is, that the breeding shall be confined to the *species*, not to *families.*

In the preceding pages we have demonstrated that, where animals are of different *species*, (as we have shown the hairy sheep and the woolly sheep to be,) it is impossible by their amalgamation to produce a permanent, self-supporting race, possessing equally the properties of both parents. We now propose to prove that, even when they are not of two species, but of only different *varieties* of the same *species*, all attempts to produce such a race are abortive.

"*Varieties*, (says Dr. Bachman,) once formed, may produce *other varieties*, or they may *sink into degeneracy and perish;* but they CANNOT AGAIN BE BROUGHT BACK TO THE RACES FROM WHICH THEY ORIGINATED." Then the American farmer who crosses the merino or Saxon-merino blood with the common country sheep—because somebody has told him that they are *varieties* only of the same species of animal, and that, by constantly breeding their issue towards the merino or Saxon-merino, he may, in a few generations, extinguish the blood of the common country race—will find himself still wide of his mark; he has forsaken the direct road, which would have surely brought him to the desired goal, for a crooked and uncertain path, in which all his labor will be unsuccessful.

Nothing can be more explicit to this point than the above quotation from Dr. Bachman, unless it be his concluding remark, viz: "NO BREED OF COWS, SWINE, OR BIRDS, HAVE EVER REVERTED TO THE ORIGINAL FORMS." And it is certain that he would not have hesitated to have included *sheep*

* Mr. Latham (in Natural History of Man, page [illegible]) speaks of the hair *changing;* but his views are not explained.

in his list, had the suggestion been made. The idea that the impure blood, by mixing with the pure, can be entirely annihilated is unphilosophical. "Like streams that flow onward, like fragments of rock torn from their native precipices, like metals changed by the chemists, the elements still exist, but in other forms; they are not annihilated, but have entered into new combinations, *never to return to their original sources*."—*Bachman.*

To this point numerous other authorities might be adduced, but we will content ourselves with the two following: Dr. Pickering says, "*Varieties do not revert to their original type;*" and even Dr. Prichard admits that "*the smallest varieties, once produced, are never again obliterated.* This (he says) would seem to be one of the mysteries of nature: we may compel her to *place her signet*, but we know not how to force it off again. Man, like the magician, or half-skilled scholar, (so beautifully described by the German poet,) often possesses the skill to compel her to work, but has not yet learned that which may oblige her to desist." This is beautifully exemplified in the case of the *horse*. The Arabian is the finest race in the world; in his own country no one ever thinks of crossing the breed—on the contrary, the pure blood has descended uncontaminated through successive generations; but in this and other countries, where the practice of amalgamation with other races prevails, they have endless varieties of this noble animal, but no pure Arabian race. But in regard to sheep, the American farmer, being now forewarned, is forearmed; and we anticipate that, with the exercise of that good sense for which our countrymen are remarkable, they will cease to pursue a practice that has been proved to be erroneous.

What would one of them think of a chemist, who, being possessed of two liquids, one oleaginous and the other aqueous, both of exceeding great value, should mix the two together and destroy both? And yet the sheep-breeder who mingles the hairy sheep and the woolly sheep, is guilty of a greater absurdity.

Let those persons who affect to despise what they term "book knowledge" (if all such have not been *weeded* out of the garden of agriculture) remember that the distinction made by us between the hairy sheep (whose fleece will not felt nor full) and the woolly sheep (whose covering will do both) is not only scientifically correct, but is one of exceeding great practical importance as regards manufactures and the arts. We next propose to show, by arguments drawn from experience—that great instructor in everything which relates to natural history, that the true way of breeding sheep is to preserve the two species distinct. We will commence with Saxony. The kingdom of Saxony is situated in the east of Germany. It is bounded on the northeast by Prussia; on its southeast border is the Erzberg mountains, which separate it from Bohemia; on the west it has Prussia and the Saxon Duchies; it is divided into four circuits, viz: Bautzen, Dresden, Leipzig, and Zwickau. These circuits are respectively divided into counties; in the circuit of Bautzen there are two counties, viz: Bautzen and Zittau; in Dresden there are four counties—Dresden, Meissen, Hayn, and Freiberg; in Leipzig there are three counties—Borna, Rochlitz, and Grimma; and in Zwickau there are five counties—Chemnitz, Zwickau, Niederforchheim, Plauen, and Glauchau. Saxony is the smallest kingdom in Europe, containing, according to some writers, 5,800, and, according to others, only 5,640 square miles. She has, then, about one-eighth of the territory of Pennsylvania, and about

one-eleventh of that of Virginia; but she has a population of 1,600,000; and it is calculated that she has 25,000,000 of sheep.

The Saxons sell their sheep and export immense quantities of wool, notwithstanding which their manufacture of wool employs 25,000 persons. But the subject to which we desire at present to call the more particular attention of the American people is the exceeding great fineness of the Saxon wool, which, considering that this quality is generally indicative of all others estimable in fleece, demands serious attention.

The King of Saxony has recently presented us with several hundred specimens of fine wool, grown in various parts of his kingdom. These we have subjected to strict examination, and find that they all possess a high degree of fineness, a large majority of them having the maximum of that known to wool grown upon the body of a sheep. How came Saxony possessed of this superior breed, since, according to the celebrated agriculturist, M. Thaer, there were no less than three varieties of sheep in Germany before the introduction of the merinos, neither of which was held in high estimation? The answer to this question is, that in 1765, Augustus Frederick, then Elector of Saxony,* imported 200 merinos from Spain; they were placed at Stolpgen, in the county of Hayn and circuit of Dresden, then one of the most populous and best-cultivated districts in that country. Popular prejudice for some time ran high against them, but it gradually subsided, and in 1777 they had grown into such estimation that an agent was sent for 300 more; 110 only could be obtained, but they were selected from all the best flocks in Spain, particularly from that of the Escurial. Then commenced two other establishments, viz: that of Rennersdorf, in the county and circuit of Bautzen, and of Lockmühle, in the county of Niederforchheim and circuit of Zwickau. In this manner the foundation of sheep-breeding was laid in Saxony; but the noble superstructure raised upon it would never have been presented but for the rigid adherence to the rule of *never mingling these merinos with the common sheep of the country*. By these means a pure breed of full-blood merinos was raised all over Saxony; and it is from their descendants that our specimens, which attract the attention and admiration of all beholders, were obtained. We challenge the inspection of these specimens, which are all of fine wool, not a hair to be found in the whole collection. What a lesson is here taught to the American sheep-breeder! We have collections of fleece from some other foreign countries which we might bring into contrast, but we wish to avoid all invidious comparisons.

Our next exhibition and proofs are from persons and places nearer home. We have specimens of fleece grown in the following States, viz: Massachusetts, Connecticut, Vermont, New Hampshire, New York, Michigan, Wisconsin, Pennsylvania, Ohio, Virginia, Tennessee, Illinois, Alabama, Mississippi, and Texas. Most of these are accompanied by letters from sheep-breeders and others. From this correspondence, as well as from sundry letters addressed to the Commissioner of Patents, we have extracted all that regards sheep-breeding; and from the whole we are enabled to pronounce that in the United States the hairy sheep and the woolly sheep live and thrive in different places, the position which

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* The former duchy, an electorate was changed to a kingdom by Napoleon about 42 years ago.

is the most appropriate for the one being inappropriate for the other species. So it appears that there is not only a season and a time for every purpose under Heaven, (Eccles., ch. iii., 6 to 8,) but also there is a place for all natural things; there is a place to breed and raise the hairy sheep; and there is a place to breed and raise the woolly sheep; but for the hybrid sheep, which is not a *natural*, but an unnatural production of man's making, there is not (as we shall proceed to show) any place in the United States; and therefore their propagation ought not to be encouraged. If a line be drawn diagonally through the United States, beginning at the southeast corner of New Hampshire, pursuing pretty much the course of the line of tide-water, and ending in Texas, it will be found that everywhere northwest of it the woolly sheep may be bred and will thrive, provided the blood of his species be kept pure; and everywhere southeast of this line the hairy sheep may be bred and will thrive, provided the blood of his species be kept pure; but that neither will thrive on the other sides, respectively, of that line, nor will they if the species are crossed.

Postscriptum.

Peradventure some persons may imagine that we (although professing to be a collector of facts only) are bound to assign a *reason* for this phenomenon. It might be difficult to do so: "*Felix qui potuit rerum cognoscere causas.*"

It might be attributed to the action of the atmosphere in the neighborhood of the sea, acting injuriously upon the delicate, fine-woolled sheep, when it is attempted to raise them on the southeasterly side of the line we have projected. The merino thrives and improves in the interior of continental Europe—as, for example, in Saxony; but remove them to England, and they dwindle. It might be assigned to geological causes, for the line we have drawn points out the general direction of the great rock formations of the United States. The *subsoil* of a country depends for its composition on the underlying rock, of which such subsoil is nothing but its comminuted fragments. Each natural soil has its natural vegetable growth, and it is well-known that sheep, more than any other of our domestic animals, subsist upon the *natural* vegetable productions of the country. It might be assigned to other causes more remote. But be all this as may hereafter be developed, the *fact* is as we have stated. He who would refuse to be admonished by it because a *reason* cannot be assigned, or the *modus operandi* pointed out, would place himself in the position of one who would persist in swallowing poisons because we cannot tell *how* they produce death.

WOOL GROWING.

[From the "Wool Grower."]

Why not grow more wool?—It has been the aim of this journal to so awaken the attention of farmers as to enable them to adopt the most profitable system. We have, therefore, urged upon them, from time to time, an increase of their flocks of sheep. Our own experience and observation have satisfied us that there is no kind of farming that is so generally profitable as raising sheep and wool. It matters not whether you are upon the bleak mountains of Vermont or in the fertile plains of Texas, upon the prairies of the West or the now solitary hills and mountains of the South—everywhere and anywhere the sheep will live and thrive, and, with proper care, pay more for the labor and capital invested than any other animal or any other system of farming. It is one of the most useful and economical modes which have been given us to convert the vegetation of the farm to money. Were it for the first time now presented to us, we should consider the sheep one of the most wonderful animals nature has produced for the use of man. Its annual growth of wool, so admirably calculated for human clothing and use in every portion of the globe, its skin and flesh, and, in many localities, its milk—all serve for the necessaries or luxuries of man. There is no animal in which there is so little waste or so little loss. For at least seven years of its life it will give an annual fleece each year to the value of the carcass, and the yearly increase will be nearly or quite equal to the cost of keeping, giving, as a general thing, a profit of cent per cent. Of all the other animals, the cow comes nearest to the sheep in the profit it returns to the farmer if well cared for; it will pay for itself each year by the milk it yields, and defray also the cost of keeping.

Is there any branch of farming or any other kind of legitimate business that will yield for a series of years a profit of 10 per cent? We assume that there is none. The very idea that a profit of 50 per cent. could be realized in any branch of business would set the whole capital of the country in motion. Farms would be sold, merchants would sell off their stocks, bankers close their banks, and, indeed, everybody who had money to invest would rush into this gold mine.

We aver, without fear of contradiction in truth, that there is hardly a locality in the whole Union, where any kind of farm animals can subsist, that the sheep, if properly attended to, will not give a net profit on the investment of at least 50 per cent., and that, with the ordinary management of farms, it will give some 20 to 40 per cent.

That there is no danger of overdoing the business, we have shown repeatedly in previous numbers. The annual increase of population in the Union requires the wool from three millions of sheep; so that, to clothe the increased population, would require an annual increase of sheep equal to four millions. But when we come to consider that there is now an annual deficiency of over seventy millions of pounds, there can be no doubt that wool growing is the most stable pursuit that can be engaged in. We cannot glut the market, nor will there be any long time that the market will be depressed below a point of profitable production. On the contrary, it is certain that no farm product goes less below this point than wool. It has long been a source of constant wonder to us that so many farmers in the western States neglect the sheep for the very precarious business of grain-growing. Every year will give them a crop of wool if they do but take care of their sheep. But there is no certainty for wheat, prepare the ground ever so well. If we have been rightly informed, the wheat raised in the West has cost the farmer more than he has obtained for it in market. Too much dependence has been placed upon this most uncertain and expensive crop.

We have tried wheat-growing upon probably as good a wheat farm as can be found in western New York, and we have also tried sheep upon the same farm; and we are free to confess that, although we have a good market at our own door, yet we can raise a given amount of money quicker and much easier with a flock of sheep than with wheat. But we find it well to raise both sheep and wheat, as by that means we find we get a better profit than to be confined to either alone. With us, and in this region, four years are as long as it proves profitable to leave land to grass. Very few now resort to naked fallows. Some mow their clover early, and then let it grow till August, when it is turned under, cultivated, and sown to wheat; others mow the first year, and pasture with sheep the second, and then plough.

Every good farmer keeps a few good sheep at least. Very many who have been in the habit of putting up a large quantity of pork for summer use now select out a few wethers and give them extra keep, and make their summer meat of mutton, decidedly the most healthful that can be used, and thus realize the money for their pork fresh. The inducements to grow more wool are: a sure market, less fluctuation from the point of profitable production than any farm product, a larger interest or profit on the capital invested than any other business, and, therefore, the best business, as a general thing, that the farmer can follow. We ask our subscribers to give us their views on the subject.

HISTORY OF THE OHIO COMPANY FOR IMPORTING ENGLISH CATTLE.

[The following article by the Hon. John L. Taylor, of Ohio, is inserted at the request of several members of Congress :]

On the 2d November, A. D. 1833, Governor Allen Trimble, George Renick, Esq., and General Duncan McArthur, citizens of the State of Ohio, for the purpose of promoting the interests of agriculture, and of introducing an improved breed of cattle into this State, formed a company, and they, together with the subscribers hereafter named to the written articles of their association, contributed the amount of money necessary to import from England some of the best improved cattle of that country.

The sum of $9,200 was very soon subscribed for that purpose, in 92 shares of $100 each; and after making the necessary preliminary inquiries and arrangements, the company appointed Felix Renick, Esq., of Ross county, Ohio, their agent for the purchase and importation of said cattle

Mr. Felix Renick was accompanied by Messrs. Edwin J. Harness and Josiah Renick, of Ohio, as his assistants, and they left Chillicothe for England on the 30th January, 1834.

The following persons were subscribers to the stock of said company on the 25th day of January, 1834, viz :

Allen Trimble	5	shares	$500
George Renick	6	"	600
Duncan McArthur	6	"	600
John J. Van Meter	2	"	200
R. R. Seymour	2	"	200
Edwin J. Harness	2	"	300
Arthur Watts	3	"	200
Robert Stewart	1	"	100

Strawder McNeil	2	shares	$200
Preslay Morris	2	"	200
James Vanse	1	"	100
Evan Stevenson	1	"	100
Thomas Huston	3	"	300
John McNeil	3	"	300
John M. Alkive	1	"	100
Elias Pratt	1	"	100
William Renick, jr	2	"	200
Josiah Renick	1	"	100
Thomas Renick	1	"	100
George Radcliff	1	"	100
Elias Florence	1	"	100
Asahel Renick	2	"	200
Felix Renick	2	"	200
H. P. Galloway	1	"	100
John Boggs, sen	1	"	100
John T. Webb	2	"	200
Batteal Harrison	1	"	100
A. Hegler and M. Paterson	1	"	100
Wesley Claypoole	1	"	100
Archibald Stewart	1	"	100
Joseph G. White	1	"	100
John Pancake, sen	1	"	100
Bodkin J. Davis	1	"	100
Charles Davis	1	"	100
Asahel Renick and E. Pratt	1	"	100
E. W. Gynne	1	"	100
M. L. Sullivan	1	"	100
Lyne Starling	2	"	200
S. S. Denny and Wm. Renick	2	"	200
M. McCrea, assign. to Harness Renick	1	"	100
Jonathan Renick	3	"	300
Francis Campbell	1	"	100
William Renick	1	"	100
John L. Taylor	1	"	100
John Crouse	1	"	100
John Foster	1	"	100
R. R. Seymour, for W. H. Cunningham, of Virginia	4	"	400
James Vanse, for Isaac Cunningham, of Kent'y	8	"	800
No. of shares	92		9,200

Mr. Felix Renick, and his assistants, Messrs. E. J. Harness and Josiah Renick, proceeded to England, and made a careful examination of much of the improved stock of that country, purchased from some of the most celebrated and successful breeders of cattle in England about nineteen at various prices, consisting of bulls and cows, of the *thorough-bred short-horned Durham stock*. They brought these to Ohio, and returned in time to exhibit them at the Agricultural Society of Ross county, on the 31st day of October, 1834.

This stock of English cattle was kept together, under the care of an agent, by said company, and they *increased the number, by additional importations from England, until the 20th day of October, A. D.* 1836; when the cattle imported, as well as the natural increase thereof since the 31st October, 1834, were sold at public auction, under regulations adopted by the company.

The following extract, from "The Scioto Gazette of October 26, 1836," will show the names of the purchasers, and the prices the stock brought at public sale:

GREAT SALE OF DURHAM STOCK,

Imported by the *Ohio company for importing English cattle* in the years 1834, 1835, and 1836, held at Indian Creek farm, the residence of Felix Renick, esq., agent of the said company, in Ross county, on the 29th day of October, 1836. The stock of the company was in fine condition, and in great demand.

Notwithstanding the high prices at which the cattle were sold, some of them exchanged owners immediately, at very considerable advances; and, for others, more than 50 per cent. on their cost was offered and refused.

Reformer, a bull, not sound, sold to John T. Webb, of Ross county, O., for - - - - - - - - - - $48
Matchem, a bull, sold to Abraham Renick, of Kentucky, for - 1,200
Earl of Darlington, sold to Batteal Harrison, of Fayette county, O., for - - - - - - - - - - 710
Young Waterloo, a bull, sold to R. D. Lilley, of Highland county, O., for - - - - - - - - - - 1,250
Duke of York, a bull, sold to R. R. Seymour, of Ross county, O., for - - - - - - - - - - 1,120
Experiment, a bull, sold to James M. Trimble, of Highland county, O., for - - - - - - - - - 1,150
Comet Halley, a bull, sold to R. R. Seymour, of Ross county, O., for - - - - - - - - - - 1,505
Whitaker, a bull, sold to Wm. M. Anderson, of Ross county, O., for - - - - - - - - - - 855
Nimrod, a bull, sold to Elias Florence, of Pickaway county, O., for - - - - - - - - - - 1,040
Duke of Norfolk, a bull, sold to Robert Stewart, of Ross county, O., for $1,225; afterwards sold, at private sale, to Governor Vance and J. H. James, of Champaign county, for - - 1,400
Goldfinder, a bull, sold to Isaac Cunningham, of Kentucky, for - 1,095
Duke of Leeds, sold to John Crouse, jr., of Ross county, O., for 575
Windham, a bull, sold to Charles Davis, of Ross county, O., for 500
Columbus, a bull, not sound, sold to Thomas Huston, of Pickaway county, O., for - - - - - - - - - 180
Davy Crockett, a bull, sold to Peter L. Ayres, of O., for - - 490
Snowdrop, a bull, sold to Stewart and McNiel, of Ross county, O., for - - - - - - - - - - 480
Independence, a bull, sold to Hegler and Peterson, of Ross county, O., for - - - - - - - - 400

Perry, a bull, sold to William H. Creighton, of Madison county, O., for - - - - - - - - - - 400
Goliah, a bull, sold to Isaac V. Cunningham, of Scioto county, for 300
Logan, a bull, sold to Elias Florence, of Pickaway county, O., for 750
John Bull, a bull, sold to William Renick, jr., of Pickaway county, O., for - - - - - - - - - - 615
Paragon, a bull, presented by the company to Felix Renick, esq., their agent.
Powhattan, a bull, sold to George Renick, sen., of Ross county, O., with Flora.
Rantipole, a bull, sold to Arthur Watts, of Ross county, O., for - 810
Gaudy, a cow, sold to James A. Trimble, of Highland county, O., for - - - - - - - - - - 985
Blossom, a cow, sold to R. R. Seymour, of Ross county, O., for 1,000
Flora, and her calf, Powhattan, were sold to George Renick, sen., of Ross county, O., for - - - - - - - 1,205
Lily of the Valley of Tees, sold to Thomas Huston, of Pickaway county, O., for - - - - - - - - - 950
Matilda, sold to Arthur Watts, of Ross county, for - - 1,000
Calypso, a cow, sold to Strawder McNiel, of Ross county, for - 325
Young Mary, and her calf, Pocahontas, were sold to Edwin J. Harness, of Ross county, for - - - - - - 1,500
Lady Blanch, (no proof of this cow being a breeder,) sold to Charles Davis, of Ross county, for - - - - 250
Teeswater, and her calf, Cometess, sold to John I. Van Meter, of Pike county, O., for - - - - - - 2,225
Duchess of Liverpool, sold to William M. Anderson, of Ross county, O., for - - - - - - - - - 570
Lady Colling, (it is doubted whether this cow will ever be a breeder,) sold to John T. Webb, of Ross county, for - - 205
Beauty of the West, sold to Asahel Renick, of Pickaway county, O., for - - - - - - - - - - 900
Lilac, sold to Elias Florence, of Pickaway county, O., for - 425
Lady of the Lake, sold to R. R. Seymour, of Ross county, O., for 775
Lady Paley, sold to Alexander Renick, of Ross county, O., for - 510
Poppy, sold to Harness Renick, of Pickaway county, O., for - 610
Pink, sold to William Trimble, of Highland county, O., for - 575
May Flower, sold to Batteal Harrison, of Fayette county, O., for 405
Lucy, (pedigree doubtful,) sold to George Ratcliff, of Pickaway county, for - - - - - - - - - 405
Moss Rose, sold to Jonathan Renick, of Pickaway county, for - 1,200
Celestina, sold to T. Huston, of Pickaway county, for - - 930
Malina, sold to Isaac Cunningham for - - - - - 1,005
Illustrious, sold to Abraham Renick, of Kentucky, for - - 775
Lady Abernethy, sold to Thomas Huston, of Pickaway county, O., for - - - - - - - - - - 815

Attest: JOHN L. TAYLOR,
Secretary of the Ohio Importing Company.

On the 1st of April, 1837, at a meeting of said company at Chillicothe, upon a settlement of the business of the company, a dividend of

$280 per share was declared on the 92 shares of the stock of said company, amounting to $25,760.

This company held their last meeting on the 15th April, 1837, and settled finally the business thereof, so far as was practicable, by ordering a second sale, which was held as follows:

"The highest prices yet."

A sale of seventeen head of improved short-horned cattle, belonging to the Ohio Company, being mostly of this year's importation, and the produce of others, took place at the Sugar Grove, in this town, on Tuesday last. The attendance was numerous, comprising a larger number of actual bidders than the previous sale. Among the individuals present who are pre-eminently noted for their agricultural enterprise, were Governor Vance, Ex-Governor Trimble, the Messrs. Renick, Mr. Sullivant—and, indeed, nearly all the large farmers of this valley and the adjacent country. The bidding was, consequently, very spirited, and the prices obtained for the cattle plainly show that the kind of stock sold is rapidly advancing in public estimation. By the following list from the auctioneer's book, our brethren of the press will discover that the cattle enumerated were even more highly valued than those of the *sham sale* they were of late parading in their columns, copied from the "Cincinnati Gazette:"

Bulls.

Acmon, three years eight months, M. L. Sullivant & Co., Columbus	$2,500
Comet Halley, five years, George Renick & Co., Chillicothe	2,500
Hazlewood, one year six months, Allen Trimble and R. R. Seymour	700
Bouncer, one year seven months, John Walke, Pickaway county, Ohio	453
Powhattan, one year nineteen days, Harness Renick, Pickaway county, O.	500
Santa Anna, three months twenty-one days, Joseph C. Vance, Ohio county, Va.	425

Cows.

Flora, seven years six months, M. L. Sullivant, Columbus	1,300
Matilda, six years six months, Allen Trimble, Highland county, Ohio	1,220
Fidella, seven months eighteen days, Allen Trimble, Highland county, O.	610
Elizabeth, (and calf,) five years, J. & Wm. Vance, Champaign county, O.	1,450
Charlotte, four years seven months, Joseph G. White, Ross county, O.	630
Arabella, (and calf,) three years seven months, Arthur Watts, Chillicothe	1,200
Blush, two years nine months, John H. James, Champaign county, O.	1,015
Emily, two years eight months, Asahel Renick, Pickaway county, O.	875
Victoress, one year nine months, M. L. Sullivant, Columbus	700

Very great benefits have resulted to the country by the introduction of this improved English Durham stock into the State of Ohio by this company.

An improved breed of cattle throughout the State has resulted from crossing the English stock with the common stock existing at that time; and a very fine, large, and thrifty race of cattle in many parts of Ohio has been bred by this laudable enterprise. Some of their full blood bulls and cows have been sold to farmers of the adjoining States; and thus the benefits of their importations have contributed largely to improve the stock of cattle in the western country.

Mr. George Renick, of Ross county, has bred, from a portion of the stock imported by said company, and the common cows of Ohio, a very fine race of cattle; and for the last six years, as he states, he has annually sold about 50 or 60; the average weight of which, at from three to four years old, was about 1,000 pounds net. Some of them weighed as much as 3,000 pounds, and one (older) as high as 3,400 pounds, gross.

Ex-Governor Allen Trimble, of Highland county; Doctor Arthur Watts, of Ross county; M. L. Sullivant, esq., of Franklin county—all well known as amongst the most successful farmers and stock-growers in Ohio—besides many others of this company—have contributed largely, by their skill and enterprise, to increase and diffuse the improved breed of cattle, resulting from the importations of the company, into every part of this State.

Doctor Watts, at the last agricultural exhibition in Ross county, in 1849, exhibited eight two-year-old steers, averaging 1,526 pounds each; and at the State agricultural fair at Cincinnati, held in 1850, he exhibited, amongst other cattle, one four-year-old steer, (full-blood Durham,) weighing 2,550 pounds, gross; and one three-year old steer, weighing 2,220 pounds, gross. These weights are given to show the enormous weight which this Durham stock of English cattle attain at an early age when bred by skilful and intelligent farmers; and they show, also, the great value of breeding from this stock to those who are engaged in furnishing the beef markets of our country.

IV.

AMERICAN RUMINANTS.

ON THE RUMINATING ANIMALS OF NORTH AMERICA, AND THEIR SUSCEPTIBILITY OF DOMESTICATION.

BY PROF. S. F. BAIRD, OF THE SMITHSONIAN INSTITUTION.

In the present paper we propose to present, in a few words, the principal characteristics of the ruminating animals of North America, with especial reference to the economical employment of several species, as beasts of burden or draught, as furnishing food of excellent quality, or as yielding valuable materials for the useful arts. It is a little singular that, in the many years during which the ruminating animals of North America have been known, so little effort has been made to render them subservient to the uses of man. The experiments, when tried, have yielded satisfactory results, even in the first and second generations; but, unfortunately, the continued training of one species for a long succession of years has not been accomplished. It is not too much to suppose that the time may come when much of this continent, now desolate, and supporting a scanty and half-starved population, may become a populous region, filled with towns and villages, and owing much of its prosperity to the employment of some of our own native animals in a state of domestication.

For further remarks on this subject, we would refer especially to the articles in relation to the moose and caribou.

We must not be understood as having anything new to present in regard to the habits or history of these animals. The materials employed are mainly derived from the valuable works of Lewis and Clarke, Audubon and Bachman, Richardson, King, and others, who have had the opportunity of seeing the various species in their native regions. The minute questions of specific characters, too, we shall merely glance at, confining ourselves to the practical part of our subject, and referring to the works above-mentioned for detailed descriptions.

The ruminating animals of North America belong mainly to the divisions of the deer, the antelope, the sheep, the goat, the bison, and the musk ox. The list specifically is as follows:

1. *Tarandus arcticus*, Rich. Barren Ground reindeer.
2. *Tarandus hastalis*, Agassiz. Woodland Caribou reindeer.
3. *Alces Americana*. Moose.
4. *Elaphus Canadensis*, Ray. Elk.
5. *Cervus Lewisii*, Peale. Black-tail deer.

6. *Cervus macrotis*, Say. Mule deer.
7. *Cervus Virginianus*, Pennant. Virginia deer.
8. *Cervus leucurus*, Douglass. White-tail deer.
9. *Antilocapra Americana*, Ord. Prong-horn antelope.
10. *Capra Americana*, Blainville. Mountain goat.
11. *Ovis montana* Desm. Big horn.
12. *Bison Americanus*, Cm. Buffalo.
13. *Ovibos moschatus*, Blainville. Musk ox.

Tarandus Arcticus, Rich. *Barren Ground Reindeer.*

The probable existence of two species of caribou in North America has been suggested for a long while, the features of distinction being sufficiently marked to convey the idea to all those who were acquainted with them of at least two strongly marked varieties. The difference is to be found mainly in the much smaller size of the Barren Ground species, yet having considerably longer, though very slender antlers, the existence of a gall-bladder, and a very different geographical distribution. It is confined almost entirely to the *Barren Grounds*, the north-eastern corner of North America along the Polar sea, bounded to the west by Great Slave, Athapasca, Wollaston, and Deer lakes, and the Copper-Mine river, and to the south by Churchill river.

The name is derived from the scarcity of wood throughout almost the entire extent, excepting in the vicinity of some of the streams. There are, indeed, shrubs and bushes, some of full size, others stunted trees; but these are not suitable for fuel or other economical purposes. A striking physical feature of the Barren Grounds consists in the succession of small lakes in narrow valleys, and connected by rapid streams, offering, in many cases, serious impediments to the passage of boats. All abound in fish, principally salmonoid, as trout, whitefish, and grayling, in numerous species. The borders of these waters are inhabited by a few half-starved, miserable Indians, in the depths of poverty and degradation.

Here the Barren Ground reindeer graze by thousands, accompanied by the musk ox—another characteristic inhabitant. Both are enabled to exist in winter only in consequence of the great quantities of reindeer moss.

The second and larger species of reindeer is as characteristically found in the *Woody District*—a region covered with wood, and reposing upon a narrow belt of primitive rocks. This is about two hundred miles wide, and is included between the Barren Grounds and the north shore of Lake Superior, extending also to some distance both east and west. Indeed, the features of this region are not lost in New Brunswick, nor even in the northern part of Maine, where caribou are found in vast numbers, as well as elsewhere.

No other species than the Barren Ground caribou is found in the region inhabited by it. Occurring as it does by thousands, it is termed the common deer by the hunters, just as the *Cervus Virginianus* bears this name in the United States. In no instance is the danger of relying upon the trivial name of an animal for the determination of species more fully shown than here, where two such totally distinct species, economically, geographically, and zoologically, are presented under a common name.

The *Tarandus arcticus* is not confined, however, to the Barren Grounds of America. It occurs in Greenland, whence specimens have been received by the Smithsonian Institution; it is found in Spitzbergen also.

In size it is exceedingly diminutive, the does being not much larger than a good-sized sheep. When fat, the bucks weigh, cleaned, from 80 to 125 pounds, and occasionally more. The species agrees with all other reindeer in the presence of horns in both sexes, although in the females and young males, they are less palmated; in all, they are slender, and have the stem much elongated. Most males have one or other brow antler developed, with a broad vertical plate extending forward between the eyes; occasionally, however, this is wanting.

The horns of this species follow the common law, and fall off annually. In a few months these are reproduced, becoming hard as they increase in size; and when they have attained their full growth, the hairy covering peels off in ragged filaments, which is a sure sign of the fatness of the animal, and generally takes place in the males between the months of September and November. The bucks generally shed their horns in January, although in some cases they retain them considerably longer; while the does cast theirs in the spring, at the time they drop their young. The coat of hair is shed in July. The shortness of the hair of the caribou, and the lightness of the skin when properly dressed, render it the most appropriate article for winter clothing in high latitudes. The skins of the young deer make the best dresses; and the animals should be killed for that purpose in August, as after that month the hair becomes long and brittle. They are so drilled into holes by the larvæ of the gad-fly that eight or ten skins are required to make a suit of clothing for a grown person. But the skins are so impervious to cold that, with the addition of a blanket of the same material, any person may bivouac in the snow with safety, and even with comfort, in the most intense cold of an arctic winter's night. The hoofs of this variety of reindeer are wonderfully adapted to the country it inhabits; for, instead of being narrow and pointed, like those of the roebuck or fallow deer, they are broad, flat, and spreading—a formation not only useful in preventing the animal from sinking in the winter so deep as it otherwise would do, but in shovelling away the snow from off the lichens clothing the rocks of the Barren Grounds, on which substance it feeds. They are, however, saved that trouble when driven to the woods for shelter, where they find a species of lichen hanging from the trees, which, from that circumstance, has been called reindeer moss.

In June, when the sun has dried up the lichens, the deer are to be seen in full march towards the sea-coast to graze upon the sprouting carices and withered grass or hay of the preceding year, which, at that period, is still standing, and retains part of its sap, in all the moist places covering the bottoms of the narrow valleys on the coasts and islands of the Arctic sea. Having dropped their young, they commence their return to the south in September, and reach the vicinity of the woods in October, at which time the males are in good condition, and there is a layer of fat deposited on the back and rump to the depth of three or four inches, and frequently five or six immediately under the skin, designated *dépouille* by the Canadian voyageurs; this fat disappears in about a

month, when they become very lean and insipid as food. The females, however, which at that period are lean, acquire, in the course of the winter, a small *dépouille*, which lasts till they drop their young. The reindeer supplies the Chippewyans, Copper Indians, Dog Ribs, and Hare Indians with food, who would be totally unable to inhabit their barren lands were it not for the immense herds of this deer that exist there. Of the horns they form their fish-spears and hooks; and, previously to the introduction of iron by the traders, ice-chisels and various other utensils were made of them. In dressing the skins, the shin-bone, split longitudinally, is used for the purpose of scraping off the hair, after it has been repeatedly moistened and rubbed; the skins are then smeared with the brains of the animal until they acquire a soft, spongy character; and, lastly, are suspended over a fire made of rotten wood until thoroughly impregnated with the smoke. This last-mentioned process imparts a peculiar odor to the leather, and has the effect of preventing its becoming so hard, after being wet, as it would otherwise be. The skins thus dressed are used as winter clothing, and, by sewing sixty or seventy together, will make a covering for a tent sufficient for the residence of a large family. The undressed hide, after the hair is taken off, is cut into thongs of various thickness, which are twisted into deer snares, bow-strings, net-lines, and, in fact, supply all the purposes of rope. The finer thongs are used in the manufacture of fishing nets, or in making snow-shoes, while the tendons of the dorsal muscles are split into fine and excellent sewing thread. In some instances I have seen the skin so finely dressed that it equalled chamois leather.

Every part of the animal is consumed, even to the contents of the stomach—a savory mixture, much esteemed by the Canadian voyageurs after it has undergone a degree of fermentation, or has lain to season, as they term it, for a few days. By collecting the blood, and boiling it, they also form a very rich soup, which is considered a dainty. When all the soft parts are consumed the bones are pounded small, and a large quantity of marrow is extracted from them by boiling, which is used in making the better kinds of the mixture of dried meat and fat termed pemmican; it is employed also by the young men and females for annointing the hair and greasing the face on dress occasions. Pemmican is formed by pouring one-third of melted fat over the meat, which has been previously cut into thin slices, dried in the sun or over the smoke of a slow fire, and pounded between stones, and then incorporating them together. If kept dry, it may be preserved sound for four or five years; and, from the quantity of nourishment it contains in small bulk, it is the best kind of food for those who travel through desert lands.

The caribou travel in herds, varying in number from eight or ten to one hundred thousand; and in the rutting season the bulk of the males and females live separately. Their daily excursions are generally towards the quarter whence the wind blows; and of all the deer of America they are the most easy to approach. The Indians kill them with the gun, take them in snares, or spear them crossing rivers or lakes. The Esquimaux catch them in traps. They are frequently slaughtered in vast numbers; a single family of Indians will sometimes kill many hundreds in a few weeks.

When the Indians design to impound deer, they look out for one of the paths in which a number of them have trodden, and which is observed to be still frequented by them. The pound is built by making a strong fence with bushy trees, without observing any regularity, varying from a few yards to a mile in circumference. The entrance to the pound is about the size of a common gate, and the inside is crowded with hedges, in every opening of which a snare is set, made of thongs of deer-skin parchment, well twisted together, which are amazingly strong; one end of the snare is usually made fast to a small growing tree. The pound being thus prepared, a row of small brushwood is stuck up in the snow on each side of the door or entrance, and these hedge rows are continued along the open part of the lake, river, or plain, which, from its openness, makes them the more distinctly observed. The brushwood rows are generally placed at the distance of fifteen or twenty yards from each other, and ranged in such a manner as to form two sides of a long, acute angle, becoming gradually wider in proportion to the distance they extend from the pound, which sometimes is not less than two or three miles; while the deer's path is exactly along the middle, between the two rows of brushwood. From a commanding situation the Indians watch the approach of the deer, when they close in upon them in the form of a crescent. The poor timorous animals, finding themselves pursued, and mistaking the brushwood for ranks of people stationed to prevent their passing on either side, rush on, and entangle themselves in the snares, thus becoming an easy prey to the ingenious hunter. The manœuvre is sometimes so successful that whole families find subsistence without having occasion to remove their tents above once or twice during the whole winter.

Doctor King, from whom, in connexion with Doctor Richardson, we have borrowed most of the preceding remarks, is strongly of opinion that the Barren Ground caribou is capable of domestication as complete as that to which the Laplanders have reduced the European species. Of the vast benefit of such a step, especially in reference to the Indians of the same region, it is difficult to speak in sufficiently moderate terms. The peculiar fondness for pets, and the skill in their domestication, manifested by these Indians, are sufficient evidence of the success with which they might be encouraged to try the experiment on the caribou. Its success would at once place them beyond the reach of those vicissitudes which are so rapidly sweeping off the Indians of the north and northeast of America. Nor would there be any difficulty in subsisting large herds of these deer throughout the year. In summer the rich pastures along Great Fish river, and other streams, would supply countless numbers; while the lichens of the rocks or shrubs would furnish them with food in the winter, with such slight assistance from their owners as the case might demand. In this way these Indians might become a pastoral people, and possibly, in time, as agricultural as the nature of the seasons would admit.

Tarandus Hastalis, Agassiz. *Woodland Caribou.*

In the last article we have indicated the principal difference between the two reindeer. In nothing is this more marked than in the geographical distribution; the one belonging to the Barren Ground, the other to the woods. The latter species is much larger, sometimes weighing

three or four hundred pounds. The horns, although very stout in proportion to their length, are yet decidedly shorter.

As already remarked, the reindeer is still common in the wilderness forming the northern parts of Vermont, New Hampshire, and Maine.

Lieutenant Thom, of the topographical corps, while retracing and surveying part of the Maine boundary line last summer, saw tracks of many individuals while in the country between Lake Memphramagog and Lake ———. They abound in Maine and New Brunswick. Of a size much greater than that of the Barren Ground caribou. The flesh, as an article of food, is far inferior. The rut takes place in October, and the young are produced in June.

The remarks in regard to domestication apply as well to this species as to the one last mentioned; while the value, as a beast of burden, or draught, would probably be much greater, on account of the superior size. There seems to be little doubt that domestication would enable the species to exist further at the north, and even in the Barren Grounds themselves. Indeed, the European reindeer might itself be imported and propagated, and thus the loss of time consequent upon the attempt of domesticating a wild species be avoided. Nothing would be easier than to bring over from Norway or Sweden a drove of reindeer, and stocking one or more of the forts in Hudson's Bay, or other parts of British America.

Tarandus furcifer. *The European Reindeer.*

The Old World reindeer (*Tarandus furcifer*) is found throughout the arctic regions. It abounds in Kamschatka, Siberia, Northern Russia, Sweden, and Norway; but especially in Finmark and Lapland. In Europe its southern limit is the Baltic; in Asia it extends along the Ural to the Caucasus. Its existence in Iceland has been denied; and, indeed, its introduction there seems to date back less than one hundred years. At that time, sixteen animals were imported from Norway, of which only three landed alive. These were turned loose in the mountains, and have multiplied to a very great degree. In some sections of the island they are found in herds of many hundreds. Little or no attempt at their domestication has been made by the inhabitants, as the cow and sheep thrive extremely well, rendering any substitute unnecessary. In Finmark and Lapland, however, where the reindeer is still found wild, the natives use every art in their power to capture and bring them to a state of domestication—an animal which constitutes their sole wealth, and, indeed, the means of their existence, and without which their country would be in reality, as to the stranger it appears, an uninhabitable desert.

The food of the reindeer varies with the season and with the climate. Lapland, says Hoffberg, in the memoir above quoted, is divided into two tracts, called the Alpine and Woodland country. Those immense mountains, called in Sweden Fjellen, divide that country from Norway, extending towards the White Sea as far as Russia, and are frequently more than twelve miles in breadth. The other, called the woodland division, lies to the east of this, and differs from the neighboring provinces of Norway by its soil, which is exceedingly strong and barren, being covered with one continued tract of wood, of old pine trees. This tract has a very singular appearance. The trees above are covered over with great quantities of a black hanging lichen, growing in filaments resembling locks of hair; while the ground beneath appears like snow, being totally covered with white lichens. Between this wood and the Alps lies a region called the Woodland, or Desert Lapmark, of thirty or forty miles in width, of the most savage and horrid appearance, consisting of scattered uncultivated woods, and continued plains of dry, barren sands, mixed with vast lakes and mountains. When the mosses on part of this desert tract have been burnt, either by lightning or any accidental fire, the barren soil immediately produces the white lichen, which covers the lower parts of the Alps. The reindeer, in summer, seek their highest parts, and there dwell amidst their storms and snows, not to fly the heat of the lower regions, but to avoid the gnat and gad-fly. In winter these intensely cold mountains, whose tops reach high into the atmosphere, can no longer support them, and they are obliged to return to the desert to subsist upon the lichens. Of these its principal food is the reindeer lichen. There are, says Hoffberg, two varieties of this: the first is called *sylvestris*, which is extremely common in the barren deserts of Lapland, and more particularly in its sandy and gravelly fields, which it whitens over like snow; its vast marshes, full of tussocks of turf, and its dry rocks are quite grown over by it. The second variety of this plant, which is less frequent than the former, is named the alpine. This grows to a greater height, with its branches matted together; it has this name, because, when those mountains are cleared of their wood, the whole surface of the earth is covered with it; yet it is seldom to be found on their tops. When the woods become too luxuriant, the Laplander sets fire to them, as experience has taught him that when the vegetables are thus destroyed, the lichen takes root in the barren soil and multiplies with facility; though it requires an interval of eight or ten years before it comes to a proper height. The Laplander esteems himself opulent who has extensive deserts producing this plant exuberantly; when it whitens over his fields, he is under no necessity of gathering in a crop of hay against the approach of winter, as the reindeer eats no dried vegetable, unless perhaps the river horsetail (*Equisetum fluviatile*). They root for this lichen under the snow like swine in a pasture; their fore-heels, nose, and feet are guarded with a hard skin closely attached to those parts, that they may not be hurt by the icy crest which covers the surface of the snow. The very strong shoes which the Laplander esteems so much, are made of these parts of the hide. It sometimes happens (but very rarely) that the winter sets in with great rains, which the frost immediately congeals; the surface of the earth is covered with a coat of ice before the snow falls, and the lichen is entirely encrusted and buried in it; thus the reindeer is sometimes starved, and a famine attacks the Laplanders. In such an exigence they have no other resource but felling old fir-trees grown over with the hairy liverworts. These afford but a very inadequate supply even for a small herd; but the greater part of a large one, in such a case, are sure to perish with hunger. In the summer, when the reindeer ranges upon the Alps, a number of plants afford it food. Hagstrom states that it refuses to eat forty-six species, the names of which he gives.

That the lichen is not absolutely necessary as an article of food, is proved by the length of time during which a female of this species lived at the Zoological Gardens, London. She survived ten winters, during which her food consisted almost entirely of hay. Her death, too, seemed to have been caused by inflammation of the lungs, rather than by any disorder of the digestive functions.

To the nations among which the reindeer is domesticated—the Laplanders especially—this animal is of the first necessity. According to Hoffberg, the mountaineer very often possesses three or four hundred, and even one thousand; the woodman rarely above one hundred. As a domestic animal, yielding a quantity of most delicious food, and occupying the place of the cow and the ox, it is invaluable; as a beast of draught, its importance is equally great, and its organization is adapted to the long wastes over which it forms the Laplander's sole means of communication: no less than that of the camel, it is framed for those deserts which, without the aid of these animals, would be impassable. The weight which the reindeer can draw is about 300 pounds, although 240 forms the usual load. Its speed, when thus employed, is almost incredible. In a race of three deer with light sledges, started by Pictet, who went to the north of Lapland in 1769 to observe the transit of Venus, the first performed about 3,090 feet in two minutes, or nearly 19 English miles to the hour; the second made the same distance in three minutes, and the third in three minutes twenty-six seconds. Journeys of one hundred and fifty miles in nineteen hours are said to be not uncommon; and one animal is affirmed, in 1699, to have drawn an officer, with important despatches, eight hundred miles in forty-eight hours, falling dead at the end.

The tame reindeer, after shedding his coat, is of a brownish-yellow color, becoming gradually whiter, and ultimately almost entirely of this color. The space around the eye is entirely black. The longest hair is under the neck; the mouth, tail, and its vicinity white; and the feet, at the insertion of the hoof, are surrounded with a white ring. The hair of the body is so thick that the skin cannot be seen when the hair is parted; and when cast, it does not come away by the roots, but breaks at the base.

We have thus gone into much detail on the subject of the reindeer, believing it to be one of vital importance to the future progress of Arctic America. Of the capability for domestication of the American species, there can be no question—this, as a general rule, being shared by all gregarious mammalia. The wild European individuals can be caught and tamed with the greatest ease. In this connexion we may remark, that the reindeer forms one of the very few exceptions to the fact, that the domestic species seldom have relatives in a known wild state. This is the case with the horse, the ox, the sheep, the cat, the dog, and others; or, at any rate, in all these instances it is difficult to refer the species to wild ones.

For domestic purposes, the horns of the various species of deer constitute serious impediments to general use. Fortunately, however, it is in our power to have them or not in domesticated species at pleasure, owing to the strong sympathy between the organs of generation and the organs which regulate the development of the horns. In all deer, except, perhaps, the reindeer, if the male be castrated when the horns are in a state of perfection, these will never be shed; if the operation be performed when the head is bare, they will never be reproduced; and if done when the secretion is going on, a stunted, ill formed, permanent horn is the result. Castration will, as a general rule, be necessary for the full perfection of deer as food or animals for useful purposes. It is probable, too, that even without emasculation much may be done to regulate the horns; for instance, if the budding antlers be broken, or cut off, while in the velvet, it is highly probable that their reproduction will be materially affected. In the park of Col. Tuley, Clarke county, Virginia, we have seen an elk *(Elaphus canadensis)* which, when young, had one horn broken off. Every successive year this horn was reproduced as a single stub, without any branches whatever; while that on the opposite side presented a magnificent development of tines, giving to the animal a singularly unsystematic appearance. It is not quite certain, or at least authorities differ widely, as to whether the reindeer experiences the same changes in the horns on castration or not. The fact that the female has horns, as well as the male, may indicate some organic difference in he constitution of the genus *Tarandus.*

ALCES AMERICANA. *Moose Deer.*

This magnificent deer, the largest of its tribe, like the reindeer, is confined to the colder portions of the northern hemisphere, although between rather more southern parallels. They abound in the northern parts of Maine and New Hampshire, in Labrador, Nova Scotia, New Brunswick, and Canada. A few are still found in New York, west of Lake Champlain, in the counties of Essex, Lewis, Hamilton, &c., especially in the neighborhood of the giant Adirondacks. This region, crowned by Tahawus or Mount Marcy, the most rugged, inaccessible, and magnificent mountain of the north, and but little inferior in height to Mount Washington, is even now in a condition almost as wild as when the white man first penetrated into its recesses. Here the traveller may listen to the shrill scream of the panther and the dismal howl of the wolf, or hunt the moose, the Virginia deer, the bear, and occasionally the elk. Sometimes the moose extends to the very shores of Lake Champlain, one individual having been killed a few years ago near the village of Westport, in Essex county, on this lake. The moose is also found in northern Vermont.

The southern limit of this species along the Atlantic coast is about 43½°; but they are rarely found so low down in the central parts of America. They exist north of 49° across the continent, and are especially numerous in the northern Rocky mountains. In this range they extend to the Arctic sea, having been found at the mouth of Mackenzie's river, in lat. 69°. Farther east they do not exceed the parallel of 65°.

To the inhabitant of Maine, New Brunswick, and Lower Canada, the habits of the moose are well known, as it is a favorite article of the chase, constituting, as it does, the largest tenant of the American forest, its chosen abode. In the account of the moose in the invaluable work of Audubon and Bachman on the Quadrupeds of North America, we find an excellent article from the pen of Mr. Kendall, of Quebec, from which we make the following extract:

"The moose are abundant to the north of Quebec, and in the northern parts of the State of Maine. In the neighborhood of Moose river, and the lakes in its vicinity, they are very abundant. In the summer they are fond of frequenting lakes and rivers, not only to escape the attacks of insects which then molest them, but also to avoid injuring their antlers, which, during their growth, are very soft, and exquisitively sensitive; and, besides, such situations afford them abundance of food.

"They there feed on the water plants or browse upon the trees fringing the shores. In the winter they retire to the dry mountain ridges, and generally 'yard,' as it is termed, on the side facing the south, where there are abundance of maple and other hard-wood trees upon which to feed, either by browsing on the tender twigs or peeling the bark from the stems of such as are only three or four inches in diameter. Their long pendulous upper lip is admirably adapted for grasping and pulling down the branches, which are held between the fore-legs until all the twigs are eaten. They peel off the bark by placing the hard pad on the roof of the mouth against the tree, and scraping upwards with their sharp, gouge-like teeth, completely denuding the tree to the height of seven or eight feet from the surface of the snow. They remain near the same spot as long as any food can be obtained, seldom breaking fresh snow, but keeping to the same tracks as long as possible.

"The antlers begin to sprout in April, and at first appear like two black knobs. They complete their growth in July, when the skin which covers them peels off, and leaves them perfectly white; exposure to the sun and air, however, soon renders them brown. When we consider the immense size to which some of them grow in such a short period of time, it seems almost incredible that two such enormous excrescences could be deposited from the circulating system alone. The daily growth is distinctly marked on the velvety covering by a light shade carried around them. The first year the antlers are only about one inch long; the second year four or five inches, with perhaps the rudiment of a point; the third year about nine inches, when each divides into a fork, still round in form; the fourth year they become palmated, with a brow-antler and three or four points; the fifth season they have two crown-antlers, and perhaps five points; the points increasing in size each year, and one or two points being added annually until the animal arrives at its greatest vigor; after which period they decrease in size, and the points are not so fully thrown out. The longest pair I ever met with had eighteen points, (others have them with twenty-three points;) they expanded five feet nine inches to the outside of the tips; the breadth of palm eleven inches without the points; circumference of shaft, clear of the burr, nine inches; weight, seventy pounds. The old and vigorous animals invariably shed them in December; some of four or five years old I have known to carry them as late as March; but this is not often the case.

"The rutting season commences in September. The male then become very furious, chasing away the younger and weaker ones. They run bellowing through the forest, and, when two of equal strength meet, have dreadful conflicts, and do not separate until one or both are severely injured. I bought a pair of antlers from a Penobscot Indian, with one of the brow-antlers and the adjoining prong broken short off. The parts were at least an inch and a half in diameter, and nearly as hard as ivory. At that season they are constantly on the move; swimming large lakes and crossing rivers in pursuit of the female. The female brings forth in May. The first time she produces one fawn, but afterwards two. It is supposed by hunters that these twins are always one a male and the other a female.

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"In summer the hair of the moose is short and glossy; in winter long and very coarse, attached to the skin by a very fine pellicle, and rendered warm by a thick coat of short fine wool. The hair on the face grows upwards from the nose, gradually turning, and ending in a thick bushy tuft under the jaws. The young males have generally a long pendulous gland growing from the centre of this tuft, and covered with long hair, sometimes a foot long. Their flesh is very coarse, though some people prefer it to any other; it is apt to produce dysentery with persons unaccustomed to use it. The nose, or *moufle*, as it is generally called, if properly cooked, is a very delicious morsel. The tongue is also considered a delicacy. The last entrail (called by hunters the bum-gut) is covered with round lumps of suety fat, which they strip off and devour as it comes warm from the animal, without any cooking; also, the marrow, warm from the shanks, is spread upon bread and eaten as butter. I must confess that the disgusting luxury was rather *too rich* to tempt me to partake of it. I have seen some officers of the Guards enjoying it well enough.

"The seasons for hunting the moose are March and September. In March, when the sun melts the snow on the surface, and the nights are frosty, a *crust* is formed which greatly impedes the animal's progress, as it has to lift its feet perpendicularly out of the snow or cut the skin from its shanks by coming in contact with the icy surface.

"It would be useless to follow them when the snow is soft, as their great strength enables them to wade through it without any difficulty. If you wish to see them previous to shooting them from their 'yard,' it is necessary to make your approach to leeward, as their sense of smelling and hearing is very acute; the crack of a breaking twig will start them, and they are seldom seen any more until fatigue compels them to knock up; and thus ends the chase. Their pace is a long trot. It is necessary to have two or three small curs, (the smaller the better,) as they can run upon the snow without breaking through the crust; their principal use is to annoy the moose by barking and snapping at their heels, without taking hold. A large dog that would take hold would be instantly trampled to death. The males generally stop, if pressed, and fight with the dogs. This enables the hunter to come up unobserved and despatch them. Sometimes they are killed after a run of an hour; at other times you may run them all day, and have to camp at night without a morsel of provisions or a cloak, as every thing is let go the moment the moose starts, and you are too much fatigued to retrace your steps to procure them. Your only resource is to make a huge fire, and comfort yourself upon the prospect of plenty of moose-meat next day. As soon as the animal finds he is no longer pursued, he lies down; and the next morning he will be too stiff to travel far. Generally, a male, female, and two fawns, are found in a 'yard.'

"When obliged to run, the male goes first, breaking the way, the others treading exactly in his tracks; so that you would think only one had passed. Often they run through other 'yards,' when all join together, still going in Indian file. Sometimes, when meeting with an obstacle they cannot overcome, they are obliged to branch off for some distance and again unite. By connecting the different tracks at the place of separation, you may judge pretty correctly of their number. I have seen twelve together, and killed seven of them."

A method of hunting this animal is as follows: In September, two persons, in a bark canoe, paddle by moonlight along the shore of the lake, imitating the call of the male, which, jealous of the approach of a stranger, answers to the call and rushes down to the combat. The canoe is paddled by the man in the stern with the most death-like silence, gliding along, under the shade of the forest, until within short shooting distance, as it is difficult taking a sure aim by moonlight. The man in the bow generally fires, when, if the animal is only wounded, he makes immediately for the shore, dashing the water about him into foam. He is tracked by his blood the next day to where he has lain down, and where he is generally found unable to proceed any further. Many are killed in this manner in the neighborhood of Moose river every season.

Hunters sometimes find out the beaten tracks of the moose, (generally leading to the water,) and bend down a sapling and attach to it a strong, hempen noose, hanging across the path; while the tree is confined by another cord and a sort of trigger. Should the animal's head pass through the dangling snare, he generally makes a struggle, which disengages the trigger; and the tree, springing upwards, lifts the beast off its legs and strangles it. The palmated horns of the moose are so ponderous, that sixty pounds is a very common weight. To bear this stupendous head-dress, nature has endowed the moose with a short and strong neck, which takes from it much of that elegance and symmetry of proportion so generally predominant in deer. It is, nevertheless, a very energetic and imposing animal. It is said neither to gallop nor leap—acquirements rendered unnecessary from the disproportionate height of its legs, by which it is enabled, as it trots along, to step with the greatest ease over a fallen tree, a gate, or a split fence. During its progress, it holds the nose up, so as to lay the horns horizontally back, which attitude exposes it to trip by treading on its fore-heels. Its speed is very great, and it will frequently lead an Indian over a tract of country exceeding three hundred miles before it is secured. This animal is said to possess, in an eminent degree, the qualities of the horse and the ox, combining the fleetness of the former with the strength of the latter. None of the deer are more easily demesticated, the reindeer not even excepted. In Canada they have frequently been trained to draw sleds or carts, although, during the rutting season, they could not be so employed. A gentleman near Houlton, Maine, some years since trained a pair to draw a sleigh, which they did with great steadiness and swiftness; subject, however, to the inconvenience that, when they once took it into their heads to cool themselves in a neighboring river or lake, no efforts could prevent them. The European species or variety, whichever it be, has also been converted to the uses of man. In former times, when it was found in Scandinavia in great abundance, it was used for the purpose of conveying couriers, and has been known to accomplish a distance of two hundred and thirty-four miles in a day, attached to a sleigh. Its speed is even greater than that of the reindeer, which can rarely exceed two hundred miles in a day, although a case is related where, in consequence of a sudden invasion of the Swedish territory by the Norwegians, an officer was despatched from the frontiers of Norway, with a reindeer and sleigh, to Stockholm with the news. This was conveyed with such speed that the distance of eight hundred miles was accomplished in forty-eight hours, the animal falling dead at the expiration of the time. To this anecdote we have already alluded under the head of the reindeer. A Swedish writer recommends the employment of the moose (or elk of Europe) in time of war, asserting that a single squadron, with its riders, could put to immediate flight a whole regiment of cavalry; or, employed as flying artillery, would, from the extraordinary rapidity of their movements, insure the victory. Indeed, at the time when attention was especially directed towards the domestication of this animal, their use was forbidden, under the heaviest penalties, on account of their having been employed, from their extraordinary speed, to effect the escape of criminals. The European elk, at one time numerous throughout Norway and Sweden, is now confined to particular districts; at the present time, it is not found farther north than 64° in Scandinavia. Owing to the danger of total extinction, a law has recently been passed forbidding its destruction in Sweden for ten years from 1857, under severe penalties. The elk is reported to attain not unfrequently a height of seven or eight feet. One individual, only two years old, measured nearly nineteen hands, or more than six feet, in height. Another elk, not fully grown, weighed nearly one thousand pounds. The period of gestation is about nine months, the female producing from one to three young in May. The horns are shed about February.

The skin of this animal has been put to various uses. In Sweden a regiment was clothed with waistcoats made of this material, which was so thick as to resist a musket-ball. When made into breeches, a pair of them, among the peasantry of former days, went as a legacy through several generations.

In respect to the domestication of the moose, the remarks already made in reference to the effect of castration in increasing the size and docility, as well as regulating the horns, of the animal will not be forgotten.

ELAPHUS CANADENSIS, Ray. *American Elk.*

The elk of the United States ranks as the second in size of the numerous species belonging to the North American continent. Strikingly similar, in general appearance, to the stag of Europe, (*Elaphus Europæus*,) by the early settlers it was supposed to be the same species; its superior size being a necessary consequence of the more extended range furnished by the boundless forests and prairies of the New World. Hence, the term "stag" occurs with great frequency in the writings of the earliest authors; and, indeed, it is within but a comparatively recent period that the diagnoses of the two species have been accurately settled. For our present purpose it will be sufficient merely to state that the American elk, or wapiti, is at least a foot higher at the shoulders than the common stag, and has all the upper parts and jaw yellowish-brown; the latter being of a uniform blackish-brown, with a black mark on the angle of the mouth, wanting in the elk. The white circle around the eye of the European species is replaced in the American by brown. The proportions of the antlers, also, are different, as well as other features.

An instance of the inconvenience of applying the same name to different objects is well seen in the case of the subject of our present article. The term elk has been given to a European species very closely allied, if not identical, with the moose of the United States, (*Alces Americanus*.) Hence, it becomes necessary, in meeting with the word elk, to know whether the writer or the animal be American or European.

The American elk, sometimes called wapiti, was once extensively distributed throughout the present limits of the United States. At the present time, in the eastern parts, it is only found in a few counties of Pennsylvania—as Elk and Clearfield—where, indeed, their numbers are decreasing day by day. Occasionally one has been seen in the moose-range of the Adirondacks, in Lewis, Hamilton, and some other counties of northern New York. This has not been the case, however, for more than twenty years. A few are known to exist in the Alleghanies of western Virginia. We next find them in the southern part of Michigan; but it is only as we proceed further west that they present themselves in numbers. In Minnesota they are found in large herds, and in still larger on the Upper Missouri, Yellowstone, and other streams. Of the vast numbers in these regions, some idea may be formed from the piles of shed horns which the Indians are in the habit of heaping up in the prairies. One of these, in Elk Horn prairie, about eighty miles above Fort Union, has for many years been a conspicuous land-mark to the traveller, showing like a white monument many miles off. This, which was torn down in the summer of 1850, was about fifteen feet high, and twenty five in circumference; others still larger are found on the Upper Yellowstone.

The northern range of the elk is given by Sir John Richardson, as the 56th or 57th parallel, and in high latitudes its eastern limit is found in a line drawn from the south end of Lake Winipeg to the Saskatchewan, (lon. 103°,) and thence to Elk river, in the 111th degree. West of this line it extends to the Pacific, and south to Texas, New Mexico, and California. This range is very extensive—much greater than that possessed by any other species; and it is not at all improbable that a careful comparison of specimens will indicate more than one species. Specimens of skulls and horns in the Smithsonian Institution, from several extreme points, vary considerably. One in particular, from the region in British America north of Fort Union, is confidently asserted by the hunters to belong to a different species, known as the little elk, considerably smaller than the more common one.

It may well be expected that in the western plains the elk should attain to its maximum size. Individuals nearly the size of a horse are not unfrequent. In California and New Mexico antlers, it is said, have been found so large as, when resting on their tips, to permit a tall man to walk erect between them.

The elk is an animal easily kept in parks, where we have frequently seen them. They are to be found on many estates in Virginia—among others, on that of Colonel Tuley, in Clarke county. Their size and strength render them dangerous in the rutting season, at which period they are quite unmanageable.

This species is easily domesticated, and can readily be trained to draw in single or double harness. It is, therefore, next to the caribou and moose, the one to which we are most entitled to look for an increase of our stock of domestic animals. The great size of the horns of the male, and his fierceness and uncontrollability during the rutting season, are certainly obstacles in the way of reducing the elk to the rank of a servant to man; nevertheless they are not insurmountable, after all. No quadruped is more to be dreaded than a wild or irritated buck; yet, by the simple operation of castrating, his temper is subdued, his size greatly increased, and his whole nature entirely changed. The flesh, too, from being unpalatable, and, indeed, almost uneatable, is converted into the crowning dish of the epicure. There is no reason to doubt that the same results will follow in the case of the elk. The inconvenience of the large horns can also be overcome by the same operation; since we have already stated that, if performed when the horns are shed, these will never be reproduced. If the social instinct be a condition to the complete domestication of an animal, no deer possesses it in a higher degree than the elk, which is sometimes found in herds of thousands.

The antlers of the buck elk drop in February or March, and are reproduced in the course of four or five months. It is difficult to believe that the noble antlers of a full-grown individual actually fall off every year, and are reproduced in a short four months; but such is the fact. The males of all the deer, whatever their size, lose their horns annually. The females bring forth in May or June.

CERVUS MACROTIS, Say. *Mule Deer.*

The black-tail deer is the largest of the true deer, of the restricted genus *Cervus* found in North America. It derives its scientific name, *macrotis*, from the great length of the ears, resembling those of the mule, whence it is sometimes called the mule deer. Its more common appellation, black tail, is owing to the black tip to the tail. In size it is considerably larger than the common Virginia deer.

This species is limited in its range by the Missouri river, east of which it is seldom seen. In ascending this stream it is found on Vermillion river, increasing in number northwards to the Saskatchawan. In the Black hills it is very abundant, as well as in most of the Rocky mountain ranges, even as far south as Texas. It is, however, confined to the eastern side of the mountains, being replaced towards the Pacific by the closely allied *Cervus Richardsonii.*

CERVUS LEWISII, Peale. *Black-Tail Deer.*

As already remarked, this species, on the western slopes of the Rocky mountains, replaces the one last named on the eastern. Larger than *Cervus Virginianus*, it is smaller than *C. macrotis*. The hair is finer than in *C. macrotis*, which species has it coarse and spongy, like that of the elk. It has no glandular opening on the outer surface of the hind-leg below the knee-joint; while in *C. macrotis* this opening is as much as six inches in length. The horns are stouter and more covered with sharp points, and the brow antler is wanting. The tail is of the same length as in the Virginia deer, but is jet black above and on the sides, and white beneath. It never runs at full speed, but, like the mule deer, bounds with every foot from the ground at the same time. The flesh is said to be inferior in flavor to that of any other species.

The Pacific black-tail deer is found all along the coast, being exceedingly abundant in California and Oregon.

CERVUS VIRGINIANUS, Pennant. *Common Deer, (Virginia Deer).*

The common deer of the United States is, at the present day, too well known to need a special description. No State in the Union is without individuals of this species. In many sections of the country, as the Alleghanies and Adirondacks, they are exceedingly abundant, and not much less so in many of the southern Atlantic States. Their range extends from Maine to the Gulf of Mexico, and from the Atlantic to the Rocky mountains, beyond which its existence is not substantiated. It varies somewhat in its features over this extensive district, being much larger in the north, and decreasing to the south by almost one-half. Epicures assert that this difference in size is accompanied by a difference in the quality of the fat when cooked and cooled. In the north, the fat on the surface soon cools and congeals, becoming like tallow or mutton suet; whereas in Florida, where it sometimes cuts an inch on the saddle, it remains soft or elastic for some time after being taken from the fire, and is of delicious taste, like the fat of beef. The economical qualities of this deer are of the first order. The excellence of its flesh in the form of venison is well known to every one. The dressed hide, as buckskin, is of the highest importance to the Indian for the construction of various articles of dress, and scarcely less so to the white hunter. The horns are converted into handles for cutlery.

The male deer loses its horns in January, the new set commencing to sprout out after the lapse of a few weeks. These require their full growth by July or August, after which they are in their prime. The rutting season commences in October or November, during which period terrible battles are fought. Not unfrequently, bucks are found with their antlers interlocked inextricably, and dead of starvation.

The young are brought forth in April or May—sometimes later—in the northern States. The average number at a birth is two, three being not uncommon.

The Virginia deer is exceeeingly susceptible of domestication, although, when petted, it is apt to become troublesome. Individuals are frequently kept in parks, where, however, they do not thrive so well as the European fallow deer. Their agility is so great as to render it a matter of serious difficulty to keep them within enclosures.

CERVUS LEUCURUS, Douglas. *Long-Tailed Deer.*

This species, if it be really distinct, is the smallest of all the American deer, presenting in its dimensions a striking contrast to the moose. In general appearance it resembles the Virginia deer; it is, however, smaller, and has a tail of great length, measuring sometimes as much as seventeen inches. It is found abundantly on the Columbia river, but does not appear to cross the Rocky mountains—at least within the territory of the United States.

CAPRA AMERICANA, Blainville. *Rocky-Mountain Goat.*

This beautiful animal is frequently confounded with the big horn, or mountain sheep, from which it differs in many important characters. It is of the size of the domestic sheep, and bears no inconsiderable resemblance to the merino breed in the way in which the fleece hangs down on the sides. The body, neck, and head resemble those of the common goat. The horns are small, awl-shaped, and pointed, and nearly erect, with but a slight curvature backwards. Both horns and hoofs are black. The animal is entirely white, with the exception just named.

The body is covered with long, straight hair, considerably coarser than the wool of the sheep, but softer than that of the common goat. This hair is abundant on the shoulders, neck, back, and thighs; a considerable tuft of it, attached to the chin, forms a beard. There is likewise much of it on the chest and lower part of the throat. The tail is short, and, though clothed with long hair, is almost concealed by that which covers the rump. Under the hair of the body there is a close coat of fine white wool. The hair on the face and legs is short, the fetlocks short and, with the hoofs, perpendicular. The small posterior hoofs do not touch the ground.

To the agriculturist and manufacturer, the mountain goat affords a promise of importance which we may well hope to see realized. No wild species can compare with it in the excellence of its fleece, which, even in its original state, is as fine as that of the celebrated Cashmere goat. Careful management, under domestication, would, no doubt, increase this character to an extraordinary degree. Hence it is not remarkable that attention should have been directed to this species with a view to its cultivation. The Highland Society at one time made an effort to introduce this animal into Scotland, where it was supposed it would thrive. Owing, however, to the inaccessibility of its nature, it was found impossible to obtain specimens. At the present time, such might perhaps be procured through the agency of the American Fur Company, to one of whose posts, Fort Benton, on the Upper Missouri, above the falls, skins are occasionally brought.

A competent wool-grower in Scotland, to whom the subject was referred, reported that "the wool which forms the chief covering of the skin is fully an inch and a half long, and of the finest quality. It is unlike the fleece of the common sheep, which contains a variety of different kinds of wool, suitable to the fabrication of articles very dissimilar in their nature, and requires much care to distribute them in their proper order. The fleece under consideration is wholly fine. That on the fore part of the skin has all the apparent qualities of wool; that on the back part very much resembles cotton. The whole fleece is much mixed with hairs, and on those parts where the hairs are long and pendant there is almost no wool."

The mountain goat inhabits the loftiest peaks of the Rocky mountain range, seldom coming down to the plains. They frequent the steepest precipices, and have much of the habit of the common goat. The species is common on those high lands of the Rocky mountains whence flow the four great rivers—the McKenzie, the Columbia, the Missouri, and the Nelson; each one emptying into a different ocean. Their range is between the parallels of 40° and 64°. The only point within the

United States where they are well known is about Fort Benton, whence we have seen a single hunter's skin. No animal is less known to our naturalists, there being not a single preserved specimen, to the best of our knowledge, in any museum within the United States. Travellers who speak of the mountain goat sometimes refer to the big horn, the female of which has horns much like those of a goat.

ANTILOCAPRA AMERICANA, Ord. *Prong-Horn Antelope.*

The prong-horn antelope is familiar to every hunter on the plains west of the Missouri river. From this line it extends to the Pacific ocean, and ranges from northern Mexico to the latitude of 53° on the Saskatchewan. It is also abundant in Minnesota, especially on the plains of Red river. On the Missouri it does not occur south of L'Eau qui Court.

The antelope is highly prized as an article of food. When young, the flesh tastes much like venison, although superior to it in flavor; the old animals, however, are frequently very rank.

This species is found at times in immense numbers, almost realizing the tales of the antelopes of south Africa. Herds of a thousand and more have not unfrequently been seen. They run with great swiftness, and all their motions are characterized by ease and grace.

To the Indians, in the absence of buffalo, the prong-horn antelope is of great importance as an article of food. They are shot with the bow and arrow under cover, but the most usual way of catching them is in pens. These pens are formed of branches of trees arranged in a circle, one side of which is incomplete, and approached by a lane formed of walls of the same material, widening outwards. Into the open extremity of this lane the antelopes are gently urged by the Indians, and thence along into the circle; whereupon the opening is filled up by means of brush, and the work of destruction commenced with arrows and clubs. Although exceedingly nimble, yet such is their stupidity that they will not attempt to leap the barriers which confine them, however slight. The hunter frequently lures them within gun-shot by lying flat on the ground, and elevating from time to time a red silk handkerchief or a cap, by which the curiosity of the animal is excited.

OVIBOS MOSCHATUS, Blainville. *Musk Ox.*

A specimen of the skin of the *ovibos moschatus*, or musk ox, sent to England by Hearne, the celebrated traveller, gave Pennant the opportunity of describing and systematically arranging it; which M. Blainville has placed, as its Latin name implies, in a genus intermediate between the sheep and the ox. A slight information of it had been previously obtained through the medium of M. Jeremie, who has the credit of having first brought it into public notice by the produce of some stockings made from its wool, which were said to be even far more beautiful in appearance than silk. By its dense woolly coat, it is effectually protected from the severest weather; and the shortness of its legs renders it admirably suited to the barren grounds, of which it forms one of the characteristic inhabitants.

By the term "barren," the traders designate the northeastern corner of the American continent, of which the extreme point is Melville Peninsula. These lands have received that appellation on account of being destitute of wood, except on the banks of some of the larger rivers that traverse them. From this circumstance, the traders have not formed there any settlements. The district is generally featured with primitive rocks, consisting of an assemblage of low hills, with rounded summits, more or less precipitous, and separated by narrow valleys. An imperfect peat-earth, covering the lower grounds, nourishes a few stunted willows, glandular dwarf birches, black spruce-trees, or larches; but the soil more generally consists of minute debris of rocks, forming a dry, coarse, quartzose sand, unfit for supporting anything but lichens. In all the larger valleys, lakes of transparent waters are met with, containing fish; some of these are perfectly land-locked, but the greater number are connected by a rapid and turbulent stream, and thus they flow outwards to the sea.

In these barren and desolate parts of the earth, the musk-ox remains both winter and summer, contented and happy; feeding, like the caribou, on grass at one season, and on lichens at another; either climbing the most precipitous situations, with all the agility and precision of the chamois, or mountain-goat, or seeking the valleys—either in search of more luxuriant food, or shelter from the raging winds.

When fat, their flesh is palatable enough, and, although of a coarse grain, resembles the caribou; but when in a lean state, it is rendered far inferior to that of any other ruminating animal in North America, owing to its being tainted with a strong flavor of musk, which is more particularly the case with bulls. Although it exceeds the weight of the caribou by two-thirds, the hoofs of the musk-ox are so similar to those of the former animal in form, that it requires the experience of a practised hunter to distinguish the difference; those of the musk-ox are, however, rather larger and narrower.

These animals assemble in smaller herds than the other quadrupeds of the north, seldom more than twenty or thirty being seen at one time; from which circumstance, together with the rocky situation they are in the habit of frequenting, it is the most easy matter to approach them; and if the hunter has only the precaution to keep himself concealed, he may destroy, one after another, the whole herd. Instead of betaking themselves to flight, they crowd closer and closer together, as their companions fall around them; which has been attributed to their mistaking the report of the gun for thunder, as, notwithstanding the shortness of their legs, they can run extremely fast. Should they, however, discover their enemies by sight, or by their sense of smell, which is extremely acute, the cows immediately have recourse to flight; while the bulls, being of a more irascible nature, attack the hunter, whose life is placed in great jeopardy, unless he possesses both activity and presence of mind.

The musk-ox inhabits the hilly, barren grounds between the Welcome and Copper mountains, from the 63d or 64th parallel to the Arctic sea, and west towards Parry's islands, or as far as civilized man has penetrated. How much farther they proceed, it is, of course, at present impossible to say. They travel from place to place in search of pasture, but do not penetrate deep into the wooded districts, and are able to procure food in winter on the steep sides of hills, which are laid bare by the winds, and up which they climb with an agility which their massive aspect would seem to render impossible. In size they are nearly equal to the smallest Highland cattle, but they are more compactly made, and the shaggy hair of their flanks almost touches the ground. In structure they differ from the domestic ox in the shortness and strength of the bones of the neck and the length of the dorsal processes which support the ponderous head. The swelling bases of the horns spread over the forehead of both sexes—in the males coming nearly in contact. The animal is destitute of a tail.

It is not probable that the musk-ox could stand the warmth of the climate of the United States, although the experiment would be well worth trying. The hair is very long and silky, and has been occasionally worked into articles of dress. Could it be obtained in sufficient quantity, there is no doubt of its being of exceedingly great value in the arts. Unfortunately, this species, like the barren-ground reindeer, does not occur within the limits of the United States, and the experiment of domestication, as well as of economical application in general, must be tried, if at all, by the Hudson's Bay Company. To the best of our knowledge, there is not a single specimen of the musk-ox in any museum of the United States; probably not even a portion of the skin or bone.

Ovis Montana, Desm. *Big-horn, (Mountain Sheep).*

This interesting animal, the largest of its kind, is extensively distributed through North America, along the highlands of the Rocky mountains, from California to the parallel of 68°. Unlike the goat, it is not restricted to the inaccessible portions of this range, but comes down to the Black hills, and even along the hills of the upper Missouri. The *mauvaises terres* of the Missouri valley, so remarkable for their rich treasures of vertebrate fossils, are likewise frequented by the big-horn. In all these localities the most perpendicular cliffs are selected, among which they move with the greatest fearlessness. The hunters say that this animal will voluntarily leap from a height sometimes as great as fifty feet, and, falling head-foremost on the elastic tips of the spiral horns, experience no injury whatever from the descent. The horns of the males have, at any rate, a battered appearance at their tips, as if subjected to some such action.

The flesh of the big-horn is excellent when in season, resembling the finest mutton, and even exceeding it in flavor. There seems to be no reason why the animal may not, at some future day, be of much importance for food; as the scantiest vegetation is sufficient to support it, and the difficulties in the way of domestication are not greater than must have been the case with the common sheep. Unfortunately, the hair is too coarse and brittle ever to be of any use in the arts. Much resembling that of the elk, it is considerably coarser in quality.

The big-horn is much larger than the common sheep, the male weighing three hundred and fifty pounds and upwards. The horns of the male are of enormous size, measuring three feet around the spiral. The tips are about eighteen inches apart. The female has horns somewhat like those of the goat, although less pointed; whence it has not unfrequently been considered as the Rocky mountain goat, and as such reported by travellers.

BISON AMERICANUS, Cm. *Buffalo.*

This, the most gigantic of the indigenous mammalia of America, once overspread the entire northern half of the continent. At the time of the discovery by the Spaniards, an inhabitant even down to the shores of the Atlantic, it has been beaten back by the westward march of civilization, until, at the present day, it is only after passing the giant Missouri and the head-waters of the Mississippi that we find the American bison or buffalo. Many causes have combined to drive them away from their old haunts: the wholesale and indiscriminate slaughter by the whites, the extension of settlements, and the changes of the face of the country; but, above all, that mysterious dread of the white man, which pervades animal life in general as a congenital instinct.

Still, it would appear that the buffalo was originally confined within certain limits, which, perhaps, varied from time to time, as they certainly have done within comparatively a recent period. We have already referred to the fact of their existence on the Atlantic coast; how far north they extended is not exactly known. Their existence in Pennsylvania, however, is substantiated by the occurrence of bones of this species in alluvial deposits of rivers, bogs, and caves. At the first settlement of Canada they were not known there. As to their southern range, Lawson speaks of their being found on Cape Fear river, in North Carolina. Theuet, in the very rare work entitled "Les Singularitez de la France antarctique," Paris, 1557, gives, (p. 147,) in a representation of a curious beast of West Florida, a readily recognisable figure of the buffalo. In the Hudson Bay country they did not pass east of the latitude of Red river; south they were found throughout the Mississippi valley, the south Atlantic States, Texas, and Mexico. Their western range was strictly limited to the Rocky mountains, none extending beyond.

At the present time none are found in the Atlantic States, nor even east of the Missouri, except in Minnesota, in the region of the upper Mississippi, and the prairies of the Red river of the north. Their main range, however, is between the Missouri and the Rocky mountains, from Texas and New Mexico to the Saskatchewan, and even as far north as Great Martin lake, lat. 64°. Of late years they have found their way through the Rocky mountains to the plains of the Columbia by the great middle pass, and north of this on the head-waters of the Saskatchewan.

Imagination can scarcely realize the numbers of buffalo which, even now, are found on the western plains. It is not uncommon to see the prairies covered with them as far as the eye can reach; and travellers have passed through them for days and days in succession, with scarcely any apparent dimension in the mass. The paths worn in the plains resemble more the beaten highways of civilization than the mere aggregation of individual hoof-marks. As their routes are, in most cases, selected with the unerring instinct of animal existence, extending in a straight line from one convenient crossing-place of river or ravine to another, and taking the most available springs or streams in their course, they well justify the remark of Mr. Benton as to their agency in defining the high-roads of travel across the prairies, for which they frequently serve almost without an alteration.

Still, vast as these herds are, their numbers are much less than in

earlier times, and they are diminishing with fearful rapidity. Every year sees more or less change in this respect, as well as alterations of their great line of travel. To the Indian, dependent for the very necessaries of life upon the buffalo, these facts come home with stern reality. His existence is bound up inseparably with that of the race of buffalo, and every consideration of humanity to the one prompts a care over the other.

If it were possible to enforce game-laws, or any other laws on the prairies, it would be well to attach the most stringent penalties against the barbarous practice of killing buffalo merely for the sport, or perhaps for the sake of the tongue alone. Thousands are killed every year in this way. After all, however, it is, perhaps, the Indian himself who commits the mischief most wantonly. A frequent mode of hunting the buffalo by them consists in making a "surround." This is done by enclosing a large herd and driving them over a precipice upon the rocks, or into one of the profound ravines which intersect the prairies in various directions. In this way thousands are sometimes killed in a single day. Fires in prairies, too, do their share in the work of destruction, either by their immediate agency or by driving the maddened animals into the ravines just referred to.

Mr. Picotte, an experienced partner of the American Fur Company, estimated the number of buffalo robes sent to St. Louis in 1850 at 100,000. Supposing each of the 60,000 Indians on the Missouri to use ten robes for his wearing apparel every year, besides those for new lodges and other purposes, by the calculation of Mr. Picotte we shall have an aggregate of 400,000 robes. We may suppose 100,000 as the number killed wantonly, or destroyed by fire or other causualties, and we will have the grand total of half a million of buffalo destroyed every year. This, too, does not include the numbers slaughtered on Red river, and other gathering points.

It is, perhaps, unnecessary to state that the American bison is not found in the Old World. A European species of the same genus, *bos*, and closely allied, is the *bos urus*, auerochs of Germany, urus of Cæsar, bonossus of Aristotle, and bison of Pausanius and Pliny. This species, once of rather wide range, is now confined to the country between the Caspian and the Black sea, where it is protected from injury by the severest legislative enactments. Other species are found in various other parts of the world.

The skins of the American buffalo are dressed as follows: After being taken off the animal, they are hung on a post, and the adhering flesh taken off with a bone, toothed something like a saw. This is performed by scraping the skin downward, requiring much labor. The hide is then stretched on the ground, and fastened down with pegs; it is then allowed to remain a day or two, or till dry. After this, the flesh side is pared down with the blade of a knife fastened in a bone, called a grate, which renders the skin even, and takes off about a quarter of its thickness. The hair is taken off with the same instrument; and these operations being performed, and the skin reduced to a proper thickness, it is covered over either with brains, liver, or grease, and left for a night. The next day the skin is rubbed and scraped, either in the sun or by a fire, until the greasy matter has been worked into it, and it is nearly dry; a cord is then fastened to two poles, and over this the skin is thrown, and pulled, rubbed, and worked till quite dry. After this, it is sewed together around the edges, excepting at one end. A smoke is made with rotten wood, in a hole dug in the earth, and the skin is suspended over it on sticks set up like a tripod, and thoroughly smoked; which completes the tanning, and renders it capable of bearing wet without losing its softness or pliability afterwards.

Buffalo robes are dressed in the same manner, excepting that the hair is not removed, and they are not smoked. They are generally divided into two parts; a strip is taken from each half on the back of the skin where the hump was, and the two halves, or sides, are sewed together, after they are dressed, with thread made of the sinews of the animal, and then the robe is ready for market.

One of the most useful applications of buffalo meat consists in the preparation of pemmican—an article of food of the greatest importance, from its portability and nutricious qualities. This is prepared by cutting the lean meat into thin slices, exposing it to the heat of the sun or fire, and, when dry, pounding it to a powder. It is then mixed with an equal weight of buffalo suet, and stuffed into bladders. Sometimes venison is used instead of buffalo beef. Sir John Richardson, while preparing for his recent Arctic expedition, found it necessary to carry with him pemmican from England. This he prepared by taking a round or buttock of beef, cut into thin steaks, from which the fat and membraneous parts were pared away, and dried in a kiln until the fibre of the meat became friable. It was then ground in a malt-mill, and mixed with nearly an equal weight of beef suet, or lard. This completed the preparation of the plain pemmican; but to a portion raisins were added, and another portion was sweetened with sugar. These latter changes were subsequently highly approved by the voyageurs. The pemmican was then placed in tin canisters, and well rammed down; and after the cooling and contraction of the mass, these were filled with melted lard through a small hole left in the end, which was then covered with a piece of tin, and soldered up. The total amount of beef used by Sir John Richardson amounted to 35,651 pounds; of lard, to 7,549 pounds; of currants, to 1,008 pounds; of sugar, to 280 pounds. These materials constituted 17,424 pounds of pemmican, costing at the rate of 1 shilling 7½ pence (36 cents) per pound.

The meat biscuit of Mr. Borden, now manufactured from beef by him at Galveston in large quantities, is also of much economical importance.

We conclude our article, already extended to unreasonable length, by presenting an account of some domesticated buffaloes, which, better than any language of our own, will present the question of domestication in a proper light. It is taken from Audubon and Bachman's Quadrupeds, as furnished these gentlemen by Robert Wickliffe, Esq., of Lexington, Ky., who has tried the experiment fully.

"The herd of buffalo I now possess have descended from one or two cows that I purchased from a man who brought them from the country called the upper Missouri. I have had them for about thirty years; but from giving them away, and the occasional killing of them by mischievous persons, as well as other causes, my whole stock at this time does not exceed ten or twelve. I have sometimes confined them in separate parks from other cattle, but generally they herd and feed with my stock of farm-cattle. They graze in company with them as gently as the others. The buffalo cows, I think, go with young about the same time the common cow does, and produce once a year. None of mine have ever had more than one at a birth. The approach of the sexes is similar to that of the common bull and cow, under all circumstances, at all times, when the cow is in heat—a period which seems, as with the common cow, confined to neither day nor night, nor any particular season; and the cows bring forth their young, of course, at different times and seasons of the year, the same as our domestic cattle. I do not find my buffaloes more furious or wild than the common cattle of the same age that graze with them.

"Although the buffalo, like the domestic cow, brings forth its young at different seasons of the year, this I attribute to the effect of domestication, as it is different with all animals in a state of nature. I have always heard their time for calving in our latitude was from March until July; and it is very obviously the season which nature assigns for the increase of both races, as most of my calves were from the buffaloes and common cows at this season. On getting possession of the tame buffalo, I endeavored to cross them as much as I could with my common cows, to which experiment I found the tame or common bull unwilling to accede; and he was always shy of a buffalo cow, but the buffalo bull was willing to breed with the common cow.

"From the common cow I have several half-breeds, one of which was a heifer. This I put with a domestic bull, and it produced a bull calf. This I castrated, and it made a very fine steer, and when killed produced very fine beef. I bred from this same heifer several calves, and then, that the experiment might be perfect, I put one of them to the buffalo bull, and she brought me a bull-calf, which I raised to be a very fine, large animal—perhaps the only one to be met with in the world of this blood, viz: a three-quarter, half-quarter, and half-quarter of common blood. After making these experiments, I have left them to propagate their blood themselves, so that I have only had a few half-breeds, and they always prove the same, even by a buffalo bull. The full-blood is not as large as the improved stock, but as large as the ordinary stock of the country. The crossed or half-blood are larger than either the buffalo or common cow. The hump, brisket, ribs, and tongue of the full and half blooded are preferable to those of the common beef; but the round and other parts are much inferior. The udder or bag of the buffalo is smaller than that of the common cow; but I have allowed the calves of both to run with their dams upon the same pasture, and those of the buffalo were always the fattest; and old hunters have told me that, when a young buffalo calf is taken, it requires the milk of two common cows to raise it. Of this I have no doubt, having received the same information from hunters of the greatest veracity. The bag or udder of the half-breed is larger than that of the full-blooded animals, and they would, I have no doubt, make good milkers.

"The wool of the wild buffalo grows on their descendants when domesticated, but I think they have less wool than their progenitors. The domesticated buffalo still retains the grunt of the wild animal, and is incapable of making any other noise, and they still observe the habit of having select places within their feeding-grounds to wallow in

"The buffalo has a much deeper shoulder than the tame ox, but is lighter behind. He walks more actively than the latter, and I think has more strength than a common ox of the same weight. I have broken them to the yoke, and found them capable of making excellent oxen; and for drawing wagons, carts, or other heavily-laden vehicles, on long journeys, they would, I think, be greatly preferable to the common ox. I have as yet had no opportunity of testing the longevity of the buffalo, as all mine that have died did so from accident, or were killed because they became aged. I have some cows that are nearly twenty years old, that are healthy and vigorous, and one of them has now a sucking calf. The young buffalo calf is of a sandy-red or rufous color, and commences changing to a dark brown at about six months old, which last color it always retains. The mixed breeds are of various colors. I have had them striped with black on a gray ground, like the zebra; some of them brindled red; some pure red, with white faces; and others red, without any markings of white. The mixed bloods have not only produced in my stock from the tame and buffalo bull, but I have seen the half-bloods reproducing, viz: those that were the product of the common cow and wild buffalo bull. I was informed that, at the first settlement of the country, cows that were considered the best for milking were from the half-blood down to the quarter, and even eighth, of the buffalo blood. But my experiments have not satisfied me that the half buffalo bull will produce again. That the half-breed heifer will be productive from either race, as I have before stated, I have tested beyond the possibility of doubt.

"The domesticated buffalo retains the same haughty bearing that distinguishes him in his natural state. He will, however, feed or fatten on whatever suits the tame cow, and requires about the same amount of food. I have never milked either the full blood or mixed breed, but have no doubt they might be made good milkers, although their bags or udders are less than those of the common cow; yet, from the strength of the calf, the dam must yield as much, or even more, milk than the common cow."

V.

AGRICULTURAL CIRCULAR AND REPLIES.

AGRICULTURAL CIRCULAR.

United States Patent Office,
Washington, August, 1851.

Sir: It being the duty of the undersigned annually to collect information on the various branches of agriculture, you are addressed with the view of eliciting such information on this most important national interest as may be useful to embody in the Report for the present year. The questions are intended rather as hints or suggestions, than to be literally followed in shaping replies. Extending, as they do, over the agricultural products of the whole country, no one person can be expected to reply to all, but to such only as relate to subjects with which he is practically familiar.

The United States Census will furnish reliable data as to the quantity of grain and other crops, the number of domestic animals, &c.; so that such questions are omitted in this Circular. But it is desired to obtain the experience of practical men in whatever relates to the cultivation of the staple crops, together with suggestions as to new processes of culture; the introduction of new varieties of grains, seeds, and plants; the improvements in machines and implements of husbandry; and all like topics of universal interest to the agriculturist.

The wide circulation given to the Patent Office Reports renders it especially desirable that all new facts and discoveries of *real practical value*, relating to American husbandry, be embodied therein in a permanent form for the use of the public; and it is confidently hoped that the efforts of this Bureau to collect such information will be readily seconded by the agricultural community.

All communications will be duly acknowledged in the Report.

Very respectfully,
THOMAS EWBANK,
Commissioner.

Information is respectfully solicited on the following and other points belonging to rural affairs:

Wheat.—Is guano used in the production of this crop? And, if so, what is the gain in bushels per 100 pounds of the manure? What the average product per acre—time of seeding and of harvesting—preparation of seed, and quantity used per acre—how many times and how deep do you plough—is the yield per acre increasing or diminishing—your system of rotation in crops—best remedies for Hessian flies and weevils—average price at your nearest market in 1851?

Corn.—Is guano used in the production of this crop? If so, in what way is it applied? What is the gain in bushels per 100 pounds of guano? State the average product per acre—cost of production per bushel—state the best system of culture—best method of feeding, whether whole or ground, cooked or raw. State, if you can, how much grain the manure formed by 10 bushels of corn consumed by hogs will add to an acre, if carefully saved and skilfully applied, at or before the time of planting.

Oats, Barley, Rye, Peas, and Beans.—Average yield of these several crops per acre—quantity of seed used—which crop least exhausting to land—are peas cultivated as a renovating crop; and, if so, with what success?

Clover and Grasses.—Quantity of hay cut per acre—best fertilizers for meadows and pastures—the grass seeds preferred in laying down meadows—quantity sown per acre—cost of growing hay per ton.

Dairy Husbandry.—Average yearly produce of butter or cheese per cow—comparative cost per pound of making butter and cheese—treatment of milk and cream—mode of churning—of putting down butter for market—average price of butter and of cheese.

Neat Cattle.—Cost of rearing till 3 years old—usual price at that age—value of good dairy cows in spring and in fall—how many pounds of beef will 100 pounds of corn produce—will a given amount of food yield more meat in a Durham, Devon, or Hereford, than in a native animal? How do you break steers to the yoke?

Horses and Mules. Is the growing of these animals profitable? What is the expense of rearing a colt or mule until 3 years old? How should brood mares and colts be treated? What is the best way to break young horses and mules for service?

Sheep and Wool.—Is wool-growing profitable—cost per pound of growing coarse or fine wool—how many pounds of wool will a ton of hay produce—are large or small sheep more profitable either for mutton or for their fleeces—how much more does it cost to produce a pound of fine merino than of ordinary coarse wool? The proportion of lambs annually reared to the number of ewes?

Hogs.—What the best breeds—the cheapest method of producing pork and bacon—how many pounds of meat will 100 pounds of corn yield? The best method of putting up pork and curing bacon and hams.

Cotton.—Average yield of clean cotton per acre—cost of production per pound—what crops best grown in rotation with cotton—best preventives against rust, army and boll worms—how deep do you usually plough for this crop—have you any experience in subsoiling or deep tillage for cotton—your experience in the use of cotton seed as a fertilizer—how can cotton lands best be improved without resting them. Is guano used; and, if so, with what result?

Sugar-cane.—Is the cane losing its vital force, and becoming more subject to premature decay than formerly—should not the seeds, in place of rattoons, be occasionally planted to produce new and healthier varieties—can you suggest any improvement in cultivation of the cane, or the

manufacture of sugar—cost of producing sugar per pound. Is guano used—and, if so, with what result?

Rice.—Can rice be successfully cultivated on upland—do you know of any varieties, decidedly superior to others, which deserve increased attention—can you suggest any improvement in the management of rice plantations—quantity grown per acre.

Tobacco.—Average yield per acre—cost of production per hundred weight or hogshead—describe any new process of cultivation or curing—crops best grown in rotation to maintain the fertility of tobacco land. Is guano used, and with what result?

Hemp.—Is the culture of hemp on the increase or decrease? Describe any new process of culture or preparation for market—average yield per acre—cost of production per pound.

Root Crops, (turnips, carrots, beets, &c.)—Is the cultivation of these roots, as a field crop, on the increase? Can you suggest any improvement in preparing land, seeding, after tillage and feeding? Average product per acre.

Potatoes, (Irish and sweet.)—Average yield per acre—cost of production per bushel—most prolific and profitable varieties—best system of planting, tillage, and manuring.

Fruit Culture.—Is the culture of fruit receiving increased attention—cannot apples enough be grown on an acre to render the crop a very profitable one to the farmer—comparative value of apples and potatoes for feeding hogs and cattle—what varieties best to keep for winter use and for exportation—do you know any preventive or remedy for the "blight" on pear and apple trees, or the "yellows" on peach trees? The best method of transplanting, budding, grafting, &c. Make any suggestions on the culture of *grapes* and other fruit—the manufacture of *wine*, and on *forest culture*.

Manures.—What is regarded as the best plan of making and preserving manures from waste—are *lime* and *plaster* used as fertilizers; if so, in what quantity, and how often applied? Is *guano* used, and with what success? Quantity usually applied per acre.

Meteorology.—Time and degree of highest and lowest range of thermometer—mean temperature of each month and of the year—fall of rain in each month, and aggregate for the year.

Note.—Please forward replies as early as convenient—if possible, before the 1st of January—giving the name, post office, county, and State.

REPLIES TO CIRCULAR.

MAINE.

PERRY, WASHINGTON COUNTY, MAINE,
December 20, 1851.

SIR:—I will attempt an answer to a *few* of the inquiries of your Circular.

My residence, as you will see by the heading, is in the extreme "down-east," upon a branch of the Bay of Fundy—exposed to the fogs and damps of that bay, which moderate in some degree the climate, both in winter and summer—the thermometer showing not so great a range as in situations a few miles inland. My answers will have reference only to my own, and similar situations in this extreme east of the Union. The *pine tree* being as yet the principal crop, there is not much data for information on agricultural topics; yet we hope a better day is dawning.

Wheat can be cultivated here, and is a profitable crop. Guano has been used very little, and not with marked success; fifteen bushels is about the average yield, though forty have been raised per acre. Summer wheat is the only kind raised. A few experiments with winter wheat show that it will do well. "Time of seeding," April 10 to May 10; of harvesting, September 10 to September 20. The best "preparation of seed" known here is a strong brine to float out all light wheat, &c.; then dry with quick lime. Our "system of rotation in crops," where any system is practised, is pasture, oats, turnips or potatoes, wheat or barley, hay, pasture—a six years' course.

Corn is a very uncertain crop here. This year it did not get even to green corn for boiling.

Oats, Barley, Rye, Peas, and Beans.—These we can raise to good advantage. Average yield of oats on green sward, fifty bushels; of barley, twenty-five bushels; rye, fifteen bushels. Barley or wheat is used to lay down land to grass with. The grass-seed takes much better than with oats or rye.

Clover and Grasses.—Quantity of hay per acre where land is in good condition, this year, from two to four tons.

Best Fertilizers.—Bone dust, hog manure; grass seeds used here, timothy, eight quarts; clover, ten pounds; fowl meadow, eight quarts. Cost of growing hay, including rent of land, taxes, and labor, $5 per ton.

Dairy.—Not much cheese made—none for market; average product of butter per cow, one hundred and twenty pounds. "Mode of putting down butter for market:" the best butter is made from sweet cream; let the milk stand from 36 to 48 hours; skim and churn; work out *all* the butter-milk, and the butter cannot fail to be good; and with one-and-a-half ounce of salt and a tea-spoonful of loaf sugar to the pound of butter, packed in spruce firkins, it will be as sweet in a year as on the day it is packed. The price of good butter here is twenty cents. As the rearing and managing of neat cattle is pursued without any system, answers to your question here would be mostly guess work. They must cost about twenty dollars per head, which is about what they sell for at three years old. Good dairy cows are worth twenty dollars in the fall, thirty dollars in the spring.

Horses and Mules.—No mules in the county. The rearing of horses is profitable if we rear fine animals, which will sell at a high price; not otherwise. There are very few raised, and no system pursued; and I must remark the same of sheep. Every farmer keeps a few; but, being fed with other stock from a common mow, no account can be given of the cost of keeping. I am well satisfied that the common coarse-wool sheep, such as are usually kept here, yielding three to four pounds of wool, will not pay the expense of keeping. The merino are as easily kept, are as hardy, yield as much wool per head, and raise as many lambs, on an average, as the coarse-wool sheep. But our winters are too long to have wool-growing or stock-raising made a profitable business, without some better system than we now have.

Root Crops.—Their cultivation is on the increase since the potato has failed; they are very much taking its place. Beef can be fattened and hogs kept very well with ruta-baga or carrots. The fly, or rather a small *bug*, has become very troublesome to the ruta-baga of late. The best remedy known here is to sow very thick—say four or five pounds of seed to the acre, and as much of the flat turnip-seed sown broadcast. The *bug* is said to prefer the flat turnip to the ruta-baga; and by thus furnishing him an abundance of food, enough will escape him to give a crop. I "can suggest" no "improvement" in preparing land, &c., on the modes practised by *good farmers*, viz: land ploughed deep, worked fine, well manured. In after culture I thin, to ten inches apart, the plants as soon as they get too large for the fly, or as soon as the second leaves are well formed; then use the cultivator and hoe freely. I have succeeded well with guano mixed with plaster, half and half in bulk. Five hundred pounds of guano to the acre give a crop equal to the best farm-yard compost. Our crops range from four to ten hundred bushels per acre, and cost from four to ten cents a bushel. In feeding, I have given up cooking them. I winter my swine *well* on ruta-baga, given raw and whole, from one-half to three-fourths of a bushel daily to each hog. They eat them well, and thrive well on them, much better (I think) than on boiled ones. I fatten my beef in the same way, feeding from one to two bushels per head daily, (or as much as they will eat.)

Potatoes, formerly our *great* and almost *only* crop, have become so uncertain by the disease that no reliable data can be procured. This year the crop was small, but of good quality; the yield, one hundred and fifty bushels per acre, half of which were merchantable, and sold for eighty cents per bushel; cost of production, twenty-five cents per bushel. Our "most prolific and profitable variety," and the only variety raised to any great extent, is the "*white blue nose.*" "The best system of planting," &c., which I have found is, plough, spread the manure, harrow, plough again, dropping the seed in every third furrow; leave them thus till the potatoes begin to break ground; then harrow crosswise the furrows. In this way I have raised 500 bushels white blue-noses to the acre.

Fruit Culture.—The culture of fruit is receiving increased attention, and I know of no crop that will yield a better income to the farmer. There has been, and still is, a great want of faith in the capacity of the soil or climate to bring fruit to maturity. This should not be so. We can raise many varieties of apples to perfection. Plums flourish well here, and pears also, wherever they have been tried. We don't yet begin to talk about the value of apples for swine, or think about exportation; and the culture is not far enough advanced to decide what are best varieties; almost any variety raised here will keep well. I think the best method of grafting, so far as I have had any experience, is, to take up the young tree (at a year old from the seed) in April, or as early as the frost will allow; cut it off at the root with a sloping cut, entering the knife at one inch below the line of the ground, and passing it out at half an inch or an inch above this line; select a scion as nearly the size of the stock as possible, and cut with a slope to match that of the stock; place the parts together, matching the barks accurately on *one* side, let the other come as it may; tie with woollen yarn or cotton wicking, (anything which is soft and will rot off quick,) and transplant immediately, covering the splice with earth. Use no wax, or composition of any kind; it prevents the thread from rotting off and girdles the tree. The advantages of this mode are, its simplicity, certainty, cheapness, and economy of time, as it may be performed in-doors in stormy weather, being careful not to let the roots dry; and if some fail to take, (very few will do so,) the loss is a mere trifle. They grow very thriftily from two to four feet. I have succeeded well in grafting the plum, by cutting down the stock, near the ground, and inserting the scion by cleft-grafting, covering with grafting-wax. This must be done very early, before the sap begins to move. Pear scions will take in the mountain ash and in the wild pear, (shad bush.) I don't know what kind of trees they will make.

"Best plan of making and preserving *manure* from waste" is the barn cellar, well supplied with *dry* muck to absorb the liquid. Lime produces no effect, or plaster applied alone to the land. This has been my experience, and that of others who have tried it. Plaster with guano seems to increase its power and prolong its action. Guano is used by very few farmers, and by them with various success. My own experience is, that it is better than any other manure that I can apply at the same cost, Quantity usually applied—three to four hundred pounds per acre. Lowest range of thermometer, 10° below zero February 8; 12° below, January 31; highest, 84°, September 6 and 8.

RANGE OF THERMOMETER.

Date.	Highest.	Lowest.	Average.	Remarks.
1850.				
December..	38°	-	20°.6	Two feet of snow.
1851.				
Jan. 7.....	42°	12°	19°.3	Two feet of snow; 3 inches of rain.
Feb. 7....	44°	10°	24°.4	Snow six days; rain three days; quantity not noted.
March....	48°	-	29°.1	Nine days snowy; 2 inches of rain; fields covered with snow, and good sleighing till 30th; 2 feet snow in the woods.
April.....	57°	23°	38°.55	Nine rainy days; 7 inches.
May......	71°	31°	46°	Eleven frosty nights; eight rainy days; 9 inches.
June......	74°	37°	53°.3	Six rainy days; 4½ inches; one frosty night.
July......	80°	44°	59°.3	Eleven rainy days; 8.5 inches.
August....	80°	47°	60°.33	Twenty-seven fair days; two rainy days; 3 inches.
September.	84°	34°	56°.4	2½ inches rain; frost 15th and 16th.
October...	70°	30°	49°.7	13 inches; eleven rainy days; ice 17th.
November.	54°	16°	33°.7	Rain three days; 4 inches; snow five days; 10 inches.

Winter set in, that is, the ground froze, and sleighing, which continues till this time, commenced on the 10th day of November.

From the time sleighing broke up in the spring till it commenced again in the fall, 7 months 11 days.

All which is respectfully submitted by

WM. D. DANA.

THOMAS EWBANK, Esq.

NORRIDGEWOCK, SOMERSET COUNTY, MAINE,
December 20, 1850.

SIR: In reply to the Circular of queries which I received from the Patent Office in September last, desiring information relative to the agricultural products, and other topics, in this vicinity, I will endeavor to give such information as can be obtained from sources to be relied upon.

Wheat.—The kinds most used here for spring sowing are a bald white chaff, called tea wheat, and a bearded red chaff, known as Malaga wheat. But a few years since we considered wheat sown in April or May, on good land, ploughed the fall previous and harrowed in the spring, would yield a sure crop; but for the last few years the Hessian fly, the weevil, and rust have almost destroyed the crop; so that many of our farmers have abandoned the attempt to raise spring wheat.

This season, however, has been a more productive one, less weevil and rust, a fair yield both in quantity and quality of grain; so our farmers seem more encouraged to renew their efforts, hoping that some way will be found to overcome these common enemies. Many have deferred sowing until the last of May or first of June, and have thereby escaped the weevil, but sometimes lose by the rust. Amount of seed used, 1½ to 2 bushels per acre; harvest last of August or first of September. Winter wheat, within a very few years, has attracted the attention of some farmers. Although they commenced the experiment by sowing small parcels, it has succeeded beyond their expectations; and, from reliable sources, an estimate has been made, showing that more than 10,000 bushels have been raised in this and Kennebec counties the past season, all of which is now sown; so that we have now fairly made a beginning to grow winter wheat. The kinds mostly used are the white flint, kloss, or banner, and Oregon, sowed in September, 1 bushel per acre; harvest in August; average yield this season 25 bushels per acre; mode of cultivation: ground well ploughed once, harrowed fine and smooth, seed sown, ploughed in with a small plough. Price this season from $2 to $2 50 per bushel; spring wheat from $1 25 to $1 50 per bushel.

Corn.—Since the failure of the wheat and potato crop, corn has received increased attention, and has yielded good and sound crops for several years in succession. Although the last spring was very unpromising, yet the very warm fall gave another good crop. Various kinds are used here, according to soils—some eight, some twelve rowed. Mode of cultivation: about 12 loads—say 6 cords—of manure spread upon the acre and ploughed in, with about 4 cords put into the hills; average product 40 bushels per acre; average price at the farm 75 cents per bushel; plant in May, harvest in September or October; the land sowed with winter wheat in the fall, or spring wheat and grass seed the following spring. Very little is used for making pork or beef, but much used for domestic purposes; the surplus is used for teams lumbering, mixed with oats, and ground, and fed to oxen dry; what is used for making pork is ground and cooked—for making beef, ground and fed dry.

Oats.—On light and easy soil many oats are raised. Ground ploughed in the fall, sowed as early in the spring as the land will admit being worked. Seed used, 3 bushels per acre; average product, about 25 bushels per acre; average price, 30 cents per bushel.

A mixed crop of oats and peas is raised here in large quantities; used for making pork and beef, and provender for teams lumbering.

New land and old rough pastures are ploughed in the fall; sowed early in the spring, 2 bushels of oats and 1 bushel of peas to the acre; average product, 30 bushels per acre, weighing about 40 pounds per bushel; average price, 1 cent per pound at the farm; sold by weight.

Barley.—But little cultivated here until within a few years. Since the wheat and potato crops have been so uncertain, more attention has been paid to it. Used for domestic purposes and fattening swine; sowed in May or June on dry soil; 1½ bushel seed per acre; yields about 20 bushels per acre; average price, 75 cents.

Rye.—Until within a few years winter rye was considered a sure and profitable crop. New land, ploughed in June, and sowed to rye in August or September, was sure to yield an abundant crop; but for the last few years not enough has been raised for our own consumption. Many farmers have abandoned the cultivatiion of it, but the high price and ready sale still induce some to continue to raise it. Spring rye, for the last few years, has also been a very uncertain crop; in 1849 but little sowed, and the yield abundant; in 1850 much sowed, and almost an entire failure. Amount of seed used, 1 to 1¼ bushel per acre; spring rye, 1 bushel per acre; sowed as soon as the fruit is out of the ground; harvest in August.

Peas.—Not many raised separate; on some light soils they yield a fair crop, but on strong and rich soil run to vine too much; mostly sowed with oats; when separated from the oats, usually sell for $1 per bushel.

Beans.—Raised mostly with corn, rarely planted alone, have yielded abundantly this year; worth $1 per bushel.

Clover and Grasses.—Clover, herdsgrass, and red-top, are the principal kinds used here. Average yield per acre, 1 ton; average price, $7; all consumed here. Land is so plenty and cheap, and labor so high, that nothing has yet been done to reclaim bogs or meadows. Although hay and pasturing are the leading objects for our farmers, yet they prefer the clearing of their upland, and getting it into grass, to spending their labor on bogs or meadows. Quantity of seed sown per acre, 12 pounds clover and 4 quarts herdsgrass, mixed, for upland; for wet land, 4 quarts herdsgrass and 4 quarts red-top per acre.

Dairying.—But little attention has yet been paid to dairies. Our distance from a suitable market for the produce of the dairy, and the difficulty of disposing of our calves, have compelled us to raise more cattle than were profitable; but now our facility for transportation is such (a railroad connecting with Boston) that an increased attention is being given to the dairy. Many farmers have reduced their sheep flock, and increased their stock of cows.

Cheeses are made during the warm weather—say 3 or 4 months; the rest of the season, spring and fall, butter is made. Average yearly product, about 200 pounds of cheese and 100 pounds of butter per cow. The amount of butter and cheese made is fast increasing, and the quality of both much improved. The manufacturing of butter from the milk, as soon as drawn from the cow, is not yet practised here. Our milk is set a sufficient length of time for the cream to rise; cream is then churned. After the butter is sufficiently worked from the butter-milk, it is salted, packed in tubs holding from 40 to 60 pounds each. Average price of butter, 12½ cents per pound; cheese, 8 cents per pound.

Neat Cattle.—Much improvement has been made in our neat stock the last few years; a less number is raised, much improved in quality, and prices increase accordingly. Three-year-old steers are now worth from $65 to $70 per pair on an average; cows, in the spring, $25; in the fall, $16. Very little beef is made here from corn. Our beef is mostly made from grass in the summer, and pumpkins and roots in the fall.

Our cattle are so much crossed that we have but very few pure bloods—Durham short-horns most prevalent; some Devon and Hereford, and native. Native cows are still preferred for the dairy.

Sheep and Wool.—Sheep are considered by most of our farmers as a profitable stock, when wool will sell for 33 cents per pound. The breeds most kept here are merino and Saxony, crossed with the native, producing a middling-sized sheep, and a good grade wool; but the increasing demand for lambs and mutton, for other markets, is now inducing our farmers to obtain a larger and more hardy breed, such as the South Down and Dishley.

The difference in the price of coarse and fine wool here does not exceed 8 cents per pound, while the difference in the lambs and mutton far exceeds that; the large coarse-wool-breeds cut about the same quantity of wool, and will raise three times as many of lambs as the small fine-wool ones. Flocks have been much reduced for the last few years, but now the demand is very great. Fat sheep are now selling here for $2 50 to $3 per head; good store ones, $2; lambs, $1 50 per head; average weight of fleeces, 3 pounds, sold this season for about 35 cents per pound.

Hogs.—Of hogs we have many excellent breeds—so much crossed with the common swine no definite name can be given to any. Our pork is mostly made from a mixture of oats and peas ground and mixed with boiled potatoes; none packed here for market; average price of sound hogs, 6 cents per pound; average weight, at 18 months old, 400 pounds.

Root Crops.—Since the failure of the potato crop, carrots, turnips, and beets are being cultivated as a field crop by a very few farmers; used for feeding milch cows, young cattle, and horses. Average yield of carrots, 400 bushels per acre; turnips the same; beets, 250 bushels.

Potatoes.—No sweet ones raised here; the Irish, once so sure and profitable a crop for food, both for man and beast, is now very uncertain. Before the disease made its appearance here, large quantities were raised for the manufacture of starch; were delivered at the mills, from the field, at 12½ cents per bushel. This season they promised fair until nearly matured, then rotted very fast; in some sections, a fair yield; in others, a total failure.

Many experiments have been tried to prevent the rot, but as yet none have fully succeeded; the best crops, however, are now raised on old pasture land, without manure; lime is sometimes used. Average crop, 110 bushels per acre; worth now 33 cents per bushel. Kinds most used, Chenango, long red, pink-eye, and peach-blows; none of which have escaped the malady. Plant early.

Cotton, Sugar-cane, Rice, Tobacco, and Hemp, not grown here.

Fruit.—The culture of apples is receiving increased attention on suitable soils, (and we have an abundance of it.) They can be made a profitable crop to the farmer. Many farmers are of the opinion that sweet apples are worth one-half as much as potatoes for swine; very few fed to cattle.

Some farmers are using such apples as are generally used for cider to feed sheep in the winter, considering that the more profitable. Much attention is paid to grafting and building for winter fruit. Our distance from a suitable market makes fall fruit of but little value, excepting for drying and domestic purposes.

No pears or peaches raised here, and but very few grapes; none manufactured into wine.

Manures.—Very little attention is yet paid to making or preserving manures; all that is done is in the barn and hog-yard. Some loam or swamp muck is hauled in the yards and mixed with straw and manure from the loam; sometimes lime is mixed with them; used for planting.

Lime is sometimes used as a fertilizer, mixed with manures, or spread upon land intended for wheat and grass. Many farmers have used it on potatoes, thinking it prevents the rot.

Plaster, not so much used as formerly, does best on clayey soils; used on corn, potatoes, and grass mostly. No guano used here.

Agricultural Societies.—There are now three organized societies in this county, all having an annual exhibition in October. Somerset Central Agricultural Society, located in the centre of the county, including this town—Hiram C. Warren, of Canaan, president; organized about 15 years—has an annual exhibition in October. Much improvement is manifested in stock, crops, and domestic manufactures every year.

Our farming is now undergoing a great change. Since the opening of the Androscoggin and Kennebec railroad, giving us daily communication with Boston, a great demand is made for much of our produce, which was only raised before for home consumption. Veal calves, lambs, poultry, apples, eggs, butter, cheese, beans, and many other articles which were worth but a trifle before the opening of this road, are now duly called for, and such prices paid for them as to induce the farmer to turn his attention to raising them.

So, on the whole, our agricultural interests are improving; the new facilities for transportation are awakening this spirit of improvement, and doing much good.

I regret very much that I am not able to give you a more full report of the state of agriculture in this vicinity; but if any part of my response, herein contained, can be of any benefit to your next annual Report, I shall feel amply repaid for the time spent in preparing it.

Very respectfully, yours,

EDWARD ROWE.

Hon. Thomas Ewbank, *Commissioner.*

Industry, Franklin County, Maine,
December 22, 1851.

Sir: Agreeably to the request in your Circular, I now proceed to give you my plan of breaking steers: Steers cannot be broken in one day, nor two, (unless you break their necks;) and for this, and other reasons, I com-

mence with them while young—say from one to two years old. In the first place, I provide myself with a suitable yoke, and bows as light as can be conveniently, without breaking. I then put them into the barn-yard, or some other small enclosure, and if they are wild and afraid, work round them some time, curry and handle them over until they are more docile. If they are still afraid, turn them back into the pasture again, until the next day or so. Then get them into the yard again, and work them over as before; after which, catch the one I wish to have on the off or right side, and have some person bring the yoke and put one end upon him. Then let the other man hold him, and I walk round gently, until I can catch the other, when I lead him up to his mate, and put the other end of the yoke upon him. If they are tame, I can yoke them alone, by hitching the first one to a post or something, while I catch the other. I now have a little goad, and commence driving them about the yard, holding on to the near (left) one's horn, or end of the yoke, that they may not run away from me. I drive them round in this manner a short time, and, if I think I can manage them, open the gate, and drive them round outside the yard, or in the road. After I have driven them about a couple of hours or so, drive them back into the yard and unyoke, curry and turn them back into the pasture again. In a couple of days or so, put them through the operation again; and so on. The advantages arising from early training are numerous. King Solomon said, "Train up a child in the way he should go, and when he is old he will not depart from it;" and I know of no reason why this saying will not apply to steers as well as boys. Again: they learn quicker, and are easier managed; for they are not so strong as when older. When I wish to haw them to, I can motion to them with the stick, and, with the other hand hold of the yoke, haul them round, or shove them the other way, which I cannot do when they are from three to four years old—the age that most of them arrive at before they are handled. I know it looks like a small business to see a man driving a pair of yearling steers round, but I think it looks better than to see him driving a pair of three-year olds with a cudgel as large as a hoe-handle, and their noses bleeding, which is the effect of his club, for he says he could not stop them; or, see him dragging them round with a pair of oxen ahead; both of which are very common sights. When I have a pair of older ones to break, I pursue nearly the same course at first as with the younger ones; after which I put them into a team of oxen. The best place is on the road, or ploughing. I generally put a pair of oxen ahead a short time at first, that they may see what is wanted of them; then put them ahead to lead. In this way, I can learn them, in two days from the time I put them into the team, to lead, to plough, and keep the furrow, so that one man can drive the whole team.

But ploughing is not all; they should learn to go with the cart, and a little of most everything. The worst part is to learn them to back; it takes some time and considerable patience to accomplish this. About every time they are yoked, back them; drive them up and back them again, and again. After a while, put them to the cart, and back them down hill, where the cart will almost run of itself; afterwards, on a level; then up hill; and so on a little at a time. Half a day at a time is as much as they ought to work at first. The greatest failing in breaking steers is a lack of patience. I have known three or four persons to get a pair of wild steers into the barn-yard, and after hallooing and racing them over the yard a number of times, and penning them up in corners, would succeed in yoking them, (at this time the poor steers begin to think they are sent for,) then put a pair of oxen ahead, and start into the field to work. If the steers go just like the oxen, (which is not very apt to be the case,) well and good; if not, there is a man each side of them, with a goad, trying to urge them along; and the steers, not knowing what is wanted of them, try to get away, when it is clip and strike, one or two on a side, and perhaps another behind. The steers, finding they cannot get away, haul in their flag and lie down. Then come the whips again, with, "Damn him, give him what he wants; he is a surly devil," and the like expressions. If these fail to rouse him to action again, they procure some straw, and, after placing it around him, set it on fire. By this time, the poor fellows think they have got *there!*

We Down-easters generally break our steers in the winter, as we have more leisure then. Neat stock has improved 10 or 12 per cent. in this county within ten years.

Respectfully, yours,

CHARLES GOODRICH.

CORNISHVILLE, YORK COUNTY, MAINE,
November 17, 1851.

SIR:—In compliance with the request contained in your Circular, I have attempted a statement of the crops and state of agriculture in this section.

The Patent Office Report is a document of inestimable value to farmers, and it augurs well for their future improvement, that they are beginning to appreciate it; and if I can throw my mite into this treasury of usefulness, I shall cheerfully do so.

Wheat.—This with us is a precarious crop. Guano is not used. The usual mode of culture is to sow, after a crop of Indian corn, manure. The ground is usually ploughed in the fall, after the corn is taken off, and again in the spring. About 1½ bushel is sown to the acre; the ground harrowed, rolled, and sowed to herdsgrass and clover. Usual time of sowing, about the 1st of May.

The two great enemies to this crop are the wheat fly (*Cecidomyia tritici* of Kirby) and the rust, (*Uredo rubigo*—red rust.) The first made its appearance here about 1834-'5. Farmers here, for several years back, sought to avoid it by sowing late; but in steering clear of Scylla they only ran upon Charybdis; for the rust has been found to be far more destructive than the fly. The usual mode of preparation for the seed is to soak it in a strong brine for twenty-four hours; then to mix with it from four to six quarts of fresh slacked lime to the bushel. This preparation is thought to be a complete prevention of the smut. Average per acre, 15 bushels; time of harvesting, the middle of August.

Farmers are beginning to learn by experience what they might have known long before if they would have listened to men of science and exact experiment: that they save both in quality and quantity by reaping their wheat as soon as it is well out of the milk. There is no fact better established in farming than this.

VARIETIES.

The Red Chaff and Black Sea.—The *red chaff* is hardy in resisting the rust, and is considered richer in gluten than most other varieties.

Corn.—The most important crop by far; guano not used. The usual crop, about 40 bushels per acre. The cost of cultivation may be set down as follows:

Interest on one acre, cost $15	$0 90
Ploughing	3 00
Manure	10 00
Harrowing and rolling	$1 00
Planting	1 50
First hoeing	2 00
Second and third hoeing	3 00
Harvesting	4 00
	25 40
Produce per acre	$33 20
Corn fodder	10 00
	43 20
Deduct	25 40
Profit	$17 80

Cost per bushel, 44½ cents, reckoning the fodder as a part of the corn. The manure ought not all to be charged to the corn, as it generally suffices for two or more crops. This may perhaps be considered a fair statement of the crop here; but although the average may not be higher than forty bushels, fifty, seventy-five, or even one hundred, may be, and are often, raised by good cultivation.

Farms that have been long cultivated are being exhausted of many mineral manures, such as phosphates, alkalies, &c., essential to a fertile soil. These manures will have to be supplied, or else a sterile soil will be the result. It is well known to men of science that they can be measurably supplied from the soil itself by deeper tillage with the subsoil plough. On reading the account of it in the Agricultural Journal, I was induced to make trial of it, and, from what experience of it I have had, I no more would think of dispensing with its use than I would with the surface plough.

The course of rotation to this crop is, to break up the green-sward, after spreading the manure in a green state; plant with corn the first year; the next, wheat, with clover and herdsgrass; to remain in grass for several years.

The method of feeding to hogs generally preferred by the most experienced is, to grind the corn and cobs together and give them in a raw state. Some have tried them cooked, but it is thought nothing is gained above feeding raw.

The utility of grinding the cobs with the corn is two-fold; the cob acts mechanically by dividing the food, and thereby promoting digestion; and at the same time the cob—it is said by those who have made the analysis of it—contains from one-eighth to one-third of the nutriment contained in the corn itself.

Beans.—This crop might be raised to almost any extent, and is not thought to be an exhausting one. But the price paid per bushel is not thought by farmers to be remunerative, compared with other crops.

Market: Portland, thirty miles; price $1 25 to $1 75.

Clover and Grasses.—Clover is universally raised after wheat for fodder and as a fertilizer; its long roots bring up materials to the surface that would not be available with other crops. There is no truer saying than the common one, that "clover sweetens the land." Herdsgrass and red-top are generally sown with clover.

It is thought the hay makes much better fodder by being mixed. Quantity per acre, from one to three tons.

Dairy.—This department of agriculture, I regret to say, receives but a small part of the attention it so well deserves.

This region is admirably adapted to grazing; the lands hilly, abounding with clear springs, affording the purest water for stock; the natural grasses of the best quality for making butter and cheese. Notwithstanding these advantages, there is but little of the butter and cheese manufactured that might be—and that of an inferior quality. The goodness of butter depends upon—first, the food for the cows; and, second, the manufacture. The best of all food is sweet upland grass; the next, corn fodder, either green or well cured. The amount of butter may be much increased by feeding with roots of various kinds, provender, &c.; but it is quite doubtful if the quality remains unimpaired. Slops of all kinds should be eschewed by all who wish good butter.

In the making of butter, great attention should be paid to cleanliness while milking, and also in the dairy. Nothing should be suffered to be present that will produce impurity in the air.

Cream is remarkable for absorbing odors. We usually set our milk from twenty-four to forty-eight hours, according as the weather is favorable or otherwise. The churn is a revolving box. The butter is longer *coming* in this churn than with most others, but it is believed the quality is better and the quantity greater from a churning of one and a half hour than from a less time. After churning, from one-half to three-fourths of an ounce of salt to the pound of butter is mixed with it, when it is set away for twelve hours. It is then worked over, and the salt well incorporated with the butter, and the buttermilk well worked out by means of a lever placed upon an inclined table. The hands are never allowed to come in contact with the butter. The perspiration from the hands, although it may not be sensible, greatly impairs the purity and flavor of the butter. The butter is next pressed by lever power in moulds containing about one pound, if it is intended for market immediately; if not, it is pressed into clean oak firkins, holding from 50 to 100 pounds, and covered so as to completely exclude the air, where it will keep for any length of time.

The yearly average per cow may be set down at 100 pounds of butter and 200 pounds of cheese.

The price of butter in Portland, or the nearest market, has been for several years past about one shilling per pound; cheese from 6 to 7 cents. These prices, of course, are not what might be and are obtained for superior articles; but, as I said before, few are willing to give that attention to the subject which is necessary to insure the skill and intelligence it demands.

Neat Cattle.—The usual price of three-year-old steers is $20; heifers, $15; average price of good dairy cows, $30 in the spring, $20 in the fall.

The method of breaking steers to the yoke is, to put them before a good yoke of oxen in the team; by this means they soon become teachable.

Horses and Mules.—The breeding of horses is considerably attended to, and is thought to be profitable. The price varies from $75 to $200.

The manner of breaking young horses varies with the tact or whim of the owner. There seems to be but one principle, however, among those who understand the matter—and that never fails to succeed—which is, to begin early, to use gentle means, and to follow up this course till the animal is broken.

Potatoes.—The average of this crop I should think to be 175 bushels per acre. The most prolific variety, the "pink-eye," since the rot made its appearance, are generally planted without manure. Although manure is not the first cause of the rot, it is thought to be among the predisposing causes. They are planted on green-sward, cultivated, and hoed once.

Fruit Culture.—In answering your query, "whether the culture of fruit is receiving increased attention," I regret that I cannot answer it in the affirmative. The soil and climate are excellent for raising apples; especially winter fruit. With regard to the second query, there is but one opinion among those who understand anything about the matter, and that is, that nothing which pertains to the farm pays so well as orcharding. A neighbor of mine, who has a fine orchard, has often said to me he wished that his whole farm was planted with apple trees. And his farm is among the best for raising fine cattle and horses, and for dairy purposes. As to the comparative value of apples and potatoes, I can speak with confidence after an experience of some 15 or 20 years. I was among the first in this place to use apples for feeding hogs. My neighbors all said they were worthless, but I had *faith* enough to follow up the experiment, and the result was *always* to find my hogs in a better state in the spring, when fed on apples alone, than when fed on corn or potatoes alone. The apples generally fed to hogs are the sweetest, and most worthless for anything else. Such apples I would not say are equal, bushel for bushel, to potatoes; but if the apples are of good quality for eating, (say part sweet and part sour,) I have no hesitation in saying they would be fully equal to potatoes. The varieties best liked for winter use are the Baldwin and Rhode Island greening.

The Roxbury russet also is kept for winter, or rather summer, as they are not in use till May or June. The only practical mode of grafting here is crown-grafting. Budding is preferred by nurserymen generally.

Manure.—Plaster is universally used as a fertilizer. It is generally applied to the corn and potato crops in the hill, at the rate of 1½ bushel to the acre. I have applied it broadcast upon green-sward, before ploughing, with equally good success. Wood ashes are sometimes combined with it, and sometimes applied alone; both are valuable. Ashes contain potash, lime, and soda. Their use depends upon these alkalies, which render them a very efficient manure.

Meteorology.—I regret that this part of my communication is necessarily meagre. I am making arrangements, however, for a series of thermometrical observations, which shall be worthy a place in your valuable Report. Our hottest weather is in July and August; our coldest in January. The highest average of the thermometer, 96°; the lowest 20° below cipher of Farenheit.

I have replied to questions upon such subjects only as were sufficiently familiar to warrant me in giving answers that may be considered reliable.

Wishing you entire success in your useful labors, I remain, most respectfully, yours,

G. W. GUPTILL.

To the Commissioner of Patents.

South Freedom, Waldo County, Maine,
December 28, 1851.

Sir: I take the liberty to write a few lines on the subject of *agriculture* in this vicinity.

Our soil varies, for the reason that the face of our country lies in large ridges; and hardly any two are composed of the same mineral substance.

The change in farming in our county seems like emigrating into another country.

It is about fifty years since this county was first settled.

The course pursued was: in the month of June to chop down large patches of forest trees, and either in the spring or fall set fire to the brush, and obtain a rapid burn, if possible. If the timber could be cleared off, the ground could be planted with corn or sowed. If not cleared, it was always planted, nevertheless. Lumbering was also a smart business. The most of this is done away with. Ploughing is the principal way of farming, and people are beginning to wake up to the best methods to procure muck, (a manure found in low places,) made of vegetable matter. It is attracting much attention, and will eventually be the strong arm of farming.

Our very cold seasons produce good wheat; hot seasons, corn. Spring wheat heretofore has been mostly sown; red sea is the kind mostly in use. Time of seeding, 10th of May. Crop this year very good. Price at this time $1 per bushel.

Winter wheat is attracting much attention, and will in all probability take the lead. The eight-rowed yellow corn is generally grown. Time of seeding, 20th May. Crop very poor this year, in consequence of early frost. Beans and oats are generally a certain crop. They are in good demand at this time. Price, $1 33 for beans; 35 cents for oats.

Hay Culture is a good business; clover and timothy mostly raised. The 15th of July is about the commencement of haying. Price on an average $8 per ton.

Stock is also quite a trade. There are from 500 to 1,000 head collected in this town yearly, (a portion of them from adjoining towns,) and driven west. They find a market in Portland, the large towns in New Hampshire, and Brighton.

The raising of eggs has become a profitable business, and pays the best of anything that our farmers pursue for the cost. Average price 12½ cents per dozen. It was estimated that the amount sold in the year 1849 from the State brought $600,000.

Potatoes, in years past, have been the great staple of Maine up to 1845, which was the first failure; it was a certain crop.

Pork and beef were made in great abundance, and potatoes were fed to cattle, in stalls, in the room of provender; 25 cents per bushel was an average price. Since 1845 the crops have been almost a complete failure, and many farmers abandoned the business. What were planted this year, and raised, are better, and rot less, than either of the five years past.

Apples are the only *fruit* cultivated to any extent. Winter fruit is the most in use, and is obtained by grafting. Thirty years ago apples were a rare article. By the industry of our farmers, there are, yearly, lots shipped to the West Indies and other places.

The tame cherry is about all the cherry that is cultivated with us. About ten years ago there appeared a barnacle upon the limbs of the trees, which has since that time completely annihilated all the trees, and there is not one to be seen in the country.

Respectfully, yours, &c.,

NEHEMIAH SMITH.

Hon. Thomas Ewbank,
Commissioner of Patents.

NEW HAMPSHIRE.

Haverhill, Grafton County, N. H.,
December 24, 1851.

Sir: The postmaster in the village handed me an Agricultural Circular a few days since, and wished me to answer it. Thinking it possible I might give some information, I send you the following:

Wheat.—There has been but very little done for some years past in raising wheat; but for the last two years we are doing considerable with winter wheat, especially this last year. It is mostly raised on old pasture land and corn ground; average yield twenty-five bushels—greatest yield one hundred and seventy-five bushels on five acres. Spring wheat mostly sown late—about the first of June; average yield fifteen bushels; average price for 1851 is $1 33.

Corn.—There is a good deal raised upon the bottom lands. Cost of production from 25 to 40 cents per bushel. Average crop 50 bushels. Guano is not used to any amount, in this vicinity, with this crop. The corn is mostly ground, and fed to our teams—oxen and horses; sometimes cob and all, but mostly threshed.

Oats, Rye, Beans, and Peas.—Average yield of oats, 40 bushels; rye, 15; beans, 15; oats, the least exhausting; peas are not used as a renovating crop.

Clover and Timothy.—Average yield per acre, one and a half ton. Clover is considered the best fertilizer; and timothy and clover for laying down meadows; 12 quarts of timothy and from 4 to 6 pounds of clover the quantity used per acre. The cost of growing hay depends upon the value of the land; on our meadows, from three to four dollars per ton.

Dairy.—The average yearly product is 100 pounds of butter, and 100 of cheese, or 150 of butter alone, per cow. Cost of making butter, two and a half cents; cheese, one and a half cent. My mode of making cheese is this: The milk is set in brass kettles, with a large spoonful of rennet to a pailful of milk. After two or three hours, it is crossed off, to allow the curd and whey to separate; then in the morning it is dipped off before setting the morning milk, which is then used in the same way. It should not be hurried in any of the operations. After it is wheyed off, dry; then scald very slightly; then break or chop the curd and salt it, at the rate of a common-sized saucerful to a half-bushel heap. Cheese is usually worth from 7 to 8, and butter from 12 to 18 cents per pound. Good cows are worth $25 in the spring, and $15 in the fall.

Hogs.—The best breed now with us is the Suffolk. The cheapest way of raising pork is to keep pigs on milk through the summer, then fatten them on corn and apples; 100 pounds of corn will yield from 16 to 18 pounds of pork. We salt our pork in clean salt, packed edgewise, and add cold water for a brine. For hams, 4 quarts salt, 4 ounces saltpetre, and 1 quart molasses, to a hundred of meat.

Potatoes.—The rot has troubled us so much of late years, that there are not so many raised as in former years. We find that we avoid the rot very much by early planting—say by the middle of April.

Fruit.—We are giving a good deal of attention to the raising of fruit, more especially apples. There is no doubt but what it is one of the most profitable crops that can be grown on a farm. Sour apples, boiled with pumpkins, make very good feed for hogs; and I think sweet apples are worth more than potatoes, bushel for bushel. The best variety for winter are the Roxbury russet and Baldwin.

Manures.—In making our compost heaps, we use both lime and plaster. I make my compost, in the fall, of muck, with about one-fourth part yard manure, and one-fourth bushel of lime, to every load of muck, to hasten the decomposition; and I also use some plaster to prevent its wasting. I shovel it over once in the spring before using it. After treating it in this way I consider it equal to my best manure.

I remain yours, very respectfully,

HENRY MERRILL.

DOVER, N. H., *January* 17, 1852.

SIR: Your Circular of August last, addressed to me, asking for information in relation to the state of agriculture in this vicinity, came duly to hand. I exhibited the Circular to such of our farmers as I considered best qualified, by experience and practice, to answer the interrogatories therein, and have waited in vain for them to furnish those answers to this late day. I do not feel myself competent to give the subjects embraced in the Circular that attention which their importance demands; but I will venture to dot down the results of my observations, and what

little experience I may have gained of the subjects, in this immediate neighborhood.

Wheat.—This grain is not extensively cultivated in this region, nor has guano been introduced as a manure. When this grain *is* cultivated, the yield is generally 20 bushels to the acre, and, when exhibited for sale, brings $1 12 per bushel.

Corn.—The corn crops are not large, it being raised mostly for home consumption. The common yield is from 25 to 40 bushels to the acre, and experience has taught the farmer in this vicinity to plough in autumn 5 or 6 inches deep; and in the spring to apply manure liberally, and plough again deep enough to mix well the soil and manure. The best method of feeding this grain is when ground into meal.

Oats are raised in small quantities. I think 30 bushels per acre an average crop; the quantity of seed sown, 3 bushels per acre. The average crop of barley is about 20 bushels to the acre; quantity of seed sown, 2½ bushels per acre.

Rye is now a profitable crop, and least exhausting to the soil—yields 25 bushels to the acre; seed about 1 bushel.

Butter.—I have no data for estimating the quantity of butter made in this county; but, from my own experience, I should think about 140 pounds per cow for the year. There is but little cheese made in this county.

Neat cattle.—Cost of raising until 3 years old, $18 50.

Horses.—The raising of horses is profitable, and the expense of raising till 3 years old, about $50.

Potatoes.—No sweet raised—the average yield of the common, 100 bushels per acre; cost of raising the same per bushel, 20 cents.

Fruit.—The culture of fruit is increasing, and can be made very profitable. The Rhode Island greening is the best winter apple, and the Roxbury russet the best for spring use and exportation.

Manure.—Cellars under barns are much approved for manure, with floors so arranged that the water from the cattle runs on the manure, and, by having dry sward or dried and pulverized muck to absorb the extra moisture, makes more and far better than throwing it out to be washed by the snow and rain. In collecting the depth of rain falling through the year, I take the years 1843 and 1850:

1843.			1850.		
January -	2	inches.	January -	$5\frac{43}{100}$	inches.
February	$1\frac{15}{100}$	"	February	$1\frac{67}{100}$	"
March -	$4\frac{40}{100}$	"	March -	$1\frac{75}{100}$	"
April -	$2\frac{60}{100}$	"	April -	3	"
May -	3	"	May -	9	"
June -	$5\frac{25}{100}$	"	June -	$1\frac{98}{100}$	"
July -	1	"	July -	$4\frac{84}{100}$	"
August -	$4\frac{25}{100}$	"	August -	$5\frac{47}{100}$	"
September	$\frac{6}{10}$	"	September	$5\frac{53}{100}$	"
October -	$3\frac{10}{100}$	"	October -	1	"
November	$2\frac{60}{100}$	"	November	$3\frac{25}{100}$	"
December	0	"	December	$3\frac{25}{100}$	"
	2ft. $7\frac{95}{100}$	"		3ft. $9\frac{91}{100}$	"

It is not possible for me to obtain the mean temperature of each month, but I herewith transmit the mean temperature for each year from 1833 to 1843, with the addition of the depth of snow in this town during the same years—

	Temperature, degrees.	Depth of Snow, inches.
1833	$45\frac{1}{10}$	99
1834	$45\frac{1}{4}$	$59\frac{1}{2}$
1835	$43\frac{3}{4}$	52
1836	$42\frac{6}{10}$	89
1837	$43\frac{3}{10}$	45
1838	$45\frac{3}{10}$	72
1839	$46\frac{3}{10}$	43
1840	$46\frac{7}{10}$	82
1841	$46\frac{8}{10}$	92
1842	47	$52\frac{1}{2}$
1843	$45\frac{3}{10}$	$113\frac{1}{2}$

I have the honor to be your obedient servant,

GEORGE T. WENTWORTH,
Postmaster, Dover, N. H.

VERMONT.

Barre, Washington County, Vermont,
December 11, 1852.

Sir: I received your Agricultural Circular some time since, and have not had sufficient leisure to give a detailed answer; but I will give you a short account of what we think the most profitable and least expensive mode of raising *wheat, corn, rye,* and *oats* in this vicinity.

As a sample, I will take my farm, which contains 90 acres—40 acres in tillage, 30 pasture, and 20 wood and timber.

I plant to corn 2 acres—take a piece that is bound out, or bears the least grass, and draw on (the last of April) 20 loads of barn-yard manure, and spread to an acre; then plough it 6 inches deep, turning it flat; then harrow it mellow, but not to disturb the turf; then furrow it lightly, 3 feet apart. I then take of manure made the summer before, and hog manure—drop a small shovelful in the furrow, $2\frac{1}{2}$ feet apart, and plant the corn from the 15th to the 20th of May. I harvest in September, by cutting it up at the ground, and let it stand in the stack two or three weeks; then I take it to the barn and husk it. Seventy-five bushels are an average yield to the acre, and 500 pounds husks, which are worth $1 per 100 pounds for making mattresses. The average price of corn here is 75 cents per bushel. After the corn is off we plough the ground so as to sow it with wheat early in April, (without ploughing in the spring,) and get about 20 bushels per acre; or, if the spring is backward, we sow with oats, and get 50 bushels per acre.

For *potatoes* we break up green-sward in the spring, with about the ame quantity of coarse, or straw manure; spread on the grass before ploughing, as we use for corn; then turn it over, and harrow it fine, and plant (without manure in the hill) 3 feet one way and $1\frac{1}{2}$ foot the other; hoe twice, and dig in September. Average yield, 200 bushels per acre.

We then plough, and sow with winter rye, the first of October, and seed with herdsgrass, (timothy,) six or eight quarts to the acre. If the land is in good heart, or well manured, six quarts are enough. We use the same seed and quantity on wheat ground.

We attend to the *dairy* business to some extent in this section. Our cows are mostly native breeds, and we think they are about equal to the Durham or Ayrshire, with the same keeping. We let them get their living in the pasture in summer, and keep them on hay and corn-fodder (stalks) in winter. In a dairy of 20 or 30 cows a fair average of butter per cow is 100 pounds, and is worth 16 cents per pound; but some dairies turn out much more. A neighbor of mine sold last year, from 11 cows, 2,190 pounds of butter, besides what was used for the farm by 7 persons. The milk, where some is given to the hogs, nearly fattens them. Hogs 20 months old will weigh from 300 to 500 pounds; and pigs 8 months old will weigh, on an average, 250 pounds. What are called the "grass fed" are the largest, but will not fat as soon as the Suffolks.

There are many fine *horses* raised in this town. It is profitable, as a colt 3 years old will cost $45 or $50; the average price is not less than $75. With regard to breaking colts, a man who is used to it will break one in from 3 to 6 weeks. In the first place bit them, by putting on the bridle, and draw the reins tight, and fasten them to the surcingle just back of the withers, and let him wear it two hours occasionally; then put him beside a steady horse in the harness, attached to the plough, wagon, or sleigh a few times; then use him alone, being very gentle with him, and in a few days he is broken. Keep him well, and make it a point not to go by him without speaking to him, and pat him, and he will soon learn that you are his friend, and he is broken before he knows it—and that, too, without whipping or injuring him—the law of kindness applying as well to brutes as to man.

Very respectfully, yours,

OSMAN DEWEY.

Hon. Thomas Ewbank,
Commissioner of Patents.

Bristol, Addison County, Vermont,
January 8, 1852.

Sir: Your Circular, addressed to me as president of the Addison County Agricultural Society of Vermont, was duly received. My remarks are chiefly applicable to this county.

Wheat.—Guano is not used in the production of wheat or any other crop in this county to my knowledge; as a general thing, winter wheat follows corn or peas.

Manure.—Barn-yard manure is applied to the previous crop—say 10 or 15 loads per acre, ploughed once; usually from 6 to 8 inches deep. The production of winter wheat is increasing in this county, both in yield per acre and number of acres. Some make 50 bushels per acre, but this is rare, and only on favorable locations with the best of husbandry; perhaps the average yield per acre is about 20 bushels. The white bald, or Genesee wheat, is generally preferred; price $1 per bushel. Spring wheat has not done as well for the last two or three years as formerly. The Black Sea has done the best of any variety.

Corn is a valuable crop to the farmer, and usually a profitable one, although this year may be an exception; perhaps not more than half an average crop in the county, in consequence of an early frost and a very severe drought; still there are some extra good crops. We plant about the middle of May, and harvest about the middle of September. There are a great many varieties cultivated in this vicinity, mostly yellow; cannot say which is best. The best system of cultivation here in the interval is to manure on top and incorporate thoroughly before planting; on clay or loam, the better way is to manure on the sod and turn under. We use gypsum or ashes on the young plant soon after it comes up. Our best farmers grind all their grain for feeding animals, and consider it good economy.

Oats are much cultivated, but considered an exhausting crop; has averaged this year about 40 bushels per acre. Sow 2½ to 3 bushels of seed per acre. Peas, beans, or rye are not cultivated to much extent in this county.

Hay was a full average crop the past summer—I should think over a ton per acre. Most farmers stock with clover and herdsgrass seed—say 12 qts. of herdsgrass seed, and 8 or 10 pounds of clover seed, per acre. The best fertilizers are, compost manures and gypsum *for top-dressing*.

I have been disappointed in obtaining the desired information as to *dairies*. The cost of raising neat cattle varies according to the price of hay. Three-year-old steers range from $30 to $40. Dairy cows usually sell in the spring for $25 to $30; in the fall for $16 to $20. Cannot say what amount of beef 100 barrels of corn will produce; but am confident that a given amount of food will produce more meat in a Durham, Devon, or Hereford, than in a native animal. The easiest mode of breaking steers is, for boys to accustom them to the yoke as early even as from 3 to 6 months old; but they are not put to service much until 3 or 4 years old.

The breeding of *good horses* has always been a lucrative business, and our county horses are considered among the *best* in any market. The cost of raising a colt to 3 years old will vary under different circumstances. My experience is, that the mare should be allow to run with the colt, without doing any service, until the colt is 8 or 10 months old, and then wean the colt, beside the mare, on hay. The colt should always be well fed, and kindly treated, and accustomed to the harness while young, beside a gentle and well-broken horse, but should not be put to hard service until fully matured.

Sheep and wool are staple articles in this county; the breeding of stock and wool-growing have been prosecuted a number of years, and probably will continue to be a good business to intelligent and experienced breeders, and of such we have a goodly number.

I know of no experiments having been made to ascertain what amount of wool a given amount of hay will produce; but I think a pound of merino wool can be produced as cheap as any, all things considered. The sheep in this county are mostly of Spanish and French merino; of the latter we had a large importation last season.

Roots, as sugar beets, carrots, and Swedish turnips, are being cultivated to some extent as field crops. I have reduced the labor very much in raising the beet and carrot crop by the use of a *seed sower* and *wheel hoe* of my own construction, as follows: The seed sower is simply two light wheels—say 14 inches diameter—made fast to a shaft 4 inches diameter, turned down three-fourths of an inch at each end for gudgeons, and 2 grooves, 16 inches apart from centre to centre, deep enough for seed boxes, over each of which is slipped a tin band with holes for the seed to pass. This is set in a frame similar to the frame of a wheelbarrow, and revolves as the wheels are pushed forward. There are two pins set in the frame directly in front of the seed boxes which make the furrows for the seed, and directly behind the seed boxes is attached a rake or roller to cover the seed. With this implement a person can sow two rows at a time as fast as he can walk, without stepping on either of them. The hoe is made thus: take two wheels—say 8 inches in diameter; attach them by an Ex of the desired length to run between the rows, as sown by the seed sower; take a thin piece of plate steel—say 13 inches long; rivet one end of two arms to the blade, and screw the other end of the arms to the front side of the Ex in such a manner that the blade will lie flat on the ground; then attach a handle 4 feet long to the back side of the Ex at a proper angle, that you may walk erect, and you may pass it between the rows as fast as you please to walk; you can regulate the depth of cultivation by elevating or depressing the handle; the ends of the blade should set in range with the outsides of the wheels, that you may push it forward rapidly without danger of cutting the plants, the wheels answering for a guide to the eye. This implement should be used on the field as soon as the plants are large enough to follow the rows, and as frequent as is necessary. In preparing the ground, I plough as deep as I can with an ordinary plough, and manure as for corn; feed mostly the milch cows, horses, and calves the first winter, and find them an indispensable crop; produce from 600 to 800 bushels per acre. I hardly know what to say in regard to potatoes; all varieties suffer more or less with the rot; the Cork-reds are perhaps the least affected of any. All systems have failed under different circumstances, and there seems to be a falling off in yield per acre, aside from the rot. I think the average for the county will not go above 80 bushels per acre, although the crop has not suffered as much with the rot this year as last.

Fruit is receiving increased attention. We have several nurseries started in the county, including all the best varieties of fruit; and, I think, are well patronized. To promote the cultivation of fruit, we have been liberal in our premiums, and it has undoubtedly had a great and good influence upon the community; and perhaps it would not be saying too much to say that our county agricultural society has been the means of a decided improvement in the general management of farms and the breeding of domestic animals.

With my best wishes for your success in the forthcoming Report, and that it may be of great use to the agricultural community, I am, sir, respectfully, yours,

CHARLES L. SMITH.

Hon. Thomas Ewbank,
Commissioner of Patents.

BRAINTREE, ORANGE COUNTY, VERMONT,
December 20, 1851.

SIR: In replying to your Circular, I shall only report on sheep, wool, and fruit.

"Is *wool-growing* profitable?"—Most of our farmers think not; and from two and a half pounds of wool to three and a half do not pay in this State, which is almost the average per fleece. There are men who shear from five to six pounds of well-washed wool per head, and those make it profitable.

The merino sheep, which weigh from 60 to 100 pounds, of round form, healthy, long, thick, fine wool, are the most profitable.

Some flocks of 100 sheep, which it is estimated consume 18 tons of hay, will shear 600 pounds of wool, and raise from 80 to 90 lambs. Such flocks are profitable; and when our farmers understand their own profession, they will improve their flocks, which is easily done by saving their best ewe lambs for breeders, instead of selling them to drovers and keeping their poorest, as is usually the case.

A sheep weighing 100 pounds, live weight, should shear from 8 to 12 pounds of washed wool; and I have no doubt that with care it can be done by proper crossing.

From 20 to 40 pounds of fine merino wool can be grown from 1 ton of hay, and from 15 to 25 of ordinary coarse wool. Large sheep may be more profitable for mutton, but small, healthy, fine ones for their fleece and mutton combined.

About four-fifths as many lambs raised as there are ewes.

There have recently been a large number of large French merinos imported into this State. The sheep are large, well-formed, skin in coarse folds, and weigh from 200 to 300 pounds, and are said to shear from 12 to 30 pounds unwashed wool. Many are confident that a cross of them with our small merinos will improve their flocks. I don't believe that they will produce as much wool from a ton of hay as our small merinos do, and a cross will tend to impair our best flocks.

Fruit.—When our State was first settled, and young orchards planted of the native varieties, no place in the world provided apples more bountifully than some parts of this State. Cider was a drug at 50 cents per barrel. In many parts of the State there were more cider mills than school-houses, and more distilleries than places of public worship. Every orchard planted seemed to flourish. The soil was full of vegetable mould, and the trees set were healthy. Being reared near where they were set in the orchard, making them perfectly acclimated and of natural growth, they could withstand our hard winters, and, having a rich soil to support them, abundant crops were the result.

Some trees were grafted 40 or 50 years ago; those have borne abundantly. There are orchards which yield from $200 to $500 to the acre. Most of the old orchards are dying, and there is not one fourth enough good apples grown here to supply the wants of the people. Within a few years a great many thousand nursery trees have been brought from their sandy soil in Massachusetts and New York; but they do not flourish. They soon prove to be rotten at the heart, and die.

We must raise our own trees on our hard soil, graft them in the limbs, or at least three or four feet from the ground, (for the natural stock is harder than the grafted,) and set them for the orchard, on land recently

cleared and rich with vegetable mould, and where it will be protected from the alternate thaws of winter; and if on the streams and in the valleys, a northern slope is preferred; on high land, a southern or eastern is best.

We have about 4,000 young apple and plum trees set for orchards, for those set on old land we dig a hole six feet across, and from twelve to fifteen inches deep; mix four or five bushels of compost manure with the soil where we fill the hole, and have the tree planted just as deep as it was when it stood in the nursery.

The ground around the tree should be covered with straw, or leaves, to protect the tree from drought, and to keep the grass from growing. We are well satisfied with the result thus far.

We have about 2,000 set on land that was cleared without a burn. The soil is rich, with an abundance of vegetable matter, which is usually burned when the land is cleared.

Trees set two years; holes were dug three feet in diameter and one foot in depth; about ten bushels of decayed leaves put around each tree for mulching. Last season we mowed the grass, and put it around the trees when it was green, to kill the grass under the tree and keep the soil light. Thus far we are well satisfied with the result.

To protect the trees from the mice, we take blocks of wood six inches in length, by three in diameter, and, with a six-quarter auger, bore a hole four inches in depth; mix one dessert-spoonful of arsenic with one quart of Indian corn meal; or, in that proportion, put one spoonful in each box, prepared as above, and put it under each tree, beneath the mulch, and renew the meal once or twice each year. This proves a secure protection.

We have quite an extensive nursery—mostly of apple trees. With proper management, as good trees and as good fruit can be raised in this State as in any State in the Union.

Trees grafted in the root, as is practised in many western nurseries, will not flourish here, being too contrary to nature for our climate; neither should young trees be trained to a stake, as some nurserymen practise. Training to stakes makes them small at the bottom and large at the top of the stake. True, they are straight; so is a young lady who wears corsets; but they are both feeble and short-lived.

I have not known of a tree taken from sandy soil that has done well. We have a few thousand pear stocks, which had grown one year on sandy soil, and they are worthless. Leaves fall in August, while those grown on hard soil remain bright till November.

The Baldwin is our best apple for late winter and spring use; also, for growth. With good care, one thousand bushels can be raised on an acre of ground in one year.

Porters are our best late fall and early winter apples.

Sweet apples might be raised to great profit for our stock. Our sheep-pastures might be covered with sweet-apple trees to great advantage; for there is nothing that will fatten sheep as fast as sweet apples. Plums do well, and no doubt an abundance of the best varieties can be grown here.

In grafting old trees, limbs from three-fourths to 1 inch in diameter are best to cut. Large limbs grow the scion too fast the first season, starts the composition, and the grafts are very liable to winter-kill. Small limbs heal over the scions the sooner, and bear abundantly the third. We have not one agricultural or horticultural publication in the State. Political, religious, and miscellaneous abound; but the day is not far distant when the people may learn that we live by agriculture.

Respectfully,

LEWIS H. SPEAR.

To the COMMISSIONER OF PATENTS.

SPRINGFIELD, VT., *January* 10, 1852.

SIR: I have been thus far remiss in not complying with your request for a communication for the Patent Office, and, in responding at this late period, must beg the privilege of confining myself to a few observations of practical experience of my own method of farming.

I am located upon the alluvial flats on Connecticut river—a soil naturally rich and fertile; but, as it grows old by cultivation, it loses the essential ingredients necessary to the production of certain kinds of crops, particularly that of wheat.

The soil of this part of our county never was sufficiently impregnated with lime to become a permanently wheat-growing district, and the cultivation of this valuable grain is, in a great measure, abandoned.

Indian corn, oats, and the various kinds of cultivated *grasses,* are the most remunerative and profitable of any crops that can be grown at intervals upon the borders of this beautiful river, and nowhere in the known world, I believe, does there exist a better soil for the production of these crops; but even here they will not grow spontaneously. It requires care and labor, skill and judgment; and, these properly exercised, a sure annual return in full compensation is the result. In order to insure a good crop of corn, deep ploughing, high manuring, and thorough cultivation are indispensable. My method is to break up the mowing lands late in the autumn, as fast as they decline in grass, down to one ton of hay to the acre, turn the sward flat over to the depth of six inches, and roll them down smooth with a revolving plank or log-roller; and early in the following spring harrow lengthwise of the furrows until the soil is pulverized and mellow, without disturbing the sod; then seed with oats, and harrow crosswise, applying 50 pounds of plaster to the acre as the young oats begin to appear above surface. I generally obtain from 45 to 50 bushels to the acre. Upon this same field, the next spring, I put on 50 ox-cart loads of manure to the acre, from the cattle, sheep, and hog yards; spread it broadcast, and plough ten inches deep; harrow well after ploughing, and plant with Indian corn from 15th to 25th of May, as the season happens to be; rows 4 feet, and hills 2 feet apart. At the first hoeing, which I have done with great care and neatness, the stalks are reduced to three in each hill; after which a compound—of three parts of unleached ashes, two parts of slaked lime and one part of ground plaster, well mixed—is applied—a large single handful to each hill of corn, and after the second hoeing, plaster alone; a common table-spoonful to each hill is applied; the third hoeing soon follows, using the cultivator each time, and elevating the earth but slightly around the hills of corn, and keeping the crop essentially free from weeds, grass, and everything else that takes sustenance from the soil.

Of my corn crop the past year, (of about ten acres,) two acres were accurately measured; and the result was, from one acre a fraction short of 93 bushels, and the other acre 88½ bushels of shelled corn, weighing 56 pounds to the bushel. The drought late in the summer injured the crops some, or there would have been as many bushels as I received in 1849, viz: 416 bushels from four acres of land. The last crop before returning again to grass, and with which I sow my grass seed, is another oat crop, after ploughing again ten inches deep, and seeding with not over two bushels of oats to the acre, in order that the straw may expand and get strength to hold itself up with long and heavy heads upon the top, and also that the grass seed may take root and come forward better. It is a common saying among farmers here that oats are a bad crop with which to seed down grass. I have always practised it, and never lost a seeding or failed of grass in abundance. Of the oat crop of the past year, which followed the corn crop of the year previous, there were 88 bushels to the acre, weighing 34 pounds to the bushel. The kinds of grass I cultivate are timothy, clover, clover and red top; and sow half a bushel to the acre. I always sow broadcast 50 pounds to the acre of gypsum on the grass lands in the spring of the year, and I believe with good success. Guano has never been used to any extent in this section. After going through the process above described, the same field will produce grass six years—the first three from 3 to 4 tons to the acre, and the last three from 1 to 2½ tons—when it is again ready for another routine of grain crops. In old and new mowing lands I cut over about 50 acres the past year, and had not less than 125 tons of hay —2½ tons to the acre upon an average; the cost of which when in the barns, counting six per cent. interest on the lands, at $100 per acre, (which is no more than its cash value when in a high state of cultivation,) is $4 per ton. The cost of obtaining a crop of corn by the above process, counting the stover to pay the harvesting, and charging nothing for the manure, except the labor in applying it, as it is made from and belongs to the farm, is not above 30 cents per bushel; and for oats, counting the straw to pay the threshing, 20 cents per bushel. But I wish to be understood that these estimates apply only to the soil and manner of cultivation here described. On our common and ordinary lands, with common and ordinary cultivation, the expense must be nearly double. Corn should be ground to feed to horses or cattle, and both ground and cooked to give to hogs; but may be fed to sheep in a natural or raw state to advantage, as this animal appears to possess powers of digestion stronger than the horse, the ox, or the hog. At the prices for which wool has been sold for the last two years it is profitable in this section.

Wool.—The cost of growing fine or coarse wool is not materially different, so far as the fleece is concerned. The carcass of the coarse sheep is larger, and better adapted to mutton; yet it is a law of nature, that in rearing, sustaining, and fattening an animal, it requires nutrition in proportion to the natural weight of carcass; and from this view of the case I am satisfied that the small, short-legged, round-bodied merino sheep, with a close, compact, even, and fine fleece, with a good length of staple, and averaging, in flocks of 400 or 500, 3½ to 4 lbs. of wool per head annually, are the best and most profitable kind of sheep that have ever been introduced into this country. It may be that I estimate this kind of the woolly race too high, for of this kind is my own flock, and I have no inclination to change it for anything better. I clipped a few over 500 fleeces last June, which averaged in weight 4 pounds per head after a thorough cold-water wash over the sheep's back, and sold at 45 cents per pound in August. The average weight of fleeces in Vermont, I think, will not go over 3 pounds, and the cost of production 36 cents per pound, allowing an increase of lambs equal to 25 per cent. on the whole flock, which is not far from correct, as every large flock must necessarily be made up of bucks, wethers, ewes that are too young to wean, as well as breeding ewes; and the number of lambs to breeding ewes, with fair keeping and attention, will be annually about 80 per cent. A ton of good hay, or its equivalent, will produce 12 pounds of wool in a washed or marketable condition of the merino blood; but whether this would be a fair computation with the coarse or long-woolled sheep, I am unable to say, as I have had no experience in these breeds. I have answered but three or four of your inquiries, and have confined my attention to those in which I have had some experience, and believe, in the main, that they are correct.

With high respect, your obedient servant,

J. W. COLBURN.

West Westminster, Windham Co., Vermont.

Sir:—It gives me much pleasure to add my testimony in favor of the great good that is resulting to the farming interest by the circulation of the Annual Agricultural Report of the Patent Office. Every farmer in the country has reason to rejoice that government has so far interested itself in the advancement of agricultural science; and farmers, true to human nature, having received favors, will be prone to ask for a continuance of the same. Among other desirable objects, I would suggest the propriety and reasonableness of asking of government an appropriation for the improvement of our breeds of domestic animals. In consideration of the great increase of agricultural wealth that would result therefrom, would it be unreasonable to ask for an appropriation for establishing a *stock farm?* Would not such an institution, under the care and management of government, be of much present and prospective advantage to our country? Surely, with our representatives in every country on the globe, and our national vessels on every sea, it has advantages for making selections of improved breeds of animals which private individuals could not command. And, indeed, a farm of this kind need not be a tax upon the treasury. It would soon become a paying institution. Having made selections of the best animals in our own country, and also foreign countries, and placed them under the care of competent individuals, a still further and progressive improvement might be anticipated by skilful breeding. We could confidently resort to such a farm for breeding animals, and would readily pay remunerating prices for all the surplus stock. It is true we have many good breeders, who, by their skilful management, will effect much in their lifetime; but man dies, and at his decease this progressive improvement in his stock is usually arrested; but government continues through all time. Under its fostering care we might confidently anticipate, for centuries to come, a continued approach towards perfection in our breeds of domestic animals. We should not want for precedents in such a case. Spain, France, and other continental governments have done, and are now doing, much for their agriculturists by this means. While the Spanish government bestowed its fostering care upon her flocks, she could confidently boast that her's was the "golden fleece;" and millions of dollars would not now compensate her for the loss she sustained in consequence of the dispersion of her standard flocks. The French government is at this time supplying the wool-growing world with an improved merino, the result of seventy years' careful breeding, at prices tenfold remunerating. We are annually paying our thousands to other countries for improved animals which should be bred in our own. If these suggestions are worthy of consideration, we trust they may receive the attention of those who are able to present them more forcibly.

As the raising of sheep and wool has been my favorite employment, I can speak only of it, and regret that I am unable to give exact statistics in answer to the inquiries in this part of the Circular:

"*Is Wool-growing profitable?*"—It has not generally been profitable in Vermont for the last ten years. It costs from $1 25 to $1 50 to keep sheep by the year. The average of wool per head will not much exceed 3 pounds. Our sheep are of the merino, a mixture of merino and Saxony, merino and native, and native breeds. We are fully persuaded that the pure merino is the most profitable variety for our climate. We regard the introduction of the Saxony sheep as a misfortune to our sheep husbandry. However well they may be adapted to other sections, they certainly do not possess a constitution sufficiently hardy to endure our northern climate without more care than most of our farmers are willing to give them. Another consideration which had, perhaps, an equal share in bringing them into disrepute was, that they yielded a fleece so light that it would not pay the cost of keeping. While wool sells for 40 cents per pound, our flocks must produce an average yield of 3 pounds and upwards, or wool-growing will not yield a profit.

"*Cost per pound of growing Coarse or Fine Wool.*"—Notwithstanding the prevalent opinion to the contrary, I am fully persuaded that it costs less to grow fine wool than coarse. My own observation and experience for a number of years past have led me to this conclusion. I keep a flock, varying from 200 to 300, of the merino breed. The average yield ten years ago did not exceed 3½ pounds. Each successive year has given a larger yield.

The clip of 1850 was 4¼ per head, and that for 1851 was a fraction over 5 pounds of well-washed wool, aside from a quarter of a pound of taggings; and during this time there has been a gradual increase in fineness. The wool shorn in 1851 has not been sold. The average price for the four preceding years was 46 cents per pound.

"*How many pounds of Wool will a ton of hay produce?*"—It would be impossible to give anything like an intelligible answer to this question without first establishing certain premises. The kind and condition of hay would make a difference in the result. The mode of feeding would also influence the growth of wool. Thus, a ton of hay might be fed so sparingly that the growth of wool would be next to nothing. Every particle of nutriment would be demanded for the supply of animal heat and the performance of those functions necessary to the maintenance of vitality. Wool and fat will not increase while the animal is fed with hay sufficient only to keep it in a *breathing condition.* The vigorous demands of vitality will not be compromised; they must first be supplied; and it is only by increasing the food beyond this point that we can hope to realize a profit either in wool, flesh, or fat. It is my opinion that many farmers keep their sheep in such a manner, during the five months of foddering, that the growth of wool during that time is almost arrested, and consequently the hay fed to them is almost lost, or, at best, has only served to maintain vitality.

Again: a ton of hay fed to different breeds would produce an unequal amount of wool. It is our opinion that the merino will give the largest increase for a given amount of food; and here, again, even in the pure merino of different folds, the amount of wool would vary considerably, according as they had been well or badly bred in years past. It is within the observation of every wool-grower, that certain members of his flock will far outstrip their fellows in the yield of wool. Thus, one will shear 3 pounds; while another, of the same live weight, having had the same care and keeping, will shear 5 pounds. Why is this? How can our entire flocks be made to give as good a return as these heavy shearers? These are certainly important questions; and upon a correct solution will depend, in a great measure, the profitableness or unprofitableness of wool-growing.

The farmers of New England cannot successfully compete with those situated more favorably in respect to cheapness of land and mildness of climate, unless they can so improve their flocks that they shall produce an average yield of heavy fleece. In breeding, for the last twelve years, I have sought to establish a flock which would produce the largest growth of wool for the amount of hay consumed. Quantity and quality of wool, with a hardy constitution, have been the leading objects which I have kept in view. The means employed to effect this have been: First, the selection of such bucks as possessed these characteristics in a high degree; second, discarding every ewe that produced either a light fleece or one not of a good grade of fineness; and, third, feeding in such a manner as to develop and maintain in the animal a high degree of vigor. By these means I have been effecting a gradual improvement in my flock, which to myself has been satisfactory.

"*Are large or small Sheep more profitable, either for their mutton or their fleece?*"—Undoubtedly, sheep at maturity require food in proportion to their live weight, and, other things being equal, we may expect about an equal return for the food consumed, whether the animal be large or small. A diminutive size is usually considered an evidence of degeneracy, and is often accompanied with a feeble constitution; hence those of a fair size are usually preferred.

Deficiency of food for a series of years will produce a dwarfish animal; and, on the other hand, liberal feeding will increase the size. Large sheep will of course command a higher price for mutton; and even for breeding, they will command a price higher than their proportional weight would warrant. It will be impossible to combine to a high degree those qualities essential both for mutton and wool in the same animal. In the one it is desirable that the food should be appropriated for the increase of flesh and fat, and in the other for wool.

"*How much more does it cost to produce a pound of Fine Merino than of ordinary Coarse Wool?*"—I have already expressed the opinion that it costs *less* per pound to produce fine merino wool than any other variety, and, where the object is mainly the growth of wool, have given a decided preference for this breed of sheep. With *improved* flocks it can be profitably produced for less than 35 cents per pound.

Allow me to explain the meaning which I attach to *improved flocks.* As before stated, certain members of a fold may be selected which uniformly produce heavy fleeces of fine wool. By judicious breeding for a long series of years, these characteristics may be permanently fixed upon the entire flock. There will be a development of vital activity in the millions of wool follicles of the skin. Every particle of food containing the elements of wool will be assimilated in such a manner as to increase its growth.* Such animals, properly fed, will invariably produce a large amount of wool, and their offspring will uniformly maintain like desirable qualities. The conformation of the coarser-woolled breeds is such, that the food is assimilated more for the increase of flesh and fat; and until these shall command a higher price than fine wool, we believe the merino will make the better return for the food consumed.

In this connexion I take the liberty to state some general impressions in regard to sheep husbandry, derived from a recent tour through some portions of Europe. Previous to sailing, I visited Hon. William Jarvis, of Weathersfield, Vermont, who had, some forty years ago, made large importations of the Spanish merino.

Mr. Jarvis is now upwards of four-score years; but, when I had made known to him my intention of visiting Spain, he seemed at once to regain his former activity, and entered into the subject with as much ardor as a man in the meridian of life. He felt confident that as good sheep might be found now, in Spain, as formerly, and gave the location where they could be found. Mr. J.'s former importations have done immense good to the sheep and general interests of the country, and every wool-grower owes him a debt of gratitude.

Landed at Havre on the 22d of February, 1851; and at Paris I fortunately fell in company with Wm. R. Sanford, esq., of this State, who was also in pursuit of sheep, and we accordingly made our arrangements to travel in company together. We proceeded immediately to Rambouillet, about forty miles distant from Paris, and examined this and other flocks in the vicinity. Here I would say that the ordinary sheep in France are inferior to our own, and that, so far as we could learn, there were but few flocks that could be relied upon for purity of blood. We had formed a favorable opinion of the French merino from previous importations; but, upon seeing them at home, in the entire flocks, we were still more favorably impressed with their good qualities. The flocks presented to our mind a striking instance of the improvements that could be effected by skilful breeding. It is a pleasure for those who can admire a noble animal to look upon their well-proportioned forms. They certainly seemed to possess a combination of those qualities most desira-

[* The remark, "Every particle of food containing the elements of wool will be assimilated in such a manner as to increase its growth," needs some qualification. Only a part, and that the smaller one, of the elements of wool contained in the food of sheep goes to form that substance, under the most favorable circumstances. The communication of Mr. Campbell is so full of instruction and valuable suggestions, that a small error from him will do more harm than from one of less authority, if uncorrected.]

ble in a breed of sheep—a combination adapted both to the production of mutton and of wool.

The compactness of the fleece, the growth of wool over the entire surface of the body, and a good degree of fineness, were sufficient evidence that they were well suited for wool-growing purposes; and they also possessed the size and quietness of habit desirable in a mutton sheep. We made purchases mostly from M. Cugnot's field.

After having summered and partly wintered a number of these French merinos, my good opinion of them has not diminished, but rather increased. It was the opinion of many that they would not thrive well on the keeping which we ordinarily give our old breeds, but I was able to satisfy them that such a conclusion was not correct. As we were obliged to feed mostly on grain during the voyage, I gave them a quantity daily until shearing time, after which the eighty ewes did not eat a bushel of grain until past the middle of September. In consequence of the drought, the feed became short, and they were fed daily with oats to make up the deficiency. The sheep throve remarkably well, even better than some of our old breeds would have done with like keeping.

They are now (December 25) dropping their lambs, which are unusually strong and healthy.

Fifteen ewe-lambs, brought over at the same time, were turned off to pasture and exposed to all the storms during the season. They came in looking remarkably well. I feel confident that we have no hardier race of fine-woolled sheep in the country. The following is the result of their shearing: Average live weight of ewes, 103 pounds; average weight of fleece unwashed, 12 pounds 8 ounces—making the proportion of wool to live weight as 1 is to 8 [illegible]/10. The lambs five months old, although they suffered much from the voyage, gave an average of 3 pounds 8 ounces.

We now concluded to visit Spain, although we had derived from various sources information which led us to the conclusion that we should not find such sheep as we were in pursuit of. Our minister at Madrid rendered us valuable assistance in obtaining information in regard to the location where the best sheep could be found. After examining the most noted flocks in Estremadura and other parts, we were fully satisfied that they were inferior to most of the improved flocks in our country. The sheep in Spain have evidently been degenerating for the last forty years. We next directed our journey through the German States. Fortunately, our excellent consul at Stutgard, C. O. Fleischmann, was intimately acquainted with the sheep husbandry of the country, and was able to render us valuable assistance After travelling through the most noted wool-growing districts, and examining the sheep of those folds which had attained the highest reputation, we were forced to the conclusion that they were not adapted to the wants of the wool-growers in the United States; at least not to those in the more northern States. They were mostly of the Saxon variety; their fleeces light, with an organization which denoted a slender constitution. We saw many things worthy of imitation in the management of their flocks, and can freely award to them the praise of having perfected, to a high degree, the science of sheep husbandry. They have attained, in their breeding, just the animal sought for; but, as above stated, the lightness of its fleece, and the delicacy of its constitution, render it objectionable to the generality of wool-growers in this country. We found in some flocks more of the characteristics of the merino; but, as yet, had been unable to find any

that combined all the desirable qualities of the breed. We continued our travels through Silesia, where we fortunately found a flock that presented the desirable points of the highly improved merino. They were selected in Spain in 1814, and had been bred with much care since that time by a truly scientific breeder, who had greatly improved upon the original stock. These sheep possessed that sameness and uniformity of appearance, which denote purity of blood. They retained a remarkable degree of evenness of staple over the entire body, and were finer and more compact, especially on the belly, than any sheep that we have seen. The surface presented a dark appearance, and on opening disclosed a beautifully-white oily wool. They were of fair size, well formed, and seemed to possess good constitutions. As an evidence of their longevity, we noticed in the fold, enclosed in a glass case, the stuffed skin of a venerable looking ewe, which had yielded a valuable fleece for 21 years, and presented, with artificial eyes, quite a life-like appearance. After close confinement on a long voyage, 19 ewes from this flock produced 145 pounds 7 ounces of unwashed wool of 10 months' growth, which would be equal to 175 pounds for 12 months, and would make the yearly average a fraction over 9 pounds. The average live weight was 71 pounds; but when fully grown, would be from 80 to 90 pounds. The produce of wool to live weight would be as 1 to 7 [illegible]/10. It may not be improper to state that the wool was in a perfectly natural state, no oil or coloring matter having been applied. They certainly possess naturally such qualities as are sufficient to satisfy the most devout admirer of them.

The proportion of lambs reared varies greatly in different years. Last year there was a large fatality among those dropped after the ewes were turned to pasture. It is believed that the little sugar maples eaten by the ewes previous to lambing produce a deleterious effect upon the lambs. Some lost upwards of fifty per cent. from this cause. The ordinary loss I should estimate as high as fifteen per cent.; but even this can be avoided by a proper previous feeding and careful attention during the lambing season. There is no reason in nature why there should be a greater mortality than with colts or calves; and an explanation of this ordinary mortality may usually be found in the feeble condition of the ewes, induced by scanty food and exposure. Let them be fed during pregnancy in such a manner as to keep up a good degree of vigor, and the loss will be less than five per cent. But here, lest I should be misunderstood, let me protest against feeding breeding animals, either male or female, too high. Our ordinary sheep have little occasion of fear from this treatment. It is our valuable animals that suffer most from this cause. An excessive accumulation of fat will surely cause degeneracy in the offspring, aside from the danger of greater immediate mortality. A gentleman of our State, the present winter, has lost eleven out of nineteen lambs from excessive fat—French ewes; and it is, to my mind, an occasion of regret, that many of our best animals are suffering from this cause. True, an excessively fat animal "fills the eye," and will often, on this account, command a much higher price, which induces the owner to adopt this course. An inexperienced breeder will often be deceived in this matter, and pay for such animals a price far beyond their true value.

I am, very respectfully, yours,

GEORGE CAMPBELL.

Hon. Thomas Ewbank, *Commissioner of Patents.*

MASSACHUSETTS.

WORCESTER, MASSACHUSETTS,
December 19, 1851.

SIR: The Agricultural Circular from the Patent Office, containing questions to be answered, has been for some time on my table. As most of the questions applicable to this section of the country have been so fully answered, I shall confine my notice to one only—that of *manures*.

My own opinion of the "best plan of preserving manure from waste" is to keep it under cover, secure from washing and evaporation, and when wanted for use, to be carted to the field for which it is intended, and immediately spread and covered by the plough. By this method, all the gases are secured in the earth without waste; but much loss is sustained by those who compost their manure; the most valuable parts pass off to vitiate the air, not to enrich the earth.

Plaster is profitably used as a fertilizer, particularly on grass lands. Our hill lands are much benefited by it, especially if the soil is of a clayey loam. The quantity used is commonly one bushel per acre, sowed on the land in the spring of the year, and is often repeated each year, for several years in succession, with beneficial results. The effects from the use of plaster are much more obvious some years than others. On some land, and in some seasons, the evidence of the benefit from the use of plaster will be strongly marked the first season. At other times, the benefit will be but little apparent the first season, but quite obvious the second and third years. Whether this difference is occasioned by a difference in the climate, or in a greater or less degree of moisture in the atmosphere, I know not. Plaster is also profitably used in being scattered upon the barn-floor where cattle are kept, to take up and retain the ammonia arising from their excrements; and for the same purpose it is scattered over the manure-heap, and adds much to its fertilizing properties. Since the potato rot has been so prevalent, that root is not now planted on manure in the hill, as was the former practice. The usual course now is to plant the potato without manure, except what may have been spread and ploughed under, and frequently without any. After the potato vines have appeared above ground one or two inches, a small quantity of plaster is thrown upon the vines, which has been found greatly to improve the crop of potatoes.

There is another fertilizer which I think much more of than any other—I mean that of *water*. I have practised irrigation for more than 30 years, and I know of no means by which land can be improved so certainly and so cheaply as by water, where it can easily be obtained.

I have on my farm a copious spring; it is situated on the side of a hill, within a few feet of the spot where the water is discharged from the earth. I have made a ditch, but little descending in its course, on the side of the hill; turned the water into the ditch, and use it in irrigating the land. The quantity is sufficient for watering some two acres, and the result has been highly beneficial. The water from this spring is, however, much less favorable for irrigation—being in the state of purity in which it issues from the earth—than the water of streams as usually found on farms, which are much enriched by that which has passed into the water, either from the surface or the material over which it has passed, and will afford the best nourishment to grass, not merely by the moisture, but more by

that with which the water is charged. Much of the richest portion of our soil is washed away by the rains, and carried by the water from the land, to be deposited in the beds of streams, in the bottom of mill-ponds, or in the ocean, where it can be of no use to the farmer. Much of this may be saved by irrigation. Turn the water over grass land, and the water will be strained, depositing its richness on the land, and be returned to the stream in a pure state.

On most farms situated in part on a side hill there are usually one or more streams of water descending from the higher parts of the hill to the valley below; although they may not be lasting, they usually continue from the early part of the spring until about the first of June, and sometimes longer. All such streams may very profitably be used in irrigation. I have on my farm a run of waters so situated, and use it most profitably on what is called the catch-work plan of irrigation; and, although the supply of water fails earlier in the season than I could wish, yet I have the benefit of it until I have secured a thick growth of grass, sufficient to secure the land in a great degree from the effects of a drought, should one occur before haying, and thereby make sure of a greater grass crop than I could otherwise have obtained. The expense attending this improvement is very inconsiderable. An intelligent man, with one to assist him, with the aid of a level, will in a short time stake out the course of his ditch on the side of the hill, giving a slight descent from the place of taking in the water in the direction it is to run—1 inch in 10 feet is sufficient; then, with a team and plough, turn the land from stake to stake, which should be at short distances, to made the ditch more perfect down hill. It will be desirable to take two furrows in the same direction. The ditch is then easily finished with a hoe. After one ditch is made, another, some 20 or 30 feet from it farther down the hill, may be made to receive the water flowing over from the first, and again distribute it equally for use, and so continuing to the bottom of the hill. When the water is admitted into the ditch, which should be formed so that the water would trickle over its banks for its whole length, it will, from the inequality of the land, soon form itself into little rills; thence the necessity of a second ditch for another equal distribution. There are frequently on these side hills hollows, and places where a dam may be made at a small expense; and a reservoir may be formed for the retaining and better controlling the water, which will add greatly to the benefits that may be secured from this improvement. I have known land watered in this manner to produce as large a crop of grass as could be dried on the ground, for many years in succession, having no manure except that which it obtained from the water, and from the dropping of the cattle when feeding off the after feed. This land has since passed into other hands; the use of the water has been discontinued, and the crop of grass is comparatively very small—not one quarter what it was formerly. The cost of this kind of irrigation is usually very small, generally less than the value of the improvement for a single year.*

There are commonly, on the sides of every stream, quantities of land which may be irrigated to great advantage. For the purpose of taking

[* Irrigation promises more for American agriculture than any other improvement at this time. All, or nearly all, of the water that falls in 12 months on a farm should be retained, to prevent the evils of drought, instead of being allowed to run off in freshets. It can be stored in catches, or numerous reservoirs.]

out the water, a dam would be necessary across the stream, and the expense must depend upon its location; and whether it would be expedient to erect such a dam, would very much depend upon the quantity of land that could be irrigated by its aid. Frequently, by going a little farther up the stream, a slight dam may be sufficient to turn out the water, although it will require a longer ditch to convey the water to the land to be irrigated. The longer the ditch, the larger it should be to convey the proper quantity of water. There is much land where this improvement may profitably be adopted. They who are disposed so to do will find it much to their advantage to employ a person skilled in the use of a level to stake out the work for this improvement. Those who doubt the benefits to be derived from irrigation have not noticed the appearance of the water in a stream after a shower, and observed how much richness it would give to the grass roots by depositing its freight on the land.

My farm is on the bank of Blackstone river, across which I have a slight dam, by which I take out the water and irrigate about 30 acres of land; and on no other land do I get so profitable a crop. It requires much attention, to be continued daily when using the water, in turning it from place to place, that all may alternately be watered, and preventing it from running too long in the same place, which would be attended with injury. If, by the use of water, a drifting sand may be converted into a luxuriant field, how much benefit, then, may be expected when water is applied to a good soil?

The land which I irrigate—except the side hill before mentioned—is principally alluvial land of a sandy soil, and I have uniformly noticed that on that portion which received the most water, I had the longest grass; being always careful not to permit the water to continue on it long at one time.

The use of water has much to commend itself to the favorable regard of those who can use it; it takes nothing from any other part of the farm, but, in its results, yields much for the improvement of other sections of the land. The hay grown on watered land is not so heavy, and may not spend so well as that grown on upland—growing without the aid of so much moisture; but will be greatly *more* in quantity. It may not be so good for a working ox, but is better for a milch cow. I have found no difficulty in keeping my stock through the winter in good order on interval-hay alone, taken from watered lands. It is, however, most expedient, in feeding stock, to change their food occasionally, even if the food is no richer; they keep in better appetite, and appear to relish their food more highly.

Respectfully, yours,

JOHN W. LINCOLN.

RICHMOND, BERKSHIRE COUNTY, MASS.,
January 1, 1852.

DEAR SIR: Your Circular, making inquiries on the progress of rural affairs, is before me. In reply to the queries suggested, permit me to say that *wheat* is not raised in large quantities in this region; but in some parts of the county, fields of ten and a dozen acres may perhaps occasionally be found; more commonly, it is seen in small lots of from 1 to 3 acres; and on a far greater proportion of farms there is none. Where raised, it is, for the most part, of spring varieties, and is usually sown as early as the season will permit, on land well-manured and tilled with corn the previous year. Such land is sown with one ploughing at seed-time, and the more harrowing given to it after sowing, the better for the land and the crop. One of the finest pieces we have ever seen in this region, (producing 37½ bushels per acre,) raised on land reclaimed from pine bushes and mouse ear, we are informed by the cultivator, was harrowed, more or less, for a week from the time of sowing. Though this may seem a harsh operation for the sprouting grain and the tender blade just rising to meet the light, he had much confidence in its benefit, and his crop certainly spoke well of his cultivation. The yield of wheat, under careful management, does not diminish in quantity for the last 10 years; yet it may be considered, in the present condition of the soil, a hazardous crop, and one which, to be successful, must be got in with care, and tended with care. A frequent change of seed from remote localities, produces a surprising effect with wheat. We are fully confident that, if farmers would club and get new seed from places 200 or 300 miles distant once in 4 years, they would more than find the expense and labor compensated. But little complaint is made of insects by the few who grow the crop. Soaking the seed in strong brine and liming previous to sowing, may prevent the work of the Hessian fly; and sowing plaster or lime on the wheat when in blossom, or while the seed is yet soft, we are confident will check the weevil or midge. It should be sown when the grain is moist, or at evening when the dew is beginning to fall, that it may remain upon the grain. No wheat raised for market.

Corn.—We have, in former Reports, stated the average quantities per acre. The cost of raising, of course, varies on different soils and under different management. By taking an exhausted piece of land, and ploughing shallow, and manuring sparingly, and half-tilling the land, and suffering the fodder to be injured by storms, it can easily be made to cost a dollar a bushel. While, by thorough management, deep and thorough ploughing, with such manuring and after-management as every farmer will give if he expects a crop, it can be raised at 50 cents a bushel; and in some localities probably for less. We once heard a neighboring farmer, who has good crops, say it did not cost him six cents a bushel to get his corn. Be that as it may, it is far below the average price of raising. The time of ploughing for corn, and the after-management, are various indeed. Some prefer to plough in autumn; some early in the spring; and others as near the time of planting as possible—always careful, however, to plough deep, and lay the sod beyond the reach of the cultivator. This late ploughing in the spring will, of course, leave the ground in the most lively condition, especially if the soil is inclining to loam.

In the application of manures, practice varies. Those who can afford it allow a portion of their manure to lie over the year, and apply it in the hill. This is certainly very fine food for corn, so rotten and fine. But it is doubted by many whether the shovelful so applied will produce so good an effect as might have been realized by giving the same space the amount that it took to make that shovelful the previous year. Our own opinion is, (and we practise upon it,) that, the sooner manure can be incorporated with the soil, the greater benefit will result from it; and, acting upon this principle, our practice is to clean the yard as early in the spring as circumstances will permit; and, if the quantity of manure will warrant, we spread and harrow in until it is buried from the sun's direct influence. If the quantity does not meet our desires, we put it in the hill; at any rate, get it on or within the land as soon as may be.*

By occasionally throwing plaster over the yard and manure heaps during the winter, and keeping them free from litter, beyond the necessary amount for the comfort of animals, the manure in spring will be found good enough for corn or any other crop. In the matter of feeding, our best farmers are coming to the grave, and, we are pretty confident, just conclusion, that it is better to soak their corn, than to grind it, if its nutritive qualities are the same. Two points of economy are gained in this way: first, the time spent in going to mill, which will amount to two or three times for a single grist; and the toll, which those experienced in the matter must know tends to diminution of quantity. How much grain the manure formed by feeding hogs with ten bushels of corn will produce, when applied to the land, I cannot say. By good management and a little help in the way of throwing turf, muck, and other decomposable substances into the hog-yard, one hog will probably make manure for an acre of corn in a year.

Oats, Barley, Rye, Peas, and Beans.—Of these, rye is the least exhausting crop; barley and peas next; and oats, from their being more certain and always in demand, are most raised and most exhausting. I have no knowledge of peas being cultivated as a renovating crop.

Grasses.—The quantity of hay per acre is various; a ton and a quarter will probably be a full average. The best fertilizer of meadow-lands must, of course, depend upon the soils to be improved. Top-dressings of composted manure are valuable; so is plaster, on lands adapted to clover; so is lime, but the high prices it commands in market will not admit of its general use. Ashes are valuable, though they may, with propriety, be incorporated with the compost heap, to be carted on to the land and spread immediately after the crop is taken off. Clover and timothy are the grasses most commonly cultivated in meadows; though with these many are now introducing red top, which is a fine and a more solid grass. The quantity of grass seed sown to an acre differs according to the dictates of the farmer's liberality and supposed ability; for some have still the idea that it is an expense—which they cannot, in economy, meet—to buy much grass seed; and a little, until they get more able, will do very well.

The advantages of thorough-stocking are, we are happy to say, being more and more appreciated; and, we presume, there are but few farmers who think of sowing less than a peck of timothy and clover on an acre; and when red-top is added, we presume the dose is fully doubled; at any rate, the quantities we have named are small enough.

Tobacco.—It has formerly been supposed that our soil was too hard, and our climate too cold, for the cultivation of this crop; but some few experiments, made on a small scale, in different sections of the county, the

[* This is a good practice. One cannot place the droppings of animals in the soil too soon after they are voided. Keeping manure in yards never adds to the aggregate amount of its fertilizing atoms; on the contrary, there is great danger of loss being sustained.]

last season—which was cool and late—may well lead us to suppose that, with proper attention, its cultivation may be attended with desirable success. The specimens we saw gave a large, thin leaf, such as could be easily cured, and we should think would command a quick market.

Potatoes.—We had fond expectations—the early part of the season was so wet, and it was so cool throughout—that the country would be blessed with an old-fashioned potato crop; but, though the produce of sound potatoes was an improvement on that of former years, yet it was not entire. But very little was seen or heard of the rot until the 23d of August, when more rain fell than we had all the six weeks previous. Immediately after this rain, we heard complaints of the rot, which, as usual, prevailed most where fermenting manures were applied. How far its effects would have been felt if potatoes had been permitted to remain in the ground, we cannot, of course, say; for many fields were soon dug, and the experiment with them ended, so far as rotting out-doors was concerned. We think this will be overcome, and that the potato will yet be reinstated as a reliable crop; and, in order to gather some conclusions satisfactory to ourselves, we entered upon the following plan of cultivation, to wit: We planted the few we raised at five different periods, and in five different patches; first, we planted early potatoes early in May, on sward-land turned over in April; land, light loam on limestone, no manure and no rot; crop good for late years, fair for years of potato raising. Second, we planted a few rows on land where potatoes were grown in 1850, on a loam inclining to clay, limestone bottom; these were planted early in May, without manure; result last of September, about one-tenth slightly affected with rot. Third, planted peach-blows around the corn-field, May 10; soil as before, on a stiff sub-soil; no manure; result in October, near the 20th, on the sides where the ground was trod down by the team in turning to plough, a few rotten potatoes were found; on other sides of the field, none; crop fair. Fourth, turned over a small piece of meadow very late in May: soil clayey loam, based on limestone; land harrowed and planted, without manure, the same day it was ploughed; crop hoed once, about half of it immediately after a shower; result in October, crop very fair of good-sized potatoes, and no rot. Fifth, turned over a small piece of sward in June; soil black loam, inclining to muck; no manure applied; harvested in October; potatoes large, well flavored, and no rot.

Such is the result of our experience with the potato crop the last year. While we permit others to draw such inferences as they see fit, the following claim our own attention: First, that it is not early planting nor late planting that mitigates the disease; at least in our case it made no difference. Second, fermenting manures, if they do not cause the disease, are auxiliary to it. We infer this from the fact that our neighbors who used such manures, on soils as favorable as our own, suffered much; while in former years we should not have thought of potato rot from any that existed among ours. Third, that open porous soils are more congenial to the potato than compact ones, or that the tendency of the disease is increased in the latter. This we learn from the fact that, on the hard trodden headlands, a tendency to the disease was manifest; while in the same field, and in the same soil, lying light and friable, no such tendency existed. Fourth, this disease is not the result of the potatoes running out; those that were fairest, largest, best, and showing no indication of rot, were a variety which has been cultivated on the farm without change of seed (not a very good plan we admit) for a quarter of a century, and promise to hold out for size and quality for half a century more; while all appearances of rot were in those of recent introduction. In conclusion, is it not possible, after all, that this disease is owing, to a great extent, to the cultivation, rather than a visitation of Providence, or the depredations of bugs and worms, that fed, unblamed, upon the foliage before the disease was known? Who knows but the effect of thorough drainage and subsoiling, and the use of other than fermenting manures—straw, or clover, or buckwheat, ploughed in—would have the effect to do away with the evil? We do not; and if any one is otherwise enlightened on the subject, let him speak.

There is increasing attention paid to the culture of *fruit*, to which our soil and climate are admirably adapted. Probably the number of apple trees set the last season has increased in at least a six-fold proportion over those set in any former year. It is but reasonable to suppose that at least one-half of these, through want of care in setting and after-management, will fail of coming to maturity. While valuable fruits are doing as well in market as they are now, (good varieties of apples being worth, at the time of gathering, from 50 to 62 cents per bushel at home,) there can be no mistake but that their culture will be a profitable business, probably the best in which the farmer can engage. Let no one venture upon it, however, without thinking that, like all productive employments, it requires labor and watching. In the first place, good trees must be well set in carefully-prepared soil, and then frequent watchings must see that the soil is kept loose around the roots, and that these are carefully fed with proper food. A fruit tree cannot, and ought not, to grow in cramped and starving circumstances, and they must be kept free from worms and other insects, which, if allowed to prey upon them, will first disfigure and then destroy them. We will suppose the cost of an apple tree, when set, to be one dollar—that is, eighteen cents for the tree, and the remaining eighty-two cents for digging the hole, preparing compost to place around the roots, and setting the tree; then add fifty cents a year for digging about it, pruning, and protecting from insects; at the end of ten years the tree has come into vigorous bearing, and the cost, exclusive of ground rent, which is paid by the increase of other crops, is $5 50. Eleven bushels of apples will pay for this; and the tree, if it has done well, has more than given this. From that time, then, there is an increase of profit without increase of labor. We have spoken of good trees, well set and well cared for, and know of no rule by which to estimate the profit of a stinted tree, stuck in the ground with a firm subsoil touching its roots, as though the cultivator was afraid they would run through and come out the other side, pruned by cattle and defoliated by worms. Disappointment and sorrow must be the reward of such cultivation.

The Baldwins, northern spies, pippins, seek-no-furthers, greenings, swaars, and Spitzenbergs, with other varieties, are all apparently at home in all the region about us. We know of no remedy for blight but thorough, deep cultivation. Plums, peaches, pears, and cherries produced well last season, and we see no object in the way of their successful cultivation. The best method of transplanting is to dig a very large, deep hole—say from four to six feet in diameter, and two feet deep—to receive the roots; if this is done six months before transplanting, to let the air operate on the sides and bottom, no harm will follow. Set the tree carefully, with its roots extended, at its former depth; cover them with rich earth or compost; throw the turf taken out of the hole around the sides, towards the bottom, where they will feed the roots; and if you throw hard pan or stiff soil, lay it on top, where the roots will not approach it, and the atmosphere will work it into good, friable soil.

Trees may be successfully set in spring or autumn. If set one year from the graft, a better proportion of root to the top will be obtained, and the growth will be subject to less stint. But be sure to keep cattle from them.

In the matter of *forest culture*, very little more is done than to preserve the wood lots. Farmers are beginning to see the importance of doing so much for the benefit of future years. It is now generally conceded by all intelligent and observing men, we believe, that the most economical method of managing woodlands is, to commence on a remote part and cut clean. This will save much in breaking down young timber, compared with the old and wasteful system of cutting a tree here and another there, which will each, from necessity, break down a younger growth in its fall, and each tree will also require a separate path to remove it. Where this mode is practised, it is not unusual to see patches of pasturage springing up, and but little prospect of a healthy aftergrowth of timber. By this thinning, too, the remaining trees are left more exposed to the winds, which, having full play, subject them to premature decay. By cutting clean, a young and thrifty growth is encouraged over all the land; the old paths are lost in it, and of course the waste of land in wood-paths is each year, as the labor is brought nearer home, diminished. Woodlands managed in this way may be renewed in from fifteen to twenty-five years, according to the location.

The practice of pasturing forests, which once prevailed, is fatal in its tendency, and by all good managers is nearly abandoned; neither sheep nor cattle are permitted to run in such grounds, unless the owner is willing to see his prospects of timber and fuel run out.

Meteorology.—1851 was decidedly a cold year; the lowest temperature was 17° below zero, in February; the warmest, two weeks in the early part of July, when we had summer heat, and aside from which we had very few warm days. Rains were abundant until the 10th of July; but from that time forward a drought followed, and the springs and streams were unusually low. The middle of November, corn suffered from the cold season; oats, spring wheat, &c., from the drought. Hay was good; and, taking all crops into account, they may be said to have been more than middling.

Yours, truly,

W. BACON.

RHODE ISLAND.

MIDDLETOWN, NEWPORT CO., RHODE ISLAND.

Answers to the questions in relation to crops cultivated in this vicinity, stock, &c.:

Corn.—Guano is scarcely used; average product—say 40 bushels per acre; difficult to ascertain the cost of production; not considered a remunerating crop unless the price is nearly or quite $1 per bushel. The best mode of culture is to cover with a good coat of manure to plough in; and, after being well ploughed, to cover with another good coat of manure, and harrow well before planting, and keep clear of weeds by thorough cultivating and hoeing.

Oats.—Average yield—say 40 bushels per acre; 3 to 4 bushels of seed used.

Barley.—Not as much cultivated as formerly, and less productive. Three bushels seed generally used; perhaps 30 bushels per acre would be as much as an average now; though, formerly, 50 would sometimes be harvested from an acre. Considered less exhausting than oats.

Rye.—Not much cultivated; less than formerly; perhaps 25 bushels would be a fair average; 1 bushel seed used per acre.

Grass.—Unless the hay yields about a ton to the acre, it is called small. Sometimes 3 tons have been obtained. Nearly or quite all kinds of manure are good for meadow or pasture. Clover, timothy, or herds-grass, with red-top or border-grass seed, generally sown; and about 1 bushel of the mixture per acre generally, varying according to soil, &c.

Horses.—A few only raised; and when they prove well, barely pay the cost of raising; break young and use moderate.

Sheep and Wool.—Wool-growing would hardly pay were it not for the mutton and lamb for the market; middle-sized sheep are preferred. A pound of fine wool may, perhaps, be raised at as little cost as coarse; but the coarser kinds are in general preferred for mutton and lamb for the market. About as many lambs generally raised as there are ewes kept, and sometimes more.

Hogs.—Not much done in raising pork, more than for home consumption.

Root Crops.—The cultivation of these is believed to be on the increase. Make the land rich, and pulverize well before planting. Average yield, perhaps, 500 bushels per acre.

Potatoes.—Used to produce well, but latterly hardly pay for the labor, owing to the blight, which, if accounted for at all, I believe must be atmospherical.

DAVID BUFFUM.

CONNECTICUT.

BROOKLYN, WINDHAM COUNTY, CT.,
January 6, 1852.

SIR: Your Circular to the president of the Brooklyn Farmers' Club was duly received through the politeness of the Hon. R. S. Baldwin, and we return an answer at the earliest time since a thorough discussion of the various questions.

Corn is the most important crop of grain raised in this town, as our farmers are mostly dependent upon it for fattening their pork. It is ground with oats or rye and barley, and fed in a raw state. Hogs will do better in this way, upon a given quantity, than when cooked.

Our best crops are raised upon green sward, ploughed 7 inches deep, a few days before planting, which takes place from the 5th to the 25th of May; manured in the hill with a compost from the hog pen—long manure and summer manure. Long manure is ploughed in too sparingly. Ground thoroughly manured, marked into rows three and a half feet apart each way, with six kernels in a hill, which are thinned out at the second time of hoeing to four; the ground kept as nearly level as possible at each time of hoeing. Eight rowed Canada most in use. Cost of production 50 cents per bushel, with, upon an average, 75 cents per bushel.

Oats are raised in considerable quantities upon ground planted with corn or potatoes the year previous, at an average of 30 bushels per acre, two and three-fourths bushels sown per acre, and will yield more and better than when sown in larger quantities, leaving room for the stalk to branch out and head better. On ground planted with potatoes, straw rusty, short, and miserable.

Barley is raised in less quantities than heretofore, from the uncertainty of the crop, but makes a valuable feed for hogs and cattle ground with corn.

Rye is almost indispensable in the manufacture of "brown bread," and the straw for bedding for horses and hogs little raised. Yields 10 bushels per acre; worth five Yankee shillings per bushel, and is considered a less exhausting crop than oats or barley.

Grass.—The yield of hay has been 25 per cent. greater for the last two seasons than for a number of years of previous, owing to the frequent rains in the months of June and July. Clover, timothy, and red-top are sown together with oats and barley. Ten pounds of clover, 8 quarts of timothy, and 16 quarts of red-top are seed enough for any land, and less should be used when in a high state of cultivation.

Clover predominates the first year, and, fed to calves till the middle of June, if likely to grow too large, yields 2 tons per acre. Should be cut, and, when the water and dew are dried out, made into small tumbles, and stand three or four days; if the weather is good, it may then be carted into the barn without the loss of time, and as bright as when cut with the scythe; making a saving of 50 per cent. over the old method of curing.

Timothy and red-top are cut the succeeding year, at an average of 1½ ton per acre for four or five years; worth $12 per ton at the barn, at a cost of $4 50 per ton. This is the most profitable crop raised in this town.

Our best fertilizer for meadows is long manure, spread early in the month of May, and dragged with a pair of horses or oxen attached to a bush. The particles are thus beaten to pieces, and, when done a short time before a storm, readily absorbed.

Plaster is used with good success upon red loam, 1½ bushel sown per acre in April. In some instances the quantity of feed and grass is increased 25 per cent. The same results are noticed on corn and potatoes. Cost $7 per ton at our mills.

Dairy Husbandry is receiving particular attention. But few of the pure-blooded Durhams and Ayrshires are kept by us. Some have crossed with them without much success. Our best cows are the native breeds; 250 pounds cheese and 15 pounds butter, or 120 pounds butter alone, are an average for our best dairies. Cheese worth $7 50 per cwt., and butter 20 cents per pound. Calves are readily sold at 7 cents per pound; which make the whole product per cow at about $28 per season.

Neat Cattle.—The raising of stock is very expensive; whence the high price of veal, butter, and cheese. Suitable calves for raising are worth $7 at five weeks of age. The cost of summering at $3, and wintering at $8, the two subsequent years at $12 each, make a cost of $42 per head—worth $30. This accounts for the large numbers that are yearly brought into the State from Vermont and Maine, where the hills are more productive and hay cheaper.

Good dairy cows are worth $35 in the spring; in the fall, $20. *Steers* are readily broken by yoking them young, before they are unmanagea le; worked lightly with other cattle till they are subdued.

Hogs have been crossed in so many different ways that a Philadelphia lawyer, with their genealogy before him, could not give them any other name than *hog*. We have had the Berkshires and Mackays, and the Suffolks are now having their turn. Their meat is of excellent flavor; but they are too small for the farmers to raise for profit; great quantities are fattened yearly. Lots of 15 and 25 average 450 pounds, and 500 in extra cases; worth this season $7 50 per cwt in the hog. The cheapness of fattening depends on the way they are kept. If kept growing till slaughtered, at 10 months of age, 100 pounds of corn will make 24 pounds of pork, or a dressed hog of 350 pounds; while the half-starved one of 18 months will consume 40 bushels, and not weigh more than 400 pounds.

Potatoes.—The average yield 100 bushels per acre, upon ground that 10 years ago produced 300. The cost of produce may be put at 20 cents. They should be planted upon light, friable soil, near the top of the ground, the manure ploughed in. The peach-blows, Vermont whites, and long-reds are least affected by disease, and yield best. The two first kinds good for eating; worth 50 cents per bushel.

The cultivation of *fruit* received a new impetus by the establishment of a nursery, on a large scale, in this town, by the Messrs. Dyer, some 8 or 10 years ago, where the finest of trees, unsurpassed by any in New England for beauty or quality, are found; many orchards in this vicinity, of 4 or 5 acres, yielding a net profit of $500 per annum. Sweet apples are worth their weight in potatoes for cattle or hogs; but sour ones should be cooked to destroy the acid; they then make an excellent and cheap food by adding a little meal for wintered hogs.

The Roxbury russet, Baldwin, and Rhode Island greening bring the highest prices in market, and will keep the best. They should be picked from the trees about the 1st of October, spread one foot thick upon a barn-floor, with a free circulation of air through. In this way they are dried and shrunk. They should then be carefully put in barrels, and headed up. Stand in a cool place till put into the cellar; removed from the walls in this way, they keep till July. Good varieties sell readily at $2 per barrel in the fall.

Farmers are turning their attention to the making and preservation of manure. New barns are built, with cellars under them, when possible. Yards are filled with loam, refuse hay, and corn fodder.

Guano has been used with the best success, but in limited quantities, owing to the high price. Poudrette is used with good success on light soils, and is considered by some to be a cheap manure at $2 per barrel.

Your plea in behalf of agriculture is read with a lively interest, and the necessity of the establishment of a Bureau at the seat of government, to provide for agricultural schools and lectures, has long engrossed the attention of our most intelligent farmers.

The Report from the Patent Office is eagerly sought after, and read; but falls into the hands of but few who live by the sweat of their brow.

Respectfully, yours,

ALBERT DAY,
JOHN GALLUP, 2d,
EDWIN SCARBOROUGH.

THOMAS EWBANK, Esq.,
Commissioner of Patents.

TOLLAND COUNTY, CONN., *January* 19, 1852.

SIR: Having received your Agricultural Circular through the hands of my friend, L. P. Waldo, Esq., I reply in brief to such of your inquiries as I am able.

Wheat cannot be made a profitable crop with us.

Corn is one of our staple crops, and is more extensively cultivated in this section of country than any other grain, except, perhaps, oats. Guano is not used to any extent. The average produce of corn ranges from 25 to 40 bushels per acre in this region. Some experimenting farmers have obtained as high as 80 bushels shelled corn per acre. I think there has been a decided improvement in the manner of cultivating this crop within the last 25 years, and that the average product per acre has doubled during that time.

The method of cultivating varies with different individuals. The general practice, I should think, is to select a grass plot which has been mowed 3 or 4 years; turn it over well with a good plough; then spread on from 20 to 30 loads of stable or barn-yard manure per acre, and immediately incorporate it with the soil by harrowing the surface thoroughly, without disturbing the sod beneath. This should be done just before the time of planting; then mark off into rows, about 3 feet apart each way, and plant without further preparation. Four stalks are usually left standing in each hill. Most farmers, at the time of planting, put into the hill a shovelful of fine manure, or some other fertilizing substance, to give the corn a start. As soon as the corn is up sufficiently, a horse and cultivator pass between the rows each way; after which men, with hoes, finish the weeding. Two more hoeings finish the cultivation of the crop. When the kernels become glazed, the crop is cut up close to the ground and put into small shocks to ripen. The practice here is to earth up round the hills at the last hoeing. The land generally being rather moist, the crop is not generally injured by drought. In dry and sandy soils a level cultivation is recommended. Pursuing this method in my own practice, I have usually obtained from 40 to 60 bushels per acre. I have made no estimate of the cost of cultivation.

In harvesting, the poor corn is sorted out, and usually fed, in a raw state, either to fattening cattle or hogs, and the good corn is ground before feeding; for neat cattle and horses, it is ground with the cob; for hogs, it is shelled and mixed, usually with oats, buckwheat, or some other grain, before grinding.

The farmers have learned to set a high value upon the manure made in their hog yards. But in this section we are all farmers only in a small way, and but few keep more than from 2 to 4 hogs. I think, usually, the quantity of manure to each swine fatted would be from 3 to 5 cart-loads, of 50 square feet each. This is done by supplying the yards with weeds, turf, and other substances.

Sheep.—Two years ago I had 14 ewes and 1 buck; sold 14 lambs on the first day of July for $32; sheared 45 pounds wool, worth 34 cents per pound. Last year had 14 ewes and 1 buck; raised 13 lambs; sold 9 lambs for $20; 40 pounds wool, worth 34 cents per pound. I retained 4 ewe-lambs to replenish my flocks. I usually feed a small quantity of grain daily to my sheep during the winter. I think it does not cost me over $1 per head per annum to keep my sheep, including the grain; so you see that they have been profitable; but I have had very good luck for three years past in raising lambs, and early lambs have sold very well.

I think that the above, after all, should be considered as an exception, rather than a general rule.

Hogs are kept generally, and, though of the native breeds, much pains have been taken to select the best to breed from, and I think we have a kind that will compare favorably with any in the country. Great weight and early maturity have been the objects aimed at. The color is white almost universally. At from 16 to 18 months old they usually weigh, dressed, from 400 to 600 pounds. A large portion of the farmers fat them the first year; and pigs from 6 to 10 months old weigh, when dressed, from 200 to 400 pounds. A spirit of rivalry has grown up in this region on this subject within a few years past, the tendency of which has been to secure the best breeds, and, in my opinion, to double the weight.

The farmers and mechanics fat their own pork, and they are generally fed from the products of the garden, and other sources, so promiscuously, that no correct estimate of the cost can well be made.

Tobacco.—Tobacco is raised to some extent in the northwest part of our county, and is said to be a profitable crop. It is not raised in the south part, and I know nothing of its culture.

Root Crops are beginning to be talked of, and are cultivated in some instances; but on this point we are yet in our infancy, and can make no suggestions.

Potatoes have been a staple crop, and were formerly raised somewhat extensively; but of late, since they have been afflicted with the rot, the farmers have been more shy about planting them.

Apples, which were formerly made into cider, are now generally fed to hogs and cattle, taking the place of potatoes for that purpose, and are thought to be about as good.

Fruit Culture has been sadly neglected till within a few years past. People seem to be now waking up to that subject, and have commenced cultivating new varieties, and renovating and improving poor varieties, by grafting and cultivating with an energy which promises well for the future. Fruit, at present prices, is among the most valuable productions of a farm.

Oats.—Oats are cultivated to about the same extent that corn is, usually following the corn crop when the land is seeded down to grass. The farmers here get the least return for their oat crop, compared with the labor bestowed upon it, of any crop which they raise. The ground is ploughed (if a corn stubble) early in the spring; the oats sown broadcast, three bushels to the acre, and worked in with the cultivator; after which the grass-seed is sown and the land made level with a bush or roller, and the labor is done till harvest. Average crop from 30 to 50 bushels per acre. The harvesting and threshing are but a small job, and the oats are cash, at from 40 to 50 cents per bushel.

Barley, Rye, Peas, and Beans.—These are all cultivated, though not extensively. On the sandy soils in the northwest part of our county, rye is raised more extensively, taking the place of corn. The best farmers usually seed down their land about once in five or six years, sowing from 8 to 10 pounds of clover, and from 6 to 8 quarts of herds-grass seed, per acre; though many get along with a much less quantity, probably to their own disadvantage. In very moist lands the clover seed is dispensed with, and red-top is used in its stead; clover being liable to winter kill on wet land.

Cheese.—No cheese of any account is made. The farmers usually keep from 2 to 8 or 10 cows. All, I believe, make butter wholly, which is generally marketed beforehand, and delivered weekly in some of the contiguous manufacturing villages, principally in Willimantic. Average price through the summer, from 14 to 18 cents per pound; in the winter, from 20 to 30 cents. Produce of each cow per annum varies much—say from 75 to 150 pounds.

Neat Cattle are not raised to any great extent. They can be bought of drovers at two or three years old for less than the cost of raising. Good cows are worth, in the spring, from $20 to $40; in the fall, from $15 to $30. The calves of dairy cows usually go to the butchers at from 4 to 8 weeks old, and are then worth from $3 to $6.

The farmers occasionally fat a yoke of oxen to sell, but no great amount of beef is fatted, except what is needed for home consumption. Good working cattle, from 5 to 8 years old, are worth from $80 to $120 per yoke at the present time, and have been for two or three years past. So you see it is not an object for us to make beef, as *oxen* will not fetch more when fatted than they are now worth to work.

No horses or mules of any account are raised for market. The farmers generally keep one horse to plough out their corn, to go to market, to mill, and to church; and that is about all that is done with the horse kind. Value of horse, usually from $50 to $100.

Yours, truly,

JOHN S. YEOMANS.

To the COMMISSIONER OF PATENTS.

CREAM HILL, WEST CORNWALL,
January 3, 1852.

SIR: I propose to answer, briefly, a few questions introduced in your Circular, confining myself to those relating to grazing and dairy husbandry, as our soil is adapted to those branches of farming.

Grazing.—Our best meadows yield three tons per acre at one cutting, and some farms average more than two tons of hay per acre. But, generally, that would be too high an estimate.

Fresh green manure is employed with advantage as to top-dressing on moist meadows; but, if it contains much straw, it is better to allow it to ferment under shelter, or to compost it with peat or swamp muck, and draw it out in autumn, to be spread in the spring. Fermented manure may be applied in the spring, or in the summer after the grass is cut, or late in the autumn; but green manure seems not serviceable when applied just as the grass is starting into vigorous growth in the spring, which thus keeps the manure moist by its shade, and rapidly appropriates all of its volatile and soluble portions.

Ashes and gypsum are very valuable, and much used as top-dressings; but the former should not be applied with barn-yard manure, as it tends to liberate and dissipate its ammonia; while the latter should always be applied with it, as it will retain the ammonia, which might otherwise escape. If frequently sprinkled in stables and on the manure heap, it must, of course, become fully charged with this gas, which will be given up when needed by plants.

The effect of manure is most distinctly seen on land which is already in good condition, and when the most valuable grasses are firmly established. Most of the land mowed in this region is permanently in grass, and its productiveness does not diminish for any length of time, if properly manured. When land is seeded to lie only a few years in a rotation of grass, red clover and timothy, or herdsgrass, are alone employed, using about two quarts of the former, with six or eight of the latter, per acre. When the land is moist, and it is designed to lie permanently in grass, a half bushel of reed-top seed may be added to advantage. A plentiful supply of seed produces a close turf, which prevents the growth of weeds, and the stems of the grass are finer and more valuable.

With regard to the cost per ton, by referring to my note book, I find that the past year we cut, by estimate, about 200 tons from 85 acres, employing nearly 200 days' work; costing, with board and tools, $1 50 per day. Add to this, interest on the land, at least $3 per acre, and the cost of returning the manure to the land to keep it in good condition, we shall make the cost of the hay in the barn a little over $3 per ton. With a superior crop, contiguous to the barn, and a favorable season, it might cost less than this.

Dairy Husbandry.—The average annual produce of cheese to a cow in this region is about 300 pounds. Where the dairy is large, it is considered most profitable to make no butter except in the spring or fall, while the weather is cool and the quantity of milk small; for it is estimated that every pound of butter takes nearly two pounds from the cheese, besides affecting its quality.

In smaller dairies, the night's milk is skimmed in the morning, and mingled with the new; for the cream, if once separated, cannot again be mixed with the milk; so that all will remain in the cheese, but will pass off in the whey.

It is estimated that the milk which will make 1 pound of butter will make nearly 3 pounds of cheese, although the proportions must vary much at different seasons, depending upon the quality of the milk and the character of the weather.

So many different circumstances must ever affect experiments upon these subjects, that we can never hope to attain that accuracy of result as in many other researches. Among these may be named the difference in cows—the milk of one being rich in butter, and another in cheese; their condition in flesh, the quality of their food, extremes of heat and cold, moisture and drought, and the quietness or excitement of the cow at milking time.

The cheese of this part of Litchfield county is much liked, and is sent to market under the name of *Goshen* cheese. The price this year has been low, yielding the farmers but 6 or 6½ cents per pound. That of butter has raised, during the season, from 12½ to 20 cents.

Neat Cattle.—The average value of cattle, at three years old, is from $25 to $30, and we consider that it costs that to raise them. Good dairy cows are worth, in the spring, from $30 to $50; in the fall, about $10 less.

Steers are usually broken in the yoke when three years old. If stabled and confined in the stanchions, their necks become used to restraint, and they submit to the yoke very readily. The most common practice is to place them, when yoked, between two pairs of older cattle; and in this way they are sufficiently broken to put on the lead. Or they may be put there at first, or even driven alone—a halter being put on one to restrain and guide them. They should be treated very gently and kindly, or they may acquire bad habits, which may prove troublesome. It is important that they should be trained to move quickly, and therefore they should not be checked or overstrained by heavy loads when young. When oxen are worked regularly, especially upon the roads, or in the winter, when there is ice, shoeing becomes almost as necessary as with horses; and it is gratifying to the driver to see with what spirit his team will take hold of their load when well shod, and with what confidence they will go upon the ice. In order to put on the shoes, the smith confines them in a frame built for the purpose.

In a rough and hilly country like New England, the ox is advantageously employed on the farm in preference to the horse. If well trained, and properly fed, he will do nearly as much work, while the expenses of keeping are very much less, and his liability to disease and accident is very small, indeed, as compared with the horse. And, when he is no longer needed for labor, his value for the shambles not only secures a season of rest and enjoyment for himself, but preserves his owner from all danger of loss.

Respectfully, yours,

T. S. GOLD.

NEW MILFORD, (NORTHVILLE POST OFFICE,)
Litchfield County, Ct., November 6, 1851.

DEAR SIR: Your Circular of August, 1851, was duly received through the politeness of the Hon. Truman Smith.

Living in a region of country favorable to agriculture, I have noted, with some interest, the effect of improved cultivation of the lands in this vicinity. Twenty-five years since, much of our plough-lands was exhausted, and presented as forbidding an aspect as does much of the worn-out lands of Maryland and Virginia. By judicious cultivation, these lands have been most completely renovated, and their productiveness and value have been increased from 100 to 500 per cent. The same land which, a few years since, would hardly pay for cultivation, will now produce 60 bushels of corn per acre, and other crops in proportion. Our usual course with worn-out lands is to summer fallow, ploughing to the depth of about five inches; cross-plough early in September, being careful to leave the soil thoroughly pulverized; then spread evenly upon the land from three to six loads of fine manure; sow with rye, and drag with harrow; then sow from six to eight quarts of timothy seed per acre, to be followed by a bush. As soon as danger from severe frosts is past in the spring—say the 20th of April, the ground is sown with clover, at the rate of from two to three quarts of seed per acre, and dragged in with a heavy bush or harrow. This, so far from injuring the rye or timothy, will decidedly improve the crop. The next step is to sow, about the first of May, 100 pounds of Nova Scotia plaster per acre; the plaster being repeated annually, while the ground remains in grass. Lands treated in this way, if not too closely fed, will produce a most luxuriant crop of grass, for three or four years in succession; when the timothy will have formed a thickly-matted turf, so essential to the production of Indian corn. Such land, with a slight manuring, will produce 50 bushels of corn to the acre.

Neat Cattle.—Cost of raising, until three years old, a good animal, about $28; which sells for from $28 to $36 and $40; the latter prices for fine-working steers. Much attention is given to selecting and breaking steers, and probably no county in the Union can boast of finer oxen than Litchfield county; many working oxen selling as high as $150 the pair, though the average of good oxen might be set as low as $110 per pair. It is generally conceded that the raising of a poor animal does not pay expenses. There are a variety of opinions as to the most valuable breed of cattle for practical farming purposes. My own observation and experience have led me decidedly to prefer a cross of the Devon and Durham, which unites many of the good qualities of both, without retaining the defects. In answer to your inquiry, as to the best method of breaking steers to the yoke, I will give you my own. Steers are generally matched at two years old, and much depends on a similarity of temperament. When yoked, a strip of board should be fastened to the horns by strings, which will prevent them turning their yoke. Too much caution cannot be used in the breaking, as many of the bad habits of working-cattle are acquired during that time. When first yoked, they should be permitted to stand, during the day, in the yard. In this way they become accustomed to the yoke, without any trouble on the part of the owner; and will generally, before night, walk about the yard together in the yoke, taking feed from the hands of the master. On the second day, put them into the teams, between two yokes of oxen if convenient, which day's work will generally satisfy them that what cannot be avoided had better be patiently endured. If a steer refuses to go, and lies down in the yoke, inserting a pin in the end of the tail will change his mind immediately, and bring him to his feet; when coaxing, whipping, or dogging will make no impression. Two or three trials of that kind, and he will forever abandon the experiment. Gentleness and using will, then, soon make them obedient and handy. My estimates of cattle will be understood to apply only to imported breeds, under good management. Neglected stock fall short of the estimate from one-third to one-half.

Sheep.—The raising of fine-woolled sheep is generally abandoned in this vicinity, and coarse sheep, for mutton, have been substituted, which are considered the most profitable stock of the farmer. The South Downs are preferred, for the purpose of raising lambs for market. The number of lambs will generally exceed the number of ewes in a flock. The lambs should be dropped in February or March; they are sold, at four months old, from $2 to $2 50 per head, some flocks selling as high as $3; while the fleece from the ewes will bring about the same as a fleece of fine wool, the quantity per head being greater. For raising lambs, a flock should not exceed fifty in number; while thirty is, perhaps, a better number. During the season of lambing, the sheep must have good shelter, and a good supply of roots or meal. This food, till grass, will insure a good market lamb.

Yours, with much respect,

ALBERT N. BALDWIN.

Hon. Thos. Ewbank,
Commissioner of Patents.

Milford, New Haven County, Ct.,
December, 1851.

Sir: I herewith send answers to some questions contained in your Circular for August, 1851, which asks information on the various branches of agriculture. A part of the topics *only* are noticed; for you truly say that no one person can be expected to reply to all the questions, as they extend over the agricultural productions of the whole country.

As much of the land in this county has been cultivated for about two centuries, and as most of the farms are not large, as compared with those in some other States; as the primitive soil was not remarkably rich; as fertilizers are not very abundant; and as labor commands a high price, you will readily see the circumstances in which products of agriculture are produced. All localities should be judged by their peculiarities.

Wheat.—There is but a very small proportion of wheat raised in this county, or State, as compared with the quantity of wheat-flour which is consumed by the inhabitants, and for manufacturing purposes. Formerly, a fair crop of wheat could be raised in this region; but, latterly, the wheat has either shrunk or blasted so much, that its cultivation has been neglected. But, for the last two years, the wheat has done better; and at the late agricultural fair in this county, and more especially at the late fair in Fairfield county, some fine samples of very plump wheat were exhibited, and the growers stated that the crops were much better than formerly. Perhaps the liberal use of lime and ashes, as manures, has something to do with these improved crops of wheat. Both fall and spring wheat are doing better than formerly.

Corn (Maize).—This is the most valuable crop which is raised in this

State; not that it will compare with the crops raised in some western and southwestern States: yet it is large enough to supply the inhabitants, and have a considerable surplus for exportation. This surplus is sent to the States lying easterly of this State, and to the West Indies, in the shape of corn meal. But as the West India trade has declined, the exportation of corn meal has proportionally declined. Guano is not extensively used in raising corn, as its cost is relatively higher than other manures; but where it has been used, it has answered a good purpose; and, in small quantities, it is applied either in the hill, at the time of planting, or about the corn at the time of first hoeing. The yellow variety is mostly preferred, and generally the ears with eight rows are grown; but some prefer the ears with ten and twelve rows. The ears with eight rows ripen earlier than the other varieties. From 20 to 60 bushels the acre are raised; but this quantity is varied both ways, according to the state of the soil, the mode of tillage, and the season. Various modes of tillage are pursued. Some sward lard is ridged, and the corn planted on the ridge, and the balk is ploughed up at the first hoeing; afterwards, the corn is hoed once or twice, according to circumstances. Others plough the whole land flat, and plant upon the furrows. Flat tillage is coming into general use; the labor is thus lessened, and the land is in a good condition to bear the drought. Four kernels are dropped in a hill, and the hills are about three feet and a half apart. It is better to spread the manure, and plough it in, than to place it in the hills, especially if the season be dry. Thorough tillage generally pays well. From ten to twenty cords of yard-manure to the acre are needed to insure a good crop. Corn should be planted as soon as the season will permit.

Hogs fatted on corn make the hardest and best pork; sometimes it is fed whole and sometimes the corn is ground. When fed in both ways, hogs thrive better than when it is fed either way alone. Generally, corn is fed raw, but hogs like it better when occasionally cooked; yet this mode is not generally followed, for want of cooking conveniences and the high price of fuel. If the cultivator is able to do the work himself, with the rent of the land, the value of manure, the team work, and the seed, a bushel of corn may be raised for from 25 to 30 cents; but when all the labor is hired, but few farmers make their fortunes by raising corn in Connecticut. For some years past, the price of corn has ranged from 75 to 90 cents the bushel.

Oats.—Most of our farmers cultivate this crop and in rotation. Oats usually follow a crop of corn or potatoes, and with this crop the grass-seed is sown. From 20 to 25 bushels the acre are considered a good yield; and from 2 to 3 bushels of seed are sown to the acre, according to the goodness of the land; on rich land, the lesser quantity will answer. Oats should be sown as early as the season will allow, as early sowing goes far towards producing plump oats. Most of the oats are fed to horses; but corn and oats ground together make fine feed for hogs. Oats exhaust land more than rye.

Rye is extensively cultivated, and yields from 20 to 35 bushels the acre, more or less, according to the richness of the land and the thoroughness of the tillage. The crop of rye is greatly increased when the land is manured with whitefish, which are bought at the landing places at from 50 cents to $1 per thousand, according to the supply and demand.

Although the whitefish greatly increase the crop of rye, yet some farmers think that their effect is to bake the land too much, and others believe that they tend to fill the land with sorrel; but, notwithstanding these objections, they are extensively used as a manure in most of the sea-shore towns. Rye exhausts the lands less than almost any other grain; and if cradlers leave the stubble high, some land will bear good crops for many successive years, and the last crop will be as good as the first. A bushel and a peck are usually sowed to the acre. The price ranges from 75 to 85 cents the bushel.

Barley is raised to some extent, but not very generally. The yield of barley to the acre is about the same as oats; but barley requires richer land than oats. Most barley is used by the brewers; but, as temperance has increased, the price has lessened, and the quantity raised has diminished. Barley yields from 20 to 30 bushels to the acre, and the usual price is from 80 to 90 cents the bushel. A bushel and a peck usually sowed to the acre.

Peas and Beans are not raised as a field crop, but they are generally raised in gardens for culinary purposes; but some gardeners raise considerable quantities, which are sold in New York and other large markets, and are thence distributed over the country among other garden seeds.

Clover and Grasses are cultivated, more or less, by all our farmers. From one to two tons are raised to the acre, according to the richness of the lands and the season. Yard manure, and sometimes ashes, are the usual fertilizers. Some farmers are in the habit of feeding out to their cattle, from stacks, the hay which has grown upon the land. Near the sea-shore, plaster of Paris is not worth much as a fertilizer; but in the inland towns the gypsum answers an excellent purpose, and is extensively used. In laying down land to grass, about half a bushel of herdsgrass and four quarts of clover-seed are sown on an acre. Sometimes a few quarts of red-top are used. A mixture of herdsgrass, red-top, and a little clover, make excellent fodder. Clover alone is not saleable; it is apt to be dusty, and then it brings on the horses a cough. After the second crop, the herdsgrass and red-top soon wear out the clover. The growing, curing, and securing a ton of hay usually cost about $6 or $7. In ordinary seasons the first quality of hay brings from $9 to $11 a ton.

Daily Husbandry.—There are not a great many large dairies kept in this region; yet all the farmers keep some cows, and many of them very fine ones. There is a great difference in the quality of cows; some will make from 75 to 150 pounds of butter in a year, and some a much less quantity. Good milch cows will make about as many pounds of cheese as of butter in a year. Dairymen do not generally churn their new milk; but the milk stands a few days for the cream to rise on the top; then it is churned—sometimes in one, sometimes in another, of the great variety of churns now in use. Butter ranges in price from 16 to 25 cents, and cheese from 8 to 11 cents, the pound, according to circumstances. The numerous manufactories and workshops in this State afford good markets for butter, cheese, and other dairy products.

Neat Cattle.—This region is famous for "red working oxen," and all other kinds of neat cattle. For form, for action, and for general beauty, the "red cattle" of this county, and indeed of other parts of this State, are much celebrated. At some of our cattle-shows may often be seen 200 pairs of "red working oxen," which could hadly be beaten in performance and beauty. The cows and young cattle also show that the breed is not degenerating. These oxen "speed the plough" handsomely at our ploughing matches, and the cows furnish a good supply of rich milk. Some pairs of these oxen sell for from $100 to $160, and some will bring higher prices, especially those which have easily managed ox-carts loaded with 4,500 pounds of stone. Good milch cows, in the spring, are worth from $35 to $75, and in the fall, from $25 to $35. It costs from $14 to $23 to rear three year olds. Good three-year-old heifers are worth from $15 to $35; but the prices vary according to their milking qualities and general appearance. Good steers are worth from $20 to $40 each, and when well marked, and work well, they command higher prices. Most farm work is done by oxen; but horses are used for distant transportation. The question, "How are steers broken to the yoke?" admits of various answers. Steers are more easily broken to the yoke while yearlings, and sometimes at an earlier age; but they are generally broken when two years old. The "boys" catch the steers and yoke them; after remaining yoked for some hours, they are trained around the yard, or lot, and, after repeating this training for a very few days, they are put to light work. Some "boys" (for breaking steers is generally boys' work) yoke up the steers, and forthwith put them on the chain, between two pairs of oxen, and make them "go ahead" any how. After the steers have been worked a few weeks, and the team is about to come home, the young steers are put forward, and made to lead the team homeward, which they do willingly. Soon they learn to "hoi and gee" easily. The second year, the steers work upon the neap of empty carts, and soon learn to hold up their heads, as drivers bid them; and when they are four years old, they manage the carts as handily as the old oxen.

A few full-blooded Devons are kept, but more generally crosses with Devons, and sometimes with Durhams. Most of our farmers believe that native cattle are kept more easily than imported.

Horses and Mules.—But few mules are reared in this section of our State, and those which are shipped to the West Indies mostly come from the western and middle States. Some good horses are reared in this region, and they are receiving an increasing attention. Very few persons are largely engaged in rearing colts, and most of those reared come from brood mares which are used in ordinary farming business. When the mares are ridden or driven to the "meeting-house," to the mill, or to the farm, the colts go also. Mares are as carefully treated as their condition requires. In this way, the rearing of colts is profitable. Three-years-old colts will have cost from $25 to $40, and they are often worth from $50 to $80. The breaking of colts is also the "boys'" work, and they begin to halter and handle them quite young. Colts are put to light service as soon as they are able to work; but if they are ridden before they are three years old, they are liable to become "hollow-backed," and are otherwise injured. From infancy, they are kept by the side of their dams; and when they are about three years old, they are harnessed, and by the side of their dams they trot off, as usual, and soon become good workers.

Sheep and Wool.—Some sheep are kept by most farmers in this vicinity; but most of them keep small flocks—enough, however, to furnish wool for family use, and some to spare. When there was much unenclosed land, in many towns there were large "town flocks," belonging to many owners, and were tended by a shepherd; but since these lands have become enclosed, the "town flocks" have disappeared. Although wool-growing is not extensively carried on, yet our farmers believe that this business would be profitable, if sheep could be protected from the ravages of dogs. But dogs are so plenty, and so mischievous, and it is so difficult to obtain indemnity for their ravages, that for *this* and some other causes the number of sheep has lately diminished. In the northern part of this State, sheep are more plenty, and more wool is clipped. It is thought that wool can be grown at from 15 to 20 cents the pound, and for some time past prices have ranged at from 40 to 50 cents the pound for the wool of sheep crossed with merinos. The wool of full-blooded merino and Saxony sheep commands a higher price. Some of the first imported merinos were brought to this country by the late Col. David Humphreys. In the course of a few years, the "merino speculation" ran so high that some rams sold for $1,000, and ewes commanded enormous prices. But, like other speculations, this has passed away, (leaving some "wrecks" behind,) and now merinos can be had at moderate prices. Their fine wool is more valued in the manufactories than for family use. The merino wool is no stronger than that of common sheep, and it is harder to work up. Most of our farmers think that the native sheep are kept more easily and cheaply than the merinos or Saxons. These last would nearly starve on short pastures, where the *natives* would thrive. The mutton of the imported sheep is no better than that of the natives, and the latter costs much less than the former. A cross of one-quarter imported blood with three-quarters native blood suits many farmers.

Hogs are not raised in large droves in this vicinity, but almost every family raise their own pork, which is esteemed better for *their* use than any that can be bought. Our pork is of the first quality, and as good as the very best. By a State law, swine are not "free commoners;" but towns can make laws to allow them to go at large. Many always keep their swine in pens; but others allow them to graze and feed upon their own lands till they are ready to be fatted, and then they are penned and corn-fed till they are ready to butcher. When about a year old, the hogs will weigh from 300 to 500 pounds; and spring pigs, killed in December, often weigh 300 pounds. A mixture of "old-fashion hogs" with Berkshires, and with the China breed, generally does very well. But more depends upon the *feed* than upon the *breed;* but in this last there is a choice; yet almost any breed makes good pork when fully fed. Whole corn is generally fed out; but when the hogs have become fat and lazy, they prefer ground feed. Hogs are better fatted with old corn than with new, especially if fed with ears, as the ears of new corn make their teeth sore. Raw corn is generally fed out; but just before killing time, the hogs like cooked food, and those who have cooking conveniences, and plenty of fuel, pursue this method. Pork is worth from $5 to $7 the hundred pounds.

Root Crops.—Turnips are much raised as a field crop, and they are raised in increased quantities. Rutabagas and the Scotch variety are raised cheaper than a crop of hay, and they help out the fodder. They are usually sowed broadcast, but they pay well when sowed in drills by those who can conveniently so cultivate them. Sward land, in good heart, rather moist soil, and well tilled, in a favorable season, will yield from 200 to 400 bushels the acre. Raw turnips help hogs, which eat them readily; but when cooked, hogs are fond of them, and thrive very fast. Turnips are good for milch cows; but as for their fattening qualities, there is much difference of opinion among farmers.

Potatoes are generally and extensively cultivated. Mercers, pink-eyes, black, red, and other varieties are raised. The former will bring from 12 to 16 cents more a bushel than the latter, and the latter generally yield better than the former; and some think that the mercers are more liable to rot than the other varieties. Rows about two feet and a half apart, and hills about one foot and a half apart, answer very well. By this arrangement, the vines usually so cover the ground that the potatoes will neither suffer from an ordinary drought, nor be scorched by the rays of the sun. At the first hoeing, they can be tilled with the cultivator, and afterwards with the plough, and the hills can be properly rounded up. Potatoes require a tolerably rich soil, and yet for a few past years it is known that on rich land, which has been highly manured, the potatoes have rotted more than on land less manured. The cause of this is not known, but the fact is fully established. In this vicinity the potatoes have not rotted as much during the last year as in preceding years. For six or seven weeks in July and August there was very little rain, and during the drought there were no signs of the rot. But soon after the rains commenced, the signs of the rot appeared. If the rot is caused by insects, which work down the vines to the potatoes, why are not the potatoes nearest the root of the vines most diseased? and why are the potatoes nearest the vines, and near the surface of the ground, often sound, while in the remote parts of the hills, and at the extremities of the roots, are found rotten potatoes? Some think that the weather has much to do with the rot; and others believe that, from age or some other cause, the potato itself has begun to degenerate. For some years past those potatoes have done best which were planted very early in the season on a dryish soil, not very highly manured. A good yield is now considered to be from 150 to 250 bushels the acre. The same land which now produces the above-named quantities formerly produced from 200 to 400 bushels the acre, with like tillage and manuring. Why this falling off? Who can tell? Pains should be taken to get good seed, and seed from a distance does better than to plant the same potatoes which grew upon the land.

Fruit Culture.—Less apples are now raised in this part of the State than formerly. The increase of temperance has decreased the orchards; for cider is viewed as an intoxicating drink by many, and it is not as generally used as formerly. But many young orchards are being set out, and many trees being grafted, not so much for cider-making as for obtaining good apples to eat. Many consider apples as good as potatoes for hogs and other animals. Great care is now taken to obtain choice fruit. Seek-no-furthers, Rhode Island greenings, Baldwins, and russets are the varieties now highly valued.

The agriculture of this State has powerful competitors in the agricultural interests of western States. Their new, fertile, and cheaply-acquired farms, their comparatively mild winters, together with the great facilities of intercommunication, naturally and forcibly tempt our young and middle-aged men to migrate westward; and this tends to increase the price of labor so much, that our agriculture cannot be carried on profitably by hired help. The crops in the West are also more abundant, and raised at a much cheaper rate; and the facilities of transportation are such that the prices of western products regulate the prices of the agricultural products of this State. These things are not mentioned as matters for complaint, but rather to exhibit our real condition. But with all these disadvantages to contend against, our enterprising and persevering farmers make our agricultural interests far exceed in value those of any other branch of our industry.

I am, sir, very respectfully, your friend, &c.,

CHAS. H. POND.

Hon. THOS. EWBANK,
Washington, D. C.

GROTON COUNTY, NEAR NEW LONDON, CT.,
December 20, 1851.

SIR: Your Agricultural Circular of the present year came to me through the postmaster of New London; and, though this reply to it would be considered common-place here, it may be interesting in other localities to know how we farmers are situated, and get along, in the old settled portions of our country—in *Connecticut especially;* from which I have not noticed any letter in either of your two volumes of Agricultural Reports—the only ones I have seen.

My farm lies on the east bank of the river Thames, about one mile north of the growing city of New London, lying on the west bank. It contains about 280 acres of land, of which about 130 acres can be ploughed. The rest is woodland; the plough land is not smooth, but has granite boulders scattered over it, and it is hilly withal.

The soil is generally loam, inclined to clay, and lying about three feet deep on the subsoil, composed of sand, clay, and small stones, so hard that it requires a pick-axe to break it up. The farm cost me, in 1837, $8,000, and has been cultivated 200 years. At the time I purchased, the buildings, with the wood and timber on it, were worth $3,000, which would make the value of the land about $5,000.

This is a very prosperous part of the country, which is evidenced by the price of labor, which, for a man to work on a farm, it is not less than $150 per year, with board, and it must be such board, too, as is right, or it will not be satisfactory.

Women to do house-work are in great demand at $1 or $1 50 per week; at these prices, one can hardly afford to hire an American woman.

The farmer, therefore, gets along with as little help as possible; and those of us whose work is done by their own families, and have a small capital—say $2,000—to commence with, are very thriving; and, in the course of 10 or 15 years, accumulate from $10,000 to $15,000.

Taxes are small in this locality; all taxes, with school taxes included, are not 25 cents on $100; and we have good schools, too, for 10 months in a year; and everything the farmer has to dispose of he can get as high a price for as is obtained in any part of the United States, and get the *cash;* and what he buys he can buy as cheap. Here likewise the small capital of $2,000 may be obtained by any young man by the time he is thirty. Those who have it not at that age among us (with rare exceptions) have either been intemperate, improvident, indolent, or in too great haste to marry.

Our ordinary course of farming is, the first year, to break up grass land, and plant corn. Our average crop of corn, taking 10 years together, when we apply equal to 10 cords of stable dung, of 30 bushels each, to the acre, is 40 bushels. The cost of the manure, if purchased, is $10.

Corn has averaged in price in this vicinity, taking the last 10 years together, 80 cents. It has been as low as 67 cents, and as high as $1 25, during that period.

I have given the average crops. The last season, on the application of 10,000 bony fish to the acre, at a cost of $7 50, with the addition of 3 loads of stable dung, at a cost of $3—in all $10 50—I got 55 bushels of corn to the acre. I think my corn costs me 60 cents a bushel to raise it, over and above the use of the land. Corn is a natural crop here. It rarely fails but for want of manure and attention.

The second year, our ordinary course is to plant *potatoes.* When they did not rot, the average crop was 150 bushels to the acre, if manured with ten loads of good manure to the acre. Since they have rotted, they average about 60 bushels to the acre. The great preventive against the rot with us is, to plant very early, and of the earliest kinds. The price for the last four or five years has averaged 70 cents per bushel; they are now worth here 80 cents per bushel. The third year, we seed down to *grass* with rye or oats. Our average crop of rye is about 15 bushels to the acre; our average crop of oats, about 25 bushels to the acre. In seeding down our land, we put on eight pounds of clover seed, a bushel of red-top, and eight quarts of herdsgrass, (timothy.) I prefer red-top to any other grass for hay. I do not think clover of much value for hay; and if I could get a crop of other grass the first year after the grain crop, I should not sow any clover.

We mow our land for seven years after seeding down, and then plough again. My hay crop last year was 40 tons, cut on about 36 acres of land. This, with an ordinary quantity of corn-fodder and straw here, is sufficient to winter well 30 head of cattle. The crop of hay last year was about 10 per cent. more than an average. The cost of cutting and of curing a ton of hay, the past season, was about $2 50.

Neat Cattle with us are very healthy. I have never lost one by sickness since I have carried on a farm, now fourteen years, with an average stock of 20 head; nor have I ever had one afflicted by any disease, except the horn-distemper, which is easily cured, if taken in time, by boring the horn nearly through with a gimlet on the under side, about three inches from the root.

The value of a cow here now is about $20. In the spring, the value of the same cow, with her calf, will probably be about $28.

I prefer cattle mostly of native blood; say three-fourths. I think on the amount of food they get with us, such make both most flesh and milk. The average weight of our native cows, well fatted, is 550 pounds with hide and tallow; they are considered well fatted if they run in a good pasture, without being milked, through August, and are fed plentifully with green corn-stalks through September. Such a cow will ordinarily have at least 40 pounds of rough tallow. The average weight of our oxen, which are in a good pasture for 4 months—that is, from July till November—and have, through October, plenty of green corn stalks, is 900 pounds. We rarely give grain to cattle we intend to dispose of before the 1st of December; after that time, beef rises, and keeps up till the 1st of July, when it falls again. Eighty per cent. of our stock fatted for market I think is fatted in the foregoing manner. The common age at which our cows and oxen are sold to the butchers is 10 years.

I do not think that imported breeds of *hogs* are more profitable to keep than native breeds. The common age of our hogs, when we kill them, is about 18 months; at that age they will average about 350 pounds each. I have mine shut up in the pen about 5 months. In that period, each will consume about 10 bushels of dry corn.

Meal will make pork faster than corn; but not sufficiently so to pay the expense and trouble of procuring it in ordinary cases.

I think if hogs are healthy, have a dry house to sleep in, and are protected from the wind, but not too warm, 600 pounds of corn will make 200 pounds of pork, if fed out in the fall months.

Besides currants, and other small *fruits* of the garden, the two kinds of fruit most certain here are peaches and quinces. With me, as yet, neither have failed; and I think I can raise either, at the present high price of labor, at 40 cents a bushel. Pears are quite uncertain here; and as for apples, one year we have the rose bug, the next year the canker worm, and the third, perhaps, (and worse than either of the others,) a small insect very much resembling the southern sand-fly, which eats up the leaves as fast as they are developed. This insect has been so destructive to my trees of late years as to have quite killed several.

Bating insects, both soil and climate here are good for the apple tree. They are often found in our woods as volunteers, and many attain a large size.

I have apple trees containing a cord of wood each. Lime and plaster are considered no fertilizers with us. Ashes are considered very valuable. Ten bushels of dry ashes per acre I consider equal to 30 bushels of the best stable-dung. I have tried African guano on corn, at the rate of 300 pounds to the acre, at the cost of $2\frac{1}{4}$ cents per pound. I did not think it paid at that price. This was in 1845. Market-gardening is carried on as extensively here, perhaps, as farming proper; but I have confined myself, as you will see, to the latter entirely.

Yours, &c.,

BELTON A. COPP.

To the COMMISSIONER OF PATENTS.

NEW YORK.

POTSDAM, ST. LAWRENCE CO., NEW YORK.

SIR:—Your "Agricultural Circular" has been put into my hands by my friend, the postmaster here, with a request that I answer it, so far as I can; with which I cheerfully comply.

Wheat.—Guano is not used in this county in the production of wheat, or of any other crop, unless it may be for the purpose of experimenting on a small scale. It would not pay cost. The principles or specific food of plants contained in guano manure are yet *abundant* in our almost virgin soil, and neither this fertilizer nor plaster will ever be much required in most parts of this county, if farmers do but husband what resources they have. The average product of wheat per acre is probably not far from fifteen bushels. The surest crop is the spring variety, and this is much the most raised. The most profitable method of raising either spring or winter wheat, is to sow it after *clean* hoed crops of either corn or potatoes. The next best method is to follow after peas. My own method is to plough but *once* for wheat or any other small grain, after corn, potatoes, or peas—the depth six or more inches; but am governed somewhat by the depth and nature of the soil and subsoil. The time of sowing fall wheat is from the 1st of September till November; but the earliest is surest and best. Spring wheat is sown from the 1st of April until June, and here again the earliest sown is surest and best. The last sown, in both cases, may have the largest growth in straw and chaff, but the earliest will exceed the other in quantity and quality of wheat. The harvesting of winter wheat is in July, and of spring in August, with some little variations. The seed is best prepared by first selecting from any given variety the most perfect of its kind, either by screening through our grain-cleaners or mills all the small or imperfect kernels, or by *casting out*—throwing from one end of the barn floor (30 or 40 feet) to the other—and thus, at the extreme end, obtaining, of course, only the largest and heaviest grain. I am convinced that, in order to keep up the healthy character and productiveness of any variety of wheat, and in fact any other vegetable with which I am acquainted, we must use for the seed *the most perfect of its kind*. The quantity sown varies from one and one-fourth to two and one-half bushels per acre. The quantity raised is evidently less than formerly, when compared with the increase of population, mostly for the reason that the West can afford to undersell us. We cannot compete with the West. Their cheapness of lands and facilities of raising it prevent it.

The best remedies against the weevil or Hessian fly, or any other insect or disease of any kind, is—first, use only the pure and perfect seed in clean and suitable soil, in good season; and, to insure against smut, wash it in water; then let it stand from six to twelve hours in a brine of common salt, dissolved to the point of saturation; after which, mix from two to four quarts of fresh slacked lime with each bushel of wheat; and thus let it remain for a few hours. The price is, this year, 87 cents in this market. The average price heretofore has been one dollar.

Corn.—The average product of corn may be made forty bushels per acre, but twice and thrice that figure are sometimes raised. The cost of production, as usually made, is probably fifty cents. The best system of culture is to plant on green sward, and the best soils are found on our clayey, loamy, or gravelly, black, sandy ridges of land. We do best to break up the soil to a depth of six or more inches in September, in narrow furrows, breaking and turning over every foot of the land. Upon this, by the 10th or 15th of May following, we put our barn-yard manure—from ten to twenty cords per acre, as we have it, or as the field requires it—in heaps so near that, when spreading it, every part of the field can be readily reached by the spreading operation. When this is well spread, it is finally harrowed in with a light harrow; thus intimately mixing the manure with the soil on the surface. The surface is thus mellow and rich, and should be at once planted. The soil below is not and should not be disturbed, either in this operation or thereafter, throughout the after-cultivation; and the best instrument to be used is the horse-hoe, or the horse harrow; the surface should be kept clean and mellow by the frequent use of the said cultivator and the hand-hoe. A good crop is easily obtained by such process, and the ground is in good order, with one more ploughing, for a crop of wheat. With the wheat we again lay down to grass.

The best method of feeding corn to hogs, is to first grind and then cook it. If to be fed alone, in the form of pudding, I have found it profitable to mix it with pumpkins, apples, and refuse potatoes during the first weeks of feeding.

Oats.—The yield of oats is also about forty bushels per acre; from two to three bushels are used for the seed. Of peas, we generally get about twenty-five bushels per acre, and sow two bushels or more per acre. I consider oats to be exhausting to land—considerably more so than peas. I believe the manure made from peas and their vines, or fodder, to be of the most valuable kind. As a food for man or animal, and as a crop preparatory to either corn or wheat, I am confident it is not appreciated as it should be by St. Lawrence county farmers.

Grasses.—The grass-seeds mostly used are the timothy (herdsgrass) and red clover. White clover is indigenous to most of our section of country. The usual quantity per acre for hay is, of timothy one peck, and of red clover one or two quarts, as the farmer chooses to mix. The quantity of hay per acre will average about one and-a-half ton. "The best fertilizers for meadows and pastures" are the most *simple* form of rotating crops, as I have before described, especially where lands will admit of it. Moist meadows, not bearing to be ploughed, should not be grazed except by sheep; and such meadows, and those pastures on which *only* sheep run, will admit of having plaster, one bushel per acre annually. *Permanent* meadows may be kept so, and their fertility kept up *if not grazed at all*, provided one bushel of plaster annually be sown in August or September. The price of good meadow lands will average perhaps twenty dollars per acre, and farms are worth from ten to forty dollars per acre, depending of course much upon position and circumstances of soil and buildings.

Dairy Husbandry.—This county is fast becoming a great dairy county, scarcely behind any in the State, and we have but just begun in the business. It is well adapted to the rich grasses, and it is, most of it, well watered. The climate for a dairy business is also equal to the best. I believe that now there is only one county (Herkimer) ahead of us in the dairy products, although it is but a few years since our farmers have turned their attention to it. I have travelled over, and have eaten of butter of several of the northern, middle, and western States, and have not anywhere found so rich and yellow butter and cheese as we make here—in the months of June and July particularly. During that season many of our pastures and other fields abound with a large proportion of the dandelion plant, the nutritive properties of which, together with the coloring principle in the plant, when eaten by the cow, impart to the milk that *rich* flavor and color which I have nowhere else seen. Instances are frequent where the avails from a dairy of cows will average thirty dollars each. Dairies of good cows will make 225 pounds of butter per cow. This is, to be sure, rarely done; but there is no difficulty in doing even beyond this where the farmer has good cows and proper facilities for making. Cows are worth, in the spring, twenty-five dollars; in December, fifteen dollars. Three-year-old cattle are worth from twenty to twenty five dollars each. Butter is worth, until September, fifteen cents; thence, until December, fourteen to fifteen cents. Cheese is worth, in the fall season, five to six cents per pound. It is mostly sent to the Boston and New York markets.

Horses.—The growing of horses is profitable here; good horses always sell readily from $75 to $125 each; ordinary horses are worth from $50 to $75. The price per acre for the pasturage is about $1; and hay is worth, on the average, $5 per ton. It can, therefore, be easily determined by any one, whether the growing of horses *is* or *is not* profitable.

Sheep and Wool.—As to wool-growing, after having had some experience in the business, I have no hesitation in saying, if there be *any* profit in it, it is *much* less than that of raising horses or cattle, or in dairying. The large breed of sheep are most profitable for their carcass, and more than for their wool; yet their wool sells nearly as high as do the finer grades. Their flesh is better, and they tell on tallow better. They are more hardy, and their increase more to be relied on. One hundred hardy, coarse-woolled ewes will raise 100 lambs where the Saxon will raise 25 and the Spanish merino 50; each having equal care. The Saxon will shear 2¼ pounds, the old-fashioned merino 3½, and the coarser varieties we have here will shear 5 pounds of wool. Buyers here make but few cents difference. For 10 years past, the price per pound will average *closely* upon 28 cents—only the average price of 2 pounds of butter; and the average value of a fleece of wool is not greater than for 8 pounds of butter.

Hogs.—Pork-raising is profitable under certain circumstances *only*. United with dairying, it is a good business; but the *calculating* farmer sees to it that no greater number of hogs are kept than can be *well* kept on the refuse *after* the butter or cheese. Pork is worth from 4 to 6 cents per pound, according to weight of hog, and also to quality.

Root Crops.—The cultivation of carrots is on the increase, and their raising and feeding are found profitable. The raising of turnips has declined; with us it never can supplant the potato. The average yield of potatoes per acre varies much in different years, without regard to the soundness or unsoundness of the crop. The average in the county last year, so far as my information extends, was 200 bushels per acre; this year it does not much exceed 100, even where there was no disease. Up to the year 1849, our farmers could raise potatoes for 15 cents per bushel, and do quite well; since then, our near facilities for market permit us to sell for from 25 to 35 cents per bushel. There has been some disease, or rot, with the potatoes in this county for several years past, but it has been *far* less than at the east, or in older portions of this State. I believe that one reason why we have had less of the rot than most other portions is this: their value has been so low, and the quantity raised so great, that there has been no inducement here, as a general practice, *to scrimp in the seed.* The farmer living where their value

is 4 shillings, would plant a smaller *piece*, or a smaller potato, than would another living where they were worth only 1 shilling per bushel. Our farmers, whose invariable practice it has been for twenty or more years past to plant one good-sized whole potato in each hill, have had no "rot" of their potatoes, and but little diminution of quantity, as compared with former years. The stems, seed-balls, and leaves give the same indication as they did from 20 to 30 years since. Such farmers as follow the old common-sense method of seeding, now get 300 bushels per acre ordinarily.

I desire to take up more time in this matter of the potato disease, as it is called, because of its importance, and because I feel quite sure of the remedy, as well as the cause, or rather causes. I wish for space to say that I believe *the* cause is in the improper manner in which the plant has been cultivated for many years past—planting year after year with but *parts,* or with the smallest of the unripe tuber, and planting so late in the season that it seldom came near maturity. We treat no other vegetable in the like manner; should we do so, we should soon learn the fatal consequences. A few years since, and for 2 or 3 years in succession, I lost seriously with the rot, and I then followed the eastern and *common* practice of using small seed, as well as late grown and late planting. I was induced, by observation and reflection, to change my practice—to plant early, on dry, rich, and warm soil; to use for seed good-sized and the *ripest* potatoes, planting them whole. I covered the seed to the depth of 4 or 5 inches; and, after the plant came up, kept the ground clear from weeds, and the surface often mellowed with the harrow or cultivator. I plant several varieties, and for 5 or 6 years last past have lost scarcely any. These have been fairly tested in several instances, and have not failed; where others, differently treated, have been ruined. It may and will be asked, if this comes to light, if the cause and the remedy are so simple, why has starving Europe, or our enlightened and suffering North, not found them long before this? I cannot tell why; but will reaffirm my opinion, as before, and have abundant proofs of the facts of my practice and its results; and will venture to predict *that the disease of the potato will continue to appear*, more or less, (something, to be sure, according as the seasons may differ,) *so long as the practice is adhered to of growing the potato as in former years.*

Fruit.—The cultivation of apples is receiving much attention in this county of late. Our farmers are taking great interest in that matter. I have no doubt that the business will be made very profitable, either for market, for family consumption, or to feed (when cooked with potatoes, pumpkins, and meal) to swine. I have had some practice in feeding apples to swine, as above, and am sure of their value.

Manures.—Plaster is used here to some extent; it is used on grass mostly, on mowing fields, and also on grain. It is found profitable, at $8 per ton even, to apply to wheat or rye when the land is sandy; and the grain has been sown upon the sod, or turf. It is used to good advantage on grass; particularly on permanent sheep pastures, or on meadows where they are soon to be broken and manured with yard manure. Lime is not yet much used in farming. My own practice is, to use plaster, lime, salt, and ashes, slacked and unslacked, mixed in my cattle-yard with the manure of the yard and stables. I mix those ingredients in the yard, and in the heaps of the yard, while they are forming; aiming to prevent, as far as possible, any escape of the extract or ley from the yard, or otherwise, by evaporation from the heaps of valuable principles; or, in other words, valuable vegetable food. By a sort of reservoir or basin in the yard, I prevent its waste by running off; and by the use of plaster in and upon the piles, I prevent much of the evaporation. I throw the long or strawy manure into such heaps, in season to have fermentation take place, and *slow combustion* considerably advanced, before I wish to draw it to the field, to apply to my corn crop. The fermentation through which it has passed destroys most of the seeds of weeds with which unfermented manure is usually invested. A better and more correct knowledge of the science of farming is greatly wanting; and that want is not confined to this county. The conviction is evident to my own mind that only about one-half of the amount of farm products is obtained that would be from the same quantity of land by the same amount of labor *provided the laborer but understood his art, so as to give to his labor the right direction.* It has been my fortune (*or misfortune*) to work some one dozen or more farms which had been *carried on* "aforetime" by as many different proprietors. I base my opinion, therefore, on practical experience, as well as upon observation.

I am, &c., sir, yours, respectfully,

ISAAC PARKER.

T. Ewbank, *Commissioner*.

Lafargeville, *January* 8, 1852.

Sir: I duly received the Circular of your Department sent me August, 1851. For the package of seeds you were so kind to direct to me early in the spring, you will accept my hearty acknowledgments.

Our season here has been again uncommonly wet, the past year very perplexing during hay time; but all crops have returned well and heavy, excepting potatoes and corn.

Corn, in many instances, did not come up after planting. Some farmers attributed it to the seed having lost its germinating power by being ever and anon washed in the field by the long-continued fall-rains. But I think it was rather owing to the damp, cold, heavy state of the soil at the earliest times of planting. The heavy bodies of snow that fell during winter kept the soil from the beneficial action of the frost, packed it hard down, and the result was, that the ground generally ploughed-up cold and heavy. Many fields had to be planted over once, and some twice, the corn not coming up until the soil grew warm with he advance of the season. The unusual warm temperature of September, and the autumnal frosts holding off until the 17th of October, saved the crop from a total failure.

The *potato crop*, as usual in wet seasons, became subject to disease; and though the rot was not so extensive in its ravages as in former years, the vines being cut down by rust, the crop was arrested in its growth, and the yield few and small.

The agriculturist, as well as the mariner, being daily exposed to the vicissitudes of the atmosphere, and the means of judging of the weather being of so much beneficial service to both, the study of *meteorology*

becomes a part of their trade. If I may, therefore, be permitted, I will subjoin an abstract of some observations on the weather, made during the year 1851, in the hope that they may perhaps contribute my humble mite to the information required under the head of meteorology. The instruments used were a thermometer in the shade, under a piazza open to the north and west, and a barometer in-doors; the place of observation about lat. 44° 10′, lon. 1° east of Washington, and, I believe, nearly 371 feet above tide-water in the Hudson.

The yearly Patent Office Reports are so replete with useful information collected by the department—these valuable documents recording the interchange of notes between agriculturists and other scientific men of all and the remotest parts of the Union, on all that is or may become practically interesting to the mechanical and farming interest of the country—are so highly prized throughout the land—that it is much to be regretted that Congress should limit the publication of copies for distribution, and that a copy should not find its way upon the shelves of every school-district library in the Union. Since 1848 we have not seen a copy of the agricultural part of the Reports in this northern region.

I am, sir, with great respect, your obedient servant,

JOHN N. ROTTIERS.

Hon. Thomas Ewbank,
Commissioner of Patents.

Abstract of Meteorological Observations for 1851.

Months.	Mean temperature, Fahrenheit.			Mean height of barometer.		Remarks.
	Morning.	Noon.	Evening.	Morning.	Evening.	
January	×22	×30	×26	29	29	Mostly cloudy.
February ...	×24	×42	×32	28.90	28.90	Nineteen days cloudy, snow, or rain.
March.......	×28	×42	×28	29	28.90	Twenty-one days cloudy, snow, or rain.
April.......	×35	×47	×46	29.10	29.10	Twenty-two days cloudy and rainy.
May........	×51	×65	×58	29.10	29.10	Eighteen days mostly cloudy and rainy.
June........	×57	×73	×65	29.10	29.10	Nineteen days mostly cloudy and rainy.
July.........	×65	×82	×69	29.10	29.20	The whole month nearly cloudy and showery.
August......	×62	×75	×62	29.60	29.70	Nineteen days mostly cloudy and rainy.
September ..	×55	×69	×62	28.80	29.30	Ten days cloudy and rainy.
October.....	×47	×57	×50	29.30	29.30	Seventeen days mostly cloudy and rainy, with some snow.
November...	×30	×38	×30	19	28.30	Twenty-seven days cloudy, rain, or snow.
December....	×22	×26	×24	29.60	29.40	Twenty-five days cloudy, rainy, or snowy.

PARIS P. O., ONEIDA Co., NEW YORK,
December 15, 1851.

SIR: Having a direct personal interest in the welfare and advancement of the cause of agriculture, and considering at the same time its immediate connexion with the general interests of the country, I have ever felt a willingness, when requested, to contribute as much as possible from my limited stock to the general fund of information on the subject. Present circumstances are such, however, that I must content myself, on this occasion, with a passing reply to some of the questions you have proposed—and that without much forethought or system.

Grass Culture.—The weather during the past season has not been as favorable to the growth of some of the crops cultivated in this region as could be desired. With the exception of a few warm days in the latter part of June, the weather was uniformly cool, much of it cloudy and damp. This retarded the growth of Indian corn, as well as of some other crops; but, perhaps, was not unfavorable on the whole to wheat or grass. Pastures, not having suffered from the extreme heat and drought usually attendant upon our midsummers, continued remarkably fresh during the whole season, to the great benefit of the dairying business, which is pursued to a large extent in many portions of our county; as a consequence, the product of butter and cheese has been much greater in quantity than the usual average, while the quality is quite superior to that of the preceding year.

The hay crop has also been better than the average; and, in fact, is, in my opinion, more abundant than has been harvested for six years past.

Red clover (both large and small) and timothy are the grasses generally cultivated among us, either for hay or pasture. These are sometimes sown separately; but usually a mixture is made, varying in its proportions, according to the varieties of soil or the opinions prevailing among different individuals. My usual practice is to use a mixture of—say 8 quarts of timothy and 8 pounds of clover seed per acre; generally sow in the spring—with wheat, barley, or oats. Two tons per acre may be considered a fair average of the hay crop. Gypsum or plaster is used to much advantage on our upland meadows or pastures as a fertilizer, especially on sandy or gravelly loams. On moist lands we find but little benefit from its application. Much also depends on the season. It is sold at the mills in this vicinity at about $3 per ton. We sow from one to two bushels per acre. So far as my own experience goes, I find no better fertilizer for meadows than a top-dressing of compost or manure, applied either very late in the fall or early in the spring. It is usually more convenient to apply it in the fall, and it may generally be done at that season with less injury to the ground, from driving over it, than in the spring, when it is saturated with the waters of the dissolving snows. As the hay crop is principally raised for home consumption, and in many instances may be considered as coming in somewhat incidentally in the rotation of crops, and the mode of cultivation is by no means uniform, the cost of cultivating it per ton is so variable, that I shall not attempt an estimate of it as an average; it would probably vary from $3 to $5 per ton. In many instances low grounds, too moist for tillage, are occupied as meadow lands. The hay procured from these, although of an inferior quality, costs but little more than the labor of gathering, added to the interest of the value of the land. As a more thorough system of drainage gradually prevails, the quantity of such meadows is proportionably diminished.

Wheat.—Winter wheat is not as much grown in this county as formerly. The yield this season, from the few pieces in cultivation, has been fair, and the quality good. From the general uncertainty of the winter wheat crop for several years past, the attention of our farmers is more directed to the cultivation of spring wheat for bread. The Italian, Siberian, and Black Sea are the varieties generally preferred. The first two are sown as early as practicable in the spring, at the rate of two bushels per acre, and harvested from the middle to the 20th of August. The average for the past year may be put at 18 bushels per acre. The Black Sea wheat seems to be better adapted to our soil and climate, and although, in consequence of its small size and somewhat dark kernel, it is not at first received with much favor, it is found, on trial, to be an excellent variety.

The flour does not as much resemble that from winter wheat as does the flour from the Siberian, and is not as suitable for pastry, but is found to make a very sweat and palatable bread; which, if properly made, is not of so dark a color as to be in any way objectionable. This variety, being more free from disease, and less liable to the attacks of insects, is, as far as my experience has shown, the most profitable for cultivation for a family supply of any kind that has been tested in this vicinity. The yield is somewhat greater than that of other kinds, fully averaging this year 20 bushels per acre.

The crop of spring wheat has been better than the average of last year, showing an increase, probably, of 20 per cent. Guano is not used with us in the cultivation of wheat, or indeed of any other field crop. Fresh manures are not profitably applied to spring wheat except on very poor soil, it being likely to induce a heavy growth of straw, with liability to lodge and rust. A field in good heart, from previous cultivation, is considered preferable. As a general rule, corn ground, which has been well manured for that crop, ploughed in the fall, and reploughed in the spring, immediately before seeding, is found best fitted for spring wheat. My own crop of the Black Sea, managed in this way, has yielded the past season 25 bushels per acre, and weighing over 60 pounds to the bushel. It was not injured at all by the Hessian fly or weevil; while other varieties, cultivated in the immediate vicinity, received material injury, particularly from the weevil—in some cases being more than half destroyed. The Black Sea wheat is sown about the 10th of May, and harvested in August, ripening earlier than the Siberian. Quantity sown, 1¼ bushel per acre. But little wheat is grown for market, and the price is nominally $1 per bushel.

Indian Corn.—This is an important crop with us; but, owing to the unfavorable season, has not succeeded as well as usual. The cool weather of the summer retarded the growth so much that it was materially injured by our early frosts, except in the most favorable localities. The most approved method of cultivation is planting our sward-ground, manured with coarse barn-yard manure before ploughing, or with well-rotted manure after ploughing, and thoroughly mixed by harrowing. A less quantity of well rotted manure will insure a good crop, if deposited directly in the hill before planting, at the rate of about 2 quarts to each hill. This method is pursued to a considerable extent. Kinds planted are the Dutton, white flint, and red glaze; rows 3 feet apart, with hills from $2\frac{1}{2}$ to 3 feet in the row, according to the kind used. The Dutton, being of a larger growth, requires more space than the red glaze, and in favorable locations will yield more abundantly; but, as it requires a warmer season to bring it to full maturity, will not answer in every locality as well as some of the smaller varieties. Ground tilled between the rows with a cultivator, and crop hoed two or three times, according to circumstances. My own method is to plant in rows both ways, at the distance of 3 feet. This admits of a free use of the cultivator, which, if run through frequently in both directions, and worked as near the hill as practicable, renders the labor with the hoe for three dressings comparatively light. The corn is cut up by the ground and shocked as soon as the kernel is glazed—say by the middle of September; husked in October. This method is almost universally preferred to that of topping the stalks, as securing a greater amount of fodder, and as being rather beneficial to the maturing of the grain. The average product of this year is more difficult to be estimated than usual, as, owing to the peculiarity of the season, more was depending on a right location, and other favorable circumstances, than usual. It has varied even on good soils from 20 to 60 or 70 bushels per acre. Forty bushels may be considered as the average. Price, 50 cents per bushel. There being but little called for this season for shipping, what is not purchased by the distillers will be principally fed by the producers. In feeding corn, I am decidedly in favor of using it in the condition of meal. For hogs, its value is materially increased by cooking; for cattle or horses, I prefer having it ground with the cob. In this form I prefer it in the spring to oats as a horse-feed, or at any season when much hard labor is required of the team.

Oats.—The crop of this grain has been very good, showing an increase above that of last year of fifteen per cent. The quantity sown was larger than usual, and the average yield may be put at 45 bushels per acre; some pieces, however, yielding from 60 to 70 bushels. Present price, 32 cents, or one cent per pound. The best crops are obtained from old lands in good cultivation, but will succeed well on sward ground if sown early, so as to become well rooted before the commencement of the summer drought; quantity of seed, from 2 to 3 bushels per acre. My preference is for the latter quantity, as thick seeding tends to check too luxuriant a growth of straw, and the crop is less liable to be thrown down by heavy storms, and consequently the grain fills better.

Barley.—This grain is extensively cultivated in the southward portion of this county, and always finds a ready sale at fair prices. The quantity sown last spring was probably about the same as usual, and the product about the usual average; showing, however, a slight improvement in the quality, the weather for the final ripening of the grain having been favorable; sown about the 1st of May, and harvested about the 10th of August; the two-rowed variety generally preferred; quantity of seed from $2\frac{1}{2}$ to 3 bushels per acre, according to the strength of the land; succeeds best after a hoed crop, but may be sown on sward ground, if well tilled; requires a warmer and drier soil than oats, and is considered less exhausting to the soil. Barley and wheat are the two best crops where it is desired to seed down to grass. Price of barley, delivered at the canal, from 63 to 75 cents per bushel; the former has been the ruling price since harvest, except for a short time, during which it was run up by speculators. Product from 25 to 35 bushels per acre.

Peas and Beans.—These are cultivated to some extent, but not as renovating crops; the former for feeding, and the latter for market. Peas were formerly found well calculated to set the ground for a crop of winter wheat; but since the cultivation of that grain has been, in a great measure, abandoned, there has been a corresponding decrease in the quantity of peas sown. Beans are more largely planted than formerly, and it is believed have generally afforded a fair profit. The average product not known. Price from \$1 to \$1 25 per bushel, according to quality. The small white generally planted; other kinds occasionally.

Tobacco.—The production of this article is at present a mere experiment with us, although its consumption is by no means so. Very few attempts at its cultivation among us were made in former years, and then only on a very small scale. The past year has, however, shown a very material change in this respect, and several have been induced to enter largely upon its cultivation, with a confident expectation that it would afford remunerating profits. Whether these expectations will be realized, or to what extent, it is yet too early to determine, as the crop is yet to be marketed, and the early frosts of the fall injured some pieces materially, but, I believe, not to the extent that was at first apprehended. I understand the encouragement has been deemed sufficient to warrant future attempts in the cultivation; and further experience will, no doubt, enable those engaged in this branch of industry to prosecute their labors more successfully hereafter. A rich, warm, alluvial soil seems to be most favorable to insure success; and as it is found essential that the plants should have as early a start as possible in the spring, they are first planted in hot-beds, and subsequently transplanted at the proper season.

Potatoes.—The potato was formerly largely cultivated in this portion of the county, and was found highly valuable to the farmer for many purposes. Our soil being well suited to produce it in perfection, the annual crop was such as rendered it a cheap article of feed for either cattle, sheep, or hogs, and, in proper quantities, was thought beneficial to the horse. The product from an acre was such as to make it more profitable for such uses than the amount of grain that could usually be obtained from the same quantity of land; the quality being, at the same time, superior. Any surplus we might happen to have of the finer varieties was generally sought for in seasons when there was any demand from other portions of the State, and frequently found a market, even in other States, at prices which would warrant transportation.

Since the appearance of the disease, which prevailed so extensively for several years past, the quantity planted by us has been gradually diminishing, until it is now less than one-half what it formerly was; and the aggregate product has suffered a still greater proportionate diminution, probably not exceeding one-fourth what it was previous to the appearance of the disease. Still it has been cultivated in many instances the last season at a profit, the average product being near 100 bushels per acre, worth from 44 to 50 cents per bushel. The crop has furnished better profits this season than in 1850; the tubers being less affected by the rot, the yield of sound potatoes was, consequently, greater; and a failure of the crop in some portions of the State west of us has caused an advance in the price; so that, although the quantity is still much less than was formerly obtained, the increased price compensates, in some degree, for the diminution in quantity to those who raise for market. This, of course, cannot benefit those who plant only for their own use; and to the poor, who formerly, in so many instances, relied on the product of their little potato patch as an important means of support for themselves and families, and who in times of scarcity made this root their principal article of diet, the potato rot has proved a most serious calamity. But it is not in the diminution of quantity alone that we have suffered; the quality has, at the same time, deteriorated. The varieties which were formerly the greatest favorites, such as the pink-eye, the Mercer, and English white, being found to be more liable to be affected with disease than some others, have been nearly abandoned, and, in the effort to obtain more healthy kinds, quality has been, in a great measure, overlooked, and to that extent that it has now become quite difficult to procure what we would formerly have considered a first rate article for the table. As to the cause of this singular and destructive disease, which, cutting off as it does one of our most valuable and healthful products, must be considered as one of the greatest calamities that have befallen us for many years, I must confess I am as much in the dark as ever. No examinations or experiments I have been able to make (and these have been numerous) have thrown any light on the subject; and no theory, as yet made public through the medium of the press, or otherwise, has satisfied my mind in relation to it. The effects of the disease are, it is true, sadly apparent to us all; but the real cause is, I imagine, yet to be ascertained; and, until that important discovery is made, no certain remedy will be likely to be found. Palliatives may indeed be applied, that, under certain circumstances, will seem to produce favorable results; while, under different circumstances, they will be found of no avail whatever. The application of lime, ashes, charcoal, coal dust, together with mowing the tops on the first appearance of the disease, and several other remedies, which from time to time have been so strongly, and often confidently, recommended, I have tried faithfully, but, alas, fruitlessly. Early digging, in dry weather, which has been supposed by some to be a security against loss, has been tried also—sometimes with apparent success; but in other instances the tubers thus secured, and deposited in the cellar in a perfectly dry and apparently sound condition, and carefully attended to, have subsequently been diseased to that extent that it became necessary to remove the whole of them together—a mass of putrefaction. During the past season, the commencement of the disease manifested itself upon the leaves and stalks at a period so early that an entire failure of the whole crop was anticipated; but in this instance the disease seems to have assumed a new phase, and, contrary to all former experience, it was found, on digging the crop, that it was far less diseased than in 1850, when the first symptoms appeared at a period considerably later in the season. The result of all my experience has taught me only this: to select varieties which have heretofore been found the least liable to disease; to avoid the application of fresh manures; to plant early, on a dry, light soil; give suitable after-culture; and then be thankful for such a crop as may be granted me. Still I am not without the hope that, in this enlightened age, the true cause of the disease will yet be discovered, and the suitable remedy devised; and whoever shall be so fortunate as to make the important discovery, may certainly claim to be considered as one of the greatest benefactors of the age.

Carrots have been found a valuable substitute for the potato for feeding; and the cultivation of this root is gradually increasing from year to year. As it is produced for home consumption, no individual has, to my knowledge, gone into it very extensively. The yield varies from 600 to 1,000 bushels per acre. The cultivation of an acre requires much more labor than the same quantity of ground in potatoes; but as the carrot may be sown in drills as near as 10 or 12 inches, the yield is much more abundant. Among the different varieties, the long orange carrot is considered as entitled to the preference.

Fruit.—The cultivation of fruit is receiving increased attention; indeed, all are ready to admit that it has heretofore been too much neglected. Our climate is not well suited to the peach; and the plumb and cherry are much affected by the black knot, which, if not attended to thoroughly, soon destroys the tree. The fruit is also liable to be destroyed, or much injured, by the curculio; consequently, these are serious drawbacks upon the cultivation of the stone fruits. With the apple and pear, however, it is quite different. These may be produced in great abundance, and in the highest degree of perfection. The land appropriated to an orchard of judiciously selected varieties of fruits, if properly managed, can be made full as profitable as by any other use to which it can be applied in proportion to the amount of labor required. Indeed, in most seasons, there are but few crops that would furnish anything like an equal profit in proportion to the quantity of land occupied. Although the other fruits may, in time, be made profitable, as yet our principal reliance as a market fruit has been the winter apples. These, in favorable seasons, are beginning to be produced in large quantities, and usually find a ready sale. Many thousands of barrels have been marketed in a single season from this and the adjacent towns, and the quantity is rapidly increasing; but, notwithstanding the increased production, the demand seems to increase in about the same ratio—the prices remaining as good as the average of former years.

The varieties most generally cultivated among us for winter use, as being most valuable for that purpose, are the Rhode Island greening, the Esopus Spitzenberg, the Baldwin, and the English and Roxbury russet. The Newtown pippin does not succeed well with us; and the northern spy, though highly recommended, has not, as yet, been sufficiently tested, although I think highly of the apple as an article of food for stock. Still, with the knowledge now possessed with regard to the cultivation of fruits, the farmer who shall be so neglectful of his apple orchard as to permit the growth of any considerable quantity of such varieties as cannot be used more profitably than in feeding to hogs, or cattle, is certainly guilty of a great oversight. No one, it is presumed, will claim that a bushel of apples contains as much nutriment as a bushel of corn; and yet, with proper care, the quality of the fruit may be made such as to command an equal price in market. Still, as, owing to a variety of causes, some portion of the fruit of each year will be found of a quality unsuitable for market, notwithstanding the greatest amount of care has been bestowed upon its cultivation, I know of no better use to which it can be applied than that of feeding. Given prudently to milch cows, apples induce an increased flow of milk; to sheep, removed from their pastures to dry fodder, they appear to be a great luxury, and are highly conducive to health, if given in moderate quantities; and, for wintering swine, I consider them far preferable to raw potatoes; indeed, I am inclined to believe, from some facts that have fallen under my observation, that if a selection were made of varieties best adapted to that purpose, apples would be found fully equal in value to the potato for feeding to swine, in any manner in which the latter vegetable might be prepared. As a general rule, sweet apples would, no doubt, be found most valuable for this purpose. Still, I would not make my selection wholly from them, for the appetite of the animal should surely be allowed to have some influence on the decision; and I have frequently observed that, when allowed to select at will, in an orchard where the different varieties were accessible, the pig often manifests a preference for a sour apple, or one moderately tart, if it is rich and juicy. With such a chance for selection, I have known pigs to thrive more rapidly than those of the same litter confined in the sty, and attempted to be fattened on boiled potatoes and pumpkins, mixed with milk, and made as palatable as possible. I would say to the farmer, cultivate none but the best varieties of apples; it costs but a trifle more to raise the very best than it does to produce the inferior varieties. If your trees are old, and still vigorous, but yielding inferior fruit, renew the tops by grafting, and you will soon reap a rich reward. If the tree is decayed or unhealthy, remove it at once, and let its place be supplied with one that will be worthy of your care, and not a mere cumberer of the ground. Then, if the time should ever arrive when the markets should be glutted to that extent that you cannot make a sale at a remunerating price, you will still find that your labor has not been in vain; you have secured for yourself and family, during most of the year, a palatable and healthy treat; and for the surplus, even your swine grunt forth their gratitude to you while they luxuriate upon the luscious repast.

I have, sir, thus hastily touched upon some of the subjects to which you have done me the honor to call my attention. Owing to the disadvantages under which I labor at present, in consequence of ill health, I confess I have not been able to do this in a manner satisfactory even to myself. Were I able, I should be happy, not only to reply to several of your inquiries which I am now compelled to pass without notice, but also to remark upon the cultivation of some crops grown in this county which I do not find in your list, viz: hops, teazles, and broom corn, all of which are cultivated to a considerable extent with us, and usually yield good profits; but as I have already exceeded the limits I first proposed for myself, I must close.

Wishing you abundant success in your really important undertaking, I am, dear sir, very respectfully, yours,

LORENZO ROUSE.

State of New York, Cayuga County,
December 1, 1851.

Sir:—Your Circular, requesting agricultural information, was duly received.

Wheat **is the leading crop in this section. I am not aware that guano is used to any extent as a fertilizer in the production of any crops.**

The great fertilizers here are stable-manure, plaster, and clover; the former at the mere cost of hauling. Plaster is obtained, by hauling a few miles, at $1 50 per ton. The usual method of raising wheat is on the three or four rotation system. The last of May, or the first of June, turn under a clover crop that is leg deep, (the more clover the better.) Plough twice afterwards, with an occasional harrowing or working with the cultivator. The time of seeding is from August 20 to September 10; quantity of seed, from 1½ to 2 bushels per acre; time of harvesting, from July 25 to August 10. In the spring, after seeding with wheat in April, it is seeded with clover, at the rate of about 15 pounds per acre, and plastered with a bushel of plaster. The second spring it is plastered as before. On the last of June the clover is cut for hay, producing from 1½ to 2 tons per acre; the last of August, or the first of September, a crop is cut for seed; yield, from 3 to 4 bushels per acre, which is worth from $5 to $6 per bushel. The yield of the wheat crop thus managed is from 20 to 30 bushels per acre, and is worth from 88 to 94 cents per bushel.

Corn.—This crop is raised more or less by all farmers. Stable-manures, ashes, and plaster, are used as fertilizers in the production of this crop. I have no data to fix the cost of production. The best system of culture is to plant early, (from the 5th to the 10th of May,) on rich land, and keep the crop clean. Yield, from 40 to 80 bushels per acre, which is worth from 46 to 54 cents per bushel. My own experience in harvesting is to cut up the corn at the ground when the earliest ears are glazed, and shock it up. After curing, harvest it; and if the stalks are well taken care of, they are worth as much for stock as a proportional crop of hay from the same land. These, cut with a suitable machine, have their value increased from 20 to 30 per cent. The corn I consider is worth as much more for grinding as the stalks are for cutting.

Clover and Grasses.—From 1½ to 3 tons are produced per acre. Plaster is the cheapest and surest fertilizer for meadows and pastures; for upland, clover is best; lowland, designed for pasture, requires timothy and red-top, at the rate of 6 quarts per acre.

Dairy Business.—This branch of rural industry has claimed our attention for years. As a general rule, in small dairies butter is made in the spring and fall, and cheese during the warm part of the summer. To determine the quantities, many things are to be taken into the account—as difference in cows, in keeping, and many other local causes. We consider that good cows, kept right, should make from 200 to 300 pounds of butter, or double that quantity of cheese.

Our method of manufacture is so similar to the thousand statements annually published, that it would be but a repetition to repeat it. The points, then, where most fail, and different opinions exist, are these, upon which I shall only dwell: In freeing the butter from the milk after churning, which we do with the hand-ladle, without water or washing, with as little working as will effect the object, none but the purest salt should be used—an ounce being sufficient for a pound of butter—which we add at the first and last workings. The Liverpool ground salt of the Ashton brand we consider as good as any. When sufficiently freed from the milk, it should be packed in good (hard wood) oak firkins, made tight, and previously soaked (24 hours or longer) in strong brine. The air should be excluded as much as possible during the filling, which should be done in a cool place. When full, put a fine white cloth over the butter, and a thin layer of salt over that, and head up the cask. Butter thus made and packed has kept, and improved as long as kept. We consider that butter improves by age as much as cheese. When butter is made by churning the milk or cream, it should not stand more than 36 hours before it coagulates; and hence it will be observed that in cold weather it is somewhat difficult to keep a room at a temperature high enough to effect that result. Our method is to scald the milk, when strained, in the pans, by setting them on the stove. Should it freeze, skim it immediately. The butter is equally as sweet as May butter, and is not as white as when otherwise managed. Price of butter, 16 cents; of cheese, 7 cents.

The culture of fruit is receiving increased attention, and I have no doubt it can be made a profitable crop. I consider apples to be worth as much, by weight, for feeding stock—cattle, hogs, or horses—as potatoes. The culture of peaches, pears, and apples is being largely extended, and the demand is steadily increasing. The varieties most desirable depend much upon the place and the use to which the producer designs to put them.

Very respectfully your obedient servant,

BENNETT RADFORD.

Hon. Thomas Ewbank.

Clifton, Monroe County, New York,
December, 1851.

Sir: In this section guano is not applied to any crop, except it be by gardeners. The only manure for wheat is green crops and barn-yard manure.

Wheat.—The best varieties of wheat are white flint and soles wheat. The soles is esteemed, under favorable circumstances, to be the most productive; is an earlier grain than the flint; has a stiffer straw; will do to sow later, and harvest earlier; but is an easy grain to shell; consequently, must be cut before it is fully ripe, or much is lost in harvesting. The kernel is plain, and of a bright color, and makes a fine article of flour. The flint is more liable to lodge on rich land, but not as liable to waste in harvesting; it makes the best of flour. Where a large crop is sowed, I think the farmer would find it to his interest to cultivate both kinds. Our wheat produces from 20 to 40 bushels per acre. The time of seeding, from 10th to 20th of September.

I commenced harvesting my last crop the 21st of July. I had a heavy crop. My flint was lodged so that the greatest part had to be cut by hand, and some of it by sickles. My soles wheat stood up so that I cut it by horse-power. I used one of Seymour and Morgan's reapers. My wheat is not all marketed; I therefore cannot state the average per acre.

The preparation of seed that I prefer, is to have it clean from all other seeds and smut. For the last two years I have ploughed but once for wheat or corn, and then follow with harrows and cultivators. I have used Ides's wheat cultivator, which has worked well on my land.

You ask whether the yield is on the increase or diminishing. In reply I would say that I obtain greater yields than for ten years past. I think this is the experience of most of the farmers in this vicinity; yet there are men in this county, as well as elsewhere, that will waste their manure and impoverish their land. I think that the manure that can be saved on one hundred acres of land that is suitable for wheat, if properly applied under good management, will prevent a decrease of crop.

Corn.—This is a valuable crop, and next in importance to every farmer to that of wheat.

My practice is to cover the land intended for corn with coarse manure from my yards, that have been kept with and littered with straw, where my sheep have left their droppings, together with what has been taken from my stables, (which is not a small pile, for I stable all my horses, oxen, and cows.) When the ground is dry enough in the spring, I plough about 8 inches deep, and turn the manure under. If I cannot do it without, I have a hand with a rake to follow after and rake the manure into the furrows. When it is well ploughed under, I have a heavy roller passed over it; then harrow it lengthwise the furrows; then go into it with a wheat cultivator, set it so as not to disturb the sod, and work it till it is mellow on the surface as deep as I can and not disturb the manure and grass that is turned under; then mark the ground both ways three feet three inches apart; then plant five or six kernels in each hill. As soon as it is up, so that we can follow the rows, I start a corn cultivator between the rows, rolling it both ways. After this, go over it again in like manner, and follow with hoes and dress it out, leaving four plants in a hill.

If circumstances will permit, I would say, continue to work it with either plough or cultivator, until the corn shades the ground, so as to keep the weeds down. After the corn is off, I have found that the succeeding crop is more benefited by the manure than the corn. I think the best method of feeding corn to make pork is, to cook it. My practice for some years past has been to shell my corn, and fill a potash kettle half full with it, then fill it with water to the brim; then boil it until the water is used up. When this is done, the kettle will be full of corn. This, I think, is better than grinding, to say nothing about the *toll*.

I never applied the manure for any given quantity of corn, so as to be able to state what the increase of grain would be by applying the manure from the hog-pen.

Oats are grown to a limited extent. I have taken but one load of oats to market since I have lived on my present farm, and that was some 15 or 20 years ago. They are usually fed to teams on the farms on which they are grown.

Barley is used by some in rotation between corn and wheat.

It sometimes produces well, but I do not cultivate it, nor other grain that has beard. These will penetrate into the fleece of wool, so that it will be impossible to free the wool from them, if the straw is put into the yard where the sheep are kept.

You ask, Is *wool growing* profitable? I would say, to a limited extent it is, on wheat-growing farms.

More sheep can be profitably kept in the winter than in the summer. Too close feeding in summer is calculated to reduce the prospect of a subsequent wheat crop on the same land. Sheep are useful in winter to help reduce the straw stack to manure. This should be done by spreading the straw daily in their yard. They should not be allowed to go to the stack and help themselves, as is sometimes the case. In so doing, they will be apt to get straw and chaff worked into their fleeces. That will damage their wool.

Sheep will winter well on hay once a day, and straw twice each day. To those that I wish to fatten, I add a feeding of corn once a day.

Sheep should have a daily supply of water through the winter, as often as any other animal.

My post-office is Clifton, Monroe county, New York.

Most respectfully, yours,

ASHBEL A. HOSMER.

Hon. Thomas Ewbank,
Commissioner of Patents.

Rochester, Monroe Co., N. Y., 1851.

Sir: In compliance with your request, embraced in the Patent Office Circular of August, 1851, I offer you such facts as are within my knowledge, and the various processes of husbandry that prevail in western New York.

Wheat.—Guano is not used as a fertilizer for wheat in this region, and only very sparingly, for experiment, on any other crop; and, as far as I am advised, it has not met the expectations of the users. The principal fertilizer for wheat is clover, with plaster, and a proper rotation. Barn-yard manure, with the surplus straw put in heaps and properly handled, is also used on summer fallows; or fresh manures applied to the corn crop, and, after the corn is taken off, immediately ploughed and sowed to wheat. What by many is thought a better process, is to follow a manured corn crop the next spring with barley, and the barley with wheat, and seed down with clover. The rotation most prevalent is to allow the field to lie in clover one or two years, and, if there are still foul grasses, to summer-fallow by three ploughings; or, if a clean clover, lay or mix with timothy grass, turn under the middle of June, and subdue with the cultivator often. Many persons, who are short of meadow, mow the clover early, and allow it to bloom again, and turn it under the first of September, and immediately sow to wheat. Both of the last processes are rapidly prevailing, in preference to the old summer fallowings, or three ploughings; and, if properly performed, succeed equally well at half the expense. The season of sowing is from the 1st to the 20th of September, at the rate of one and a half bushel per acre. When *drilled* in, one bushel is found to return as much per acre as the one and a half sown broadcast, owing to being better covered; producing a more perfect vegetation; standing the winter better, from having deeper-planted roots, which is an important consideration; and saving enough in seed to bread the entire population of the wheat-growing community. Very late sowing is the only preventive known against the fall attack of the *Hessian fly;* for its inroads in the spring, there is none. When they greatly prevail on a single field, ploughing under the stubble immediately after harvest, and following with wheat on spring crops, destroy the entire progeny of that locality; but it must be done before the *larva* changes into the fly.

The *weevil* (wheat midge) is now commencing its ravages, for the first time within two years past, in the great wheat district west of Cayuga lake. Its attacks, as yet, seem to be confined to late crops and the belated portions of early crops; and it is hoped that, from the use of early varieties, and from the favorableness of our seasons, it will not obtain extensive foothold in this region.

It is augured that the security in having early varieties and forward growth consists in the fact that the chaff of the kernel passes the state of softness required by the insect to deposit the *ovum* of its future progeny.

The earliest varieties that produce well in this climate are the *soules*, or sowles, and the Hutchinson or bearded Kentucky. Many persons, in districts where the weevil prevails, are resorting to the Mediterranean wheat, in consideration of its early maturity, a coarse variety abounding in *gluten*, and making a flour not unlike spring wheat.

The average price for 1851, is about \$1—88 cents lower than it has been for some years.

Indian Corn.—Guano is not used on this crop; as a top-dressing, plaster and ashes are generally preferred. Corn is generally made with recent coarse barn-yard manure, ploughed under, or on green sward, turned over, harrowed, and immediately planted; but the best crop on foul swards is made by fall-ploughing, as late as possible, and harrowed in the spring at the first appearance of the starting up of the grass. Immediately before planting, cover with coarse manure, and cross-plough under, and thoroughly drag it and plant.

This course will give a greater yield and a cleaner field than any other process. This region is not strictly a corn country; wheat being found much more profitable for the labor expended. The average produce is about 35 bushels per acre, although 80 and sometimes 100 bushels are produced.

Corn is the most labor-absorbing crop that is raised in the northern States; but, being made mostly at periods when little other farming work is pressing, and being an important item in family husbandry, every farmer raises enough for his own use at least.

The old process of ploughing and hilling in hoeing is fast giving way to the use of the cultivator and flat dressing. *For feeding,* there cannot be two opinions as to the advantages of grinding, and even cooking, food for fattening animals; as the process relieves the animal economy of so much of that labor which it has to go through in the stomach before assimilation takes place. Another fact appertaining to the subject is conclusive: *no seed or grain is, or can be, digested at all, if unbroken;* but, in all cases, passes the animal whole. This rule holds good with all vitality excepting birds.

Without any close experiments, or reliable criteria for judging, it may be assumed, as near the truth, that the manure from 10 bushels of corn fed to hogs, if bedded with a sufficiency of straw, or other vegetable matter, to absorb the entire produce of the animals, and if properly secured against the elements, would, if judiciously applied to an acre of corn on poor or worn land, increase the crop from 15 to 20 per cent.

Oats.—A cheap made crop in this region, and not liable to many diseases or mischances; but a heavy feeder on the soil, and a bad crop to lay down with clover, as the foliage is so heavy that it shades and chokes out the young grasses; consequently, a poor rotation for fertilizing. The average price is this year about 37 cents.

Rye.—Rye, as a crop, is hardly known in the wheat districts.

Peas, on some soils, are profitably cultivated as food for hogs only. The pea bug attacks them so freely, that the seed has to be obtained from Canada, where the pest is not known. Many persons cultivate peas as a renovator of the soil, under the mistaken idea that it adds positive qualities. It is true it is a fine preparation for wheat, a light feeder, leaving the land light and free from weeds; but that the taking off of several tons per acre of its fat and muscle can add anything to its producing properties is preposterous. Yet a field in naked fallow, without grasses, had better be under the pea crop than remain exposed to the elements.

Beans are occasionally cultivated, as a crop, on light and thin soils, but to no great extent. Almost every farmer, once in a year or two, raises a small patch for family use.

Clover and Grasses.—No farmer, with the least pretensions to understanding his business, ever lets a wheat crop pass without seeding with clover, which, in this climate, is generally sown in the spring, on the last fall of snow, or before the heaving and lifting of the soil by night frosts are passed, whereby the seed is carried into the earth and covered. Many persons mix timothy seed, at the rate of 4 quarts to the acre, when they intend to mow it; and there is no objection to the grass, as it only increases by offsets, and dies like clover when once turned under. Old meadows are best renewed by a top-dressing, in the fall, of a good coat of manure, and well dragged with a strong team and loaded harrow in the spring.

A system of irrigation, when circumstances will permit, is an important process for producing hay. Low and mucky meadows, which are intended for hay alone, are best laid down with red-top, one of the best cattle-hays known, a great yielder, and will stand good till after harvest. The quantity of clover seed sown is generally about 6 quarts to the acre, though many sow double that quantity, with profit over the cost of seed. The quantity of hay produced per acre will average about two tons of cured hay.

Dairy Business.—This branch of husbandry does not prevail in wheat-growing districts, as it requires too much land in grass for pasture and for meadow to sustain the stock during our long winters.

Butter and Cheese.—The average prices are about 6 to 12½ cents per pound.

Neat Cattle.—The same reasoning will apply as respects the subject of dairies. The Durhams take on fat the easiest, particularly when young, and the Devons and Ayrshires, and natives, or crosses between them, are generally the best milkers.

To break Steers.—Handle them freely the summer and fall after they are one year old; and before they are two, use them freely to a light yoke; and the winter they become three, break them thoroughly to light work, with a quick step and without noise.

Horses.—There are a good many raised in this region, both for profit and from necessity; as, in a wheat-growing community, there are more horses than men. The cost does not exceed $35 to bring them to three years. The raising of mules is not known.

Wool.—Wool is not extensively grown in this district, although every well-managed wheat farm should have one sheep to every arable acre; yet, not having much experience in sheep husbandry to any notable degree, I cannot speak with any precision as to the other question.

Hogs.—The best breeds are Berkshire and Leicester, or a cross between them. They are usually fattened at from 12 to 18 months old, and weigh from 200 to 400 pounds. They are first fed on cooked potatoes, apples, pumpkins, &c., and finished off by a month's feed of corn in the ear.

The best and most expeditious method for fattening hogs is, to keep them in good clover pasture till the middle of September; then house and feed them with ground peas and barley, or barley-meal alone, cooked or sowered in tubs. It will make pork quicker and cheaper than any other process, and of the finest quality.

Root Crops are considerably, though not generally, cultivated, owing to the amount of hand-labor required.

Carrots are the prevailing crop, and much the most valuable, particularly for horses and milch-cows; and stock or store-hogs winter respectably on them alone.

The premium crop for this State, in 1849, was within a fraction of two thousand bushels to the acre—showing that the amount of nutriment exceeded the produce of fifteen tons of hay, at two tons per acre.

Potatoes.—The average yield since that inscrutable disease—the rot—will not exceed fifty or sixty bushels to the acre; formerly, a bushel to the square rod, or one hundred and sixty bushels to the acre, was common. Potatoes are not made for less than 25 cents per bushel.

The merino, round pink-eye, and flesh color are the greatest producers; the long pink-eye, mercers, and Foxites are best for eating. Dry soils, or green sward, or fallow land, without stimulating manures, with early planting, are, since the disease, the safest method of growing. There is some pretty good evidence that the planting of potatoes and corn in alternate rows is a preventive of the rot.

Fruit Culture.—Apples, of the best quality, are easily grown in this region; and farmers are extending their orchards, as apples find a ready market both east and west. It is said by some persons that two bushels of apples are equal to one bushel of potatoes, and that two bushels of potatoes are equal to one bushel of corn for feeding; though this estimate is only an approximation. The best winter varieties for this climate are the Rhode Island greenings, Esopus Spitzenbergs, Swaars, Baldwins, Vandeveers, seek-no-furthers, northern spies, Newtown pippins, and russets. The best apples known for exportation are Newtown pippins and russets.

Peaches, and the other fine fruits, succeed in all that part of western ew York west of Cayuga lake. There is nothing known of the cause, cure, or prevention of the leaf or yellows in the peach, or fire-blight in the pear. One thing is quite settled, that insect-depredation has nothing to do with it.

Grapes.—The only variety cultivated with any success is the Isabella. The Catawba does not ripen except upon dry, warm land, and all the foreign kinds mildew. The making of wine—veritable wine—is out of the question in any climate not sufficiently genial to develop the saccharine qualities of the grapes sufficiently to make the dried raisin, and generate the tartaric instead of the malic acid.

In this new country, the genius of the people is much more bent upon destroying than planting *forest trees.*

Manures.—Wheat crop is principally manured by a rotation with clover; while the corn and root crops, except the potatoes, come from the recent manures of the barn-yard, which are sometimes fermented in the yards and applied on summer-fallows for wheat. Plaster is universally used for a fertilizer, mostly for its benefits to the clover, as it is a mooted point with our farmers whether it affects the wheat plant at all.

Lime, applied to our western soils, has not, as yet, as far as observation has gone, produced any beneficial results; which is contrary to all experience in all older counties, and can only be accounted for by supposing that our soils contain a redundancy of that material. As an application to recent manures, it is decidedly detrimental, and only beneficial to stimulate or affect vegetable matter.

Your obedient friend,

L. B. LANGWORTHY,

President of the Union Agricultural Society.

To the COMMISSIONER OF PATENTS.

MACEDON, WAYNE COUNTY, N. Y.,
January 10, 1852.

SIR: I send a few brief replies to some of the questions in the Agricultural Circular of the Patent Office, regretting that I have been prevented from furnishing them sooner by unavoidable causes.

Wheat Culture.—A great loss is sustained by most of the farmers in the northern portion of western New York through shallow cultivation. When the land was first cleared of the forests, and the country was new, 40 bushels per acre was a very common product.

Now the farmer is satisfied with one-half the amount. Every one knows the reason of this falling off. The soil has been partly exhausted by bad husbandry of its valuable constituents. But, fortunately, (if the expression may be allowed,) the cultivation has been only of a *superficial* character, and the subsoil has not been injured by this thriftless treatment; hence, what is usually regarded as very bad farming, has at least one redeeming characteristic—it left a part of the riches of the soil for the present race of cultivators. It is to be hoped that when they find out what a magazine of hidden wealth has been reserved for them, they will not waste it, as their predecessors did, by a remorseless exhaustion in cropping. The experiments which have been made under my observation, in efficiently deepening the soil, have all resulted in a most decided improvement. The wheat crop, more especially, has been benefited. Probably, as an average, this increase is not less than one-half made; in some cases, it is more than double.

In one instance, the earth taken from a ditch was spread on the ground for the distance of a rod each side. A year or two after, during a very unfavorable season, when the field generally did not exceed 5 bushels per acre, this strip, dressed with the subsoil, afforded at least 20.

An extensive farmer told me that, so greatly superior was the under soil for the growth of wheat, he would gladly have 6 inches of the top entirely removed from the whole of his farm. Better, no doubt, would it have been to have well mixed the two portions by subsoiling, in connexion with trench ploughing. The Michigan subsoil plough of the larger size, drawn with a strong team, has proved an admirable implement for this purpose.

Sowing Grass Seed.—A great improvement might be achieved by sowing larger quantities of seed. Any one, by walking over newly-seeded fields, may usually discover irregular bare patches, without number, when the growth of herbage does not cover the soil. If these bare portions, however small they may be, singly, were all congregated together without the mixture of grass, the farmer would most unwillingly permit so many bare acres to be idle. A year or two since, the writer sowed a small field early in spring with grass, accompanied with no other crop; it was lightly harrowed in. The seed consisted of equal portions of timothy and clover, and was applied at the rate of *one bushel* per acre. In a few weeks the whole surface was densely covered with a beautiful and even growth of green herbage—not an inch of bare earth was visible. It was pastured that year, and mowed for hay the next. Although the land was ordinary upland, and had never been heavily manured, the crop of dried hay was 3½ tons per acre. Being cut early, a fine second growth followed, which was subsequently pastured. It was estimated at one-half the amount of the preceding crop, which would give the whole growth for the year at *five tons* per acre, and which could not have been far from correct. It should have been stated that a dressing of gypsum was applied early the previous spring.

Breaking Steers.—Very objectionable is the frequent practice of educating oxen to the sound of a loud voice, or a scream, in commanding them, and the free use of the lash in enforcing orders.

A most successful trainer of young oxen, who pursues it as a business, adopts substantially the following practice:

He first secures a number of yokes for economizing his own labor, and encloses them in a yard. At first they are usually wild and intractable. He passes around deliberately among them till they become familiar with his presence, carefully avoiding any movement, as much as may be, which might in the least degree excite fear. He soon finds it easy to stroke them with his hand—at first, perhaps, with a single touch, which they cease to dislike or avoid when they perceive no injury is received. In this way, by degrees, he makes himself quite familiar with them, until he can freely handle them. He then applies the ox-bow, and afterwards the yoke, to which, in like manner, they become accustomed. This is all done by operating but a moment or a very short time on each successively, so as not to annoy or tire them by constant attention. As they become more familiar, this period is gradually lengthened. In order to lead them, the ox-bow is applied to the neck, and drawn with a moderate force. They may at first resist a little; but if no degree of violence is used, they soon find it easier to advance than to submit to a constant pressure at the neck—on the same principle, precisely, that a tight board fence will resist violent blows, but will yield to the constant pressure of a bank of earth against it.

All these drillings are accompanied, at the proper time, with a low, firm word of command. Ultimate obedience is always insisted on. It is surprising what a change is wrought in the external behavior of a dozen wild steers thus treated, in the course of a few days. When the process is completed, they become the best broken oxen I have known; mild, tractable, prompt in obeying, and, above all, not needing a hoarse bawl, nor a lashing whip, on the part of the driver, to enforce orders.

Very respectfully,

J. J. THOMAS.

Hon. Thos. Ewbank,
Commissioner of Patents.

Seneca County, New York,
December 20, 1851.

Sir: After consulting with some of our practical farmers, and obtaining such information as I could in relation to the subjects embraced in your Circular, I will endeavor to answer it accordingly.

Wheat, with us, is a principal and leading crop; the mode of tillage, a clover-lay of from one to three years, ploughed a good depth. If ploughed again, it should be equally deep, and use the drag or cultivator frequently. Many of our best farmers plough but once, and do the after-tillage with the drag and cultivator, the crop being equally good, and leaving the turf and a great portion of the foul seed below. One other benefit: the soil is less likely to run together and become hard in those extremes of wet and dry so frequently seen in the spring. Much of our land tilled in either of those ways will, in good seasons, with no destruction from insects, yield from thirty to forty bushels to the acre. Breaking up or ploughing to be done by the middle or last of June; best time to sow, from the 10th to the 20th of September; quantity of seed to the acre, 1½ bushel—some prefer more; wheat for seed should be put into the mow dry; if damp, a fermentation ensues, which may affect its germination, and also have a tendency to generate smut; when threshed, clean it of all foul seed, and, if the ground is not too dry, wash it in brine and lime before sowing.

The average yield of wheat, for all sown in this county, is estimated at from 16 to 18 bushels to the acre; in 1848 it was 18 bushels—some of the towns 20, and one (Ovid) 25. The above estimates for common seasons, and with no extraordinary injury by insects; our average ought to range much higher, and would if we would abandon the system of stubbling in.

Cost per acre, including seed, harvesting, and threshing, is estimated at $10; time of harvesting generally about the 20th of July; cut a little before fully ripe. Price, since harvest this year, for white wheat of good quality, 85 cents; varieties most sought for are Soule's, Hutchinson, and white flint.

The yield this year is less than usual; the damage done by the weevil is estimated at from 20 to 25 per cent. Spring wheat has been cultivated to good advantage. When done, the ground should be ploughed in the fall, and sowed as early in the spring as it will do to work; if in March, all the better; but as the weevil seems to injure this more than winter wheat, it will become a question of expediency whether to sow any.

Sowing winter wheat at the times above stated, or at the time of light frost, is thought by many of our observing and experienced farmers to be a remedy against Hessian fly; and some have thought an early spring and harvest a remedy against weevil. The Mediterranean wheat ripens much earlier, and, although injured to some extent, it was much less than other varieties; but its average yield is less, quality inferior to, and duller in market than the white.

Corn.—The cost of raising Indian corn is estimated at seven dollars per acre; average yield about thirty bushels—in some instances, 75 to 90 bushels. Best course of tillage, a green sod, ploughed in the fall; plant from the 1st to the 15th of May; till with the cultivator and the *hoe.* For feed it is better ground than whole; and for hogs it is better cooked. Crop last season below common average price of fifty cents.

Rye not much cultivated. Peas and beans very little, if any, more than for culinary purposes.

Oats.—Average yield, 36 bushels to the acre; amount of seed, 2½ bushels; cost, $5. This year the yield is above an average; price in market, 36 cents.

Barley, the last year, has been a full average crop—say from 20 to 25 bushels to the acre; cost of raising about the same as oats, and, it is thought, less exhausting to land. Both these crops do best on corn stubble; if sowed on sod, it ought to be ploughed in the fall; price this season, 70 cents.

Buckwheat is somewhat extensively raised; in 1848 the whole amount was 704,940 bushels; average produce per acre 15 bushels; cost per acre $3 25; this year the yield to the acre a full average; market price 37½ cents. This crop is considered one of the most renovating of our grain crops, and, next to corn, the best purifier from foul weeds.

Hay.—The quantity cut per acre is a full average, over 1½ ton, the season having been favorable to that crop; cost per ton $1 25; market price $6. Best fertilizer for meadows, plaster, with a mixture of ashes—say one-fourth; in laying up land for meadow or pasture we prefer clover seed, about six quarts to the acre, and some add a little timothy; for interval or muck land, timothy, with about one-third clover.

Average yield of clover seed is said to be two bushels and one-eighth per acre this year, above a common average; price, $4 50 to $5. Mode of tillage for early clover: some pasture close and take out by the 1st of July, then cut the second growth for seed; others mow the first crop of grass from the 1st to the 4th of July, and then mow the after-crop for seed. This course is thought to get it more pure.

Of the *Dairy.*—This being a grain-growing county, not as much attention is paid to some other departments as should be. Very little cheese is made; of butter, some more than is required for domestic consumption, and of a good quality; when sold in the market it is generally put up in firkins of about 90 pounds; price the present season, 14 cents. It is estimated that a good cow will yield 150 pounds in a season.

Cost of raising *neat cattle* until three-years old is variously estimated at from $20 to $25—and that, too, is their estimated value; at that age the profit in raising them is that they are kept much of the time during winter on straw and other coarse provender, not saleable, and should not be sold if it was, and which by this means is converted into a marketable article; without any detriment to the farm.

We have the short-horn Durhams of good blood, the Devons, and the native breeds, and a mixture of the whole. The Durhams are esteemed the best for fatting; a cross of Devons and Durhams next; the Devons and a cross of our native breeds the best for working oxen; and although some, of the Durhams are good milkers, the natives, as a whole, are thought to be the best. To acquire full and healthy developments, young cattle should be kept well the first year.

Horses.—The stock is good. To rear a colt to 3 years old will cost $30 to $35, when his value will be from $55 to $75; and when fully matured and broke, will range from $80 to $150. We are now getting a cross of the Morgan stock, which promises to give more figure and action, and will add to their value for market horses, if the size is not diminished. Colts, as well as neat cattle, should be kept well the first year; brood mares, if gentle, are worked moderately in the after-part of the season; turned into the yard during the winter; and a few messes of bran or unbolted wheat-flour given to them about foaling time.

Wool-growing is said to be profitable, with proper care, and sheep of the right kind. The difference in the cost of producing a pound of merino, as compared with a pound of ordinary coarse wool, is in favor of the former. Merinos retain their fleeces better until the time of shearing; give a heavier yield; the price is higher; and, being fuller clothed, they stand the changes of weather better, and are not so liable to disease. It has been estimated by practical men that 12 tons of hay, or its equivalent, are sufficient to keep 100 common-sized Saxon or merino sheep through the foddering season; or 3 per cent. of the weight of the sheep, per day, will suffice.

Then, estimating the hay at $6 a ton, and assuming that the increase and growth of the flock will pay for the summer keeping, which most of our farmers think they do, and estimating the wool at 40 cents a pound, with a yield of 3½ pounds to the fleece, it leaves a profit of $68 on 100 sheep. Some of the butchers say that sheep of medium size—from 60 to 70 pounds, and from one-quarter to one-half merino—are the most profitable for mutton; they show more fat when opened, and the flesh is better, generally, than the common stock of larger size.

The sheep of this county are mostly merino, of good quality, being thought more hardy than the Saxon, and more profitable than the coarse wool; average yield of fleece 3½ pounds; average price the last season 40 cents per pound.

This branch of husbandry, like some others, being of secondary importance, does not receive the attention it should; for want of proper shelter, the comfort of the flock is too often neglected, and too little care is taken by many of our farmers in selecting ewes for breeders; for these we should select the round chested, with full shoulders and good hind-quarters, and either sell those of different form or keep them from the

buck; then, with judicious crossing, our flocks would continue to improve.

Of *hogs*, the breeds most esteemed are the Berkshire and Leicester, as being least expensive to fatten; and, by crossing, the size of the former is increased, while the properties to lay on flesh are not diminished. We have another stock or kind imported from China, which, when crossed with the Berkshire, improve both; they fatten very easily, and attain a good size.

The cheapest method of making pork is to swill the hogs liberally during the summer; let them glean the stubble, and run in the orchard; then feed them with potatoes, boiled, mixed with corn or other meal; feed them, as it is husked, with the refuse or unsound corn, and then give them, for a time, corn-meal or whole corn. Very little pork is put up, except for domestic use; it is now sold in the carcass, and sent to New York; present price, $5 50 a hundred.

Average yield of *potatoes*, 80 bushels to the acre; cost of raising, $6. The difficulty of raising, and uncertainty of preserving, this crop, of late years, have reduced its production to very little more than is necessary for the use of the table. Crop this year below an average, but is said to be less affected with disease; price per bushel, 50 cents.

Carrots and Beets (mangel wurzel) have been cultivated as field crops, and produced well; but the amount of labor required, it was thought, rendered them unprofitable.

Fruit.—Our soil and climate are both favorable to the cultivation of fruit; and some years past increased attention has been given to its improvement by pruning and grafting the apple-orchards with what were supposed to be the best varieties, though, unfortunately, they did not prove to be so.

The committee of the State Agricultural Society for 1847, to whom were referred the selection of apples for domestic use and exportation, to be cultivated in the State of New York, say: "The varieties of apple which the undersigned have selected and recommend to the society, under the resolution of 1846, are as follow:

"Early harvest, early strawberry, large yellow bough, early Joe, and William's favorite; all which are summer apples.

"Fall pippins, golden sweet, Gravenstein, Jersey sweeting, Porter, Rambo, Detroit red, and Bellebane; for autumn uses.

"Baldwin, yellow bellefleur, Hubbardston, non-such, Jonathan, Newtown pippin, northern spy, blue pearmain, Rhode Island greening, American golden russet, Roxbury russet, swaar, ladies' sweeting, Talman's sweeting, Esopus Spitzenberg, Vandevere, waxen apple, Westfield, and seek-no-further; for winter use and exportation."

In relation to the value of apples for feeding stock, the same committee say:

"Aside from its edible uses to man, the apple is an important and economical food for most kinds of farm stock. Milch cows thrive upon them when fed in moderate quantities, and they add to the quantity and quality of the milk. They are also an excellent food in making beef. Horses eat them rapidly; for them they constitute succulent and healthy food. Sheep, swine, and geese will fatten altogether on good apples; and for all kinds of poultry they are desirable and nutricious food. The best varieties, too, are as comparatively valuable for stock-feeding as for market purposes; and for stock-feeding alone, the best varieties of both sweet and acid should be cultivated. Indeed, for stock-feeding solely, no cheaper, more convenient, or valuable *green* food can be grown, for fall and winter forage, than the apple; and, as such, it is strongly recommended to the general farmer. They are as easily housed and preserved from the frost as the root crops, and equally convenient for ordinary feeding."

It would seem that apples enough could be grown on an acre to make the crop profitable; at two rods apart, which I believe to be the common distance, 40 trees will stand on one acre; then, suppose one tree yields 10 bushels, the product will be 400; which, at 25 cents per bushel, is $100.

Apples are said to be worth less for feeding hogs than potatoes; some make the difference one-half, others one fourth. To feed both raw, the difference would be very little. A great benefit to be derived is from the early varieties, which give our hogs a start in the fore part of the season. The peach, and most other kinds of fruit, are cultivated to advantage, except the plum; which, although it seemed heretofore to be in its natural clime, and one of the most vigorous and healthy of our fruit-trees, has of late years been the victim of an insect, (which stings the branches of the trees,) and, in some parts, has been entirely destroyed. No remedy has been discovered. Discreet pruning, in the commencement, might have prevented the evil; it now can only give partial relief. The late frosts, for the last two years, destroyed a large portion of the fruit-crop in this county, and what survived was of an inferior quality.

Manures.—In relation to *manures*, we have not yet advanced beyond the ordinary modes of barn-yard preservation, and it is most economical to have them dishing, or lowest in the centre, that the liquor may not run off. Some believe that to pile it up under the shed during the summer, is a benefit. Whether it is, or, if so, whether the benefit equals the labor, is yet a problem. Lime is used to some extent, and with beneficial results, especially on heavy and clay soils; its tendency is to make them loose and pliable; quantity from 10 to 30 bushels to the acre. Plaster is much used, and is beneficial on most of our land; to all growing crops, about one bushel to the acre; and meadows and pasture land, once a year, with a mixture of ashes; if unleached, one-quarter; if the land is intervale or muck, and has been recently drained and reclaimed from a wet state, and is sour, apply ashes in greater proportion; they aid to neutralize the acid, and, at the same time, furnish the grass with a necessary element of its composition. Price of lime from 12½ to 18 cents a bushel; plaster 15 cents a bushel. Ashes are an incidental production of the farm, and should not be sold or taken off.

Our *farm machinery and implements* are generally good; among the ploughs the most approved are the Springport, Burrall's wheel-plough, and, for breaking up hard ground, the iron beam-plough is much used. Ide's improved is preferred by many as a plough for all work. Ide's wheel cultivator improved is an excellent implement, and especially beneficial when we plough but once. Pitts's improved threshing machine is in general use, and a good article. McCormick's, Hussey's, and Burrel's reaping machines are used. Of the machines for hulling and cleaning clover-seed, the *Rasp* machine of Rittenhouse & Co. is decidedly the best; it cleans faster and with less motive-power than any other.

Underdraining.—We have a machine for making drain-tile—an important aid in the process of underdraining, and in the improvement of our land; the necessity and benefits of which were so ably set forth in a report at our last annual agricultural fair by the committee on that subject, that it is thought an extract would convey useful information. The committee say: "The attention of farmers to the necessity for draining their lands has been called pointedly to the subject within a few years, and the result thus far has been satisfactory and profitable. Scarcely a farm exists but what some part or portion of it will exhibit a constantly moist surface, or a dry surface with a wet subsoil; in either case the saturated soil naturally generates acids injurious to our cultivated plants; and it is well known that when these saturated soils are moved, and exposed to warmth by sunshine, decomposition will take place and the excess of acids discharged, yielding in this condition a good manure.

"The fact that wet soils will not produce well-developed plants is known to every man of common observation; yet it is not well known that wet subsoils do most seriously interfere with our farming products.

"We would earnestly advise the farmers of Seneca county to consider the condition of all their fields more closely, and not be confident in the appearance of a dry surface-soil; for there is many a field which will bear the plough, yet the crop which follows is poor, and the soil is left sour and unproductive. Such fields must generally be kept late in the spring—perhaps too late to work favorably in the autumn. Frost will inflict an injury. In every case, then, where such soils exist, draining is the remedy: the water is carried off; the rays of the sun are permitted to act, communicating warmth; the air penetrates; the roots of our plants are enabled to descend and find their natural and proper food. By the act of draining, therefore, many important benefits are promptly obtained by the farmer; his land is improved, his crops are increased, and his temporal welfare largely promoted."

The average depth of ploughing is supposed to range from 6 to 8 inches; subsoil ploughing is done to some extent, and land with a vegetable mould, or muck, as we call it, on the surface, and a hard, clay soil below, containing lime, which is generally the case, is much benefited by that process—if to the depth of a foot, all the better; the best is done by the Michigan subsoil plough; it mixes the substratum with the lighter soil, and gives more strength and firmness to the whole. When subsoiling is done on what we call our lake lands, it should be done by following the surface-soil, ploughing, loosening, and stirring the soil to a greater depth, without bringing any part of it to the surface; on these lands at present, and until the soil is more exhausted, 7 or 8 inches are thought to be deep enough for reversing the furrow-slice. By loosening the soil deeper, it will give better chance for the roots of plants to descend, let the water down from the surface, and be ready for tillage earlier in the spring, and, if necessary to draw fresh soil from below by a deeper furrow, it will be easier done. The yield of wheat per acre, so far as the soil is concerned, without taking into the estimate the injury done by weevil, is on the increase; and the average yield twenty-five years ago, per acre, for the town of Ovid, was thirteen bushels; four years ago, it was twenty-five, and ought to be, and may be, much increased. Wheat, as a general rule, should be sown only on a clover-lay; the system of stubbling in, so called, or sowing wheat, after barley, oats, or flax, as it has been and is too frequently done, is a mistaken policy in good husbandry. It costs but little, it is true—once ploughing and two or three times harrowing will do; but generally the crop is light, and often an entire failure; and if by chance it should succeed, it is overtasking the soil, and very likely to prove it so in some future crop; besides, its tendency is to propagate foul weeds generally, and especially pigeon weed, that bane of wheat, and source of vexation to all good farmers. As a general system, instead of stubbling in, these crops should be seeded down; and, if double cropping is done, sow wheat after corn, if the land has been, as it should be, manured previous to putting in that crop.

Not only wheat, but the yield of other crops, is on the increase, which may and should be continued; the soil mostly calcareous, and loam mould of excellent quality, not easily exhausted, only wants discreet husbandry for a general and continued improvement.

The settlement in this county commenced more than sixty years ago, and we have our best yields on land first cultivated, and, with judicious tillage, and the free use of clover—that best of renovating crops—they give promise to be more productive one hundred years hence than they now are.

If the weevil (wheat midge) should continue with us, and destroy or materially injure our wheat crop, the attention of our farmers must of necessity be directed to other branches of agriculture, heretofore comparatively neglected. Whatever it may be, care and diligence will be required to make it profitable; for, although mechanical and chemical science has done much to aid, yet persevering, well directed labor, is the most reliable source of agricultural wealth.

Respectfully, yours,

JAMES DE MOTT.

Hon. THOMAS EWBANK,
Commissioner of Patents.

CANANDAIGUA, ONTARIO Co., N. Y.,
December 24, 1851.

SIR: The following remarks are offered in reply to the Circular of the Patent Office of this year:

Wheat.—The varieties sowed in this vicinity are: Soule's white and red, Soule's white, red chaff bald, white flint, Mediterranean, and bluestem. The Soule's has for several years past been the most valued, being the most productive. But during the last two years, wheat has been more or less extensively affected by what is usually called the *weevil*, but more correctly known as the *wheat midge*. This is in appearance somewhat like a flax seed, less narrow, however. It is deposited in the house or hull of the kernel, and frequently absorbs the whole kernel. In an examination during the harvest of this year, I found sometimes as many as three of those insects at the foot of one kernel. In such a case the kernel is mainly absorbed, it being reduced to a mere line in size. Heads of wheat having the appearance of holding 60 to 100 kernels, had only from 10 to 40. The wheat crop has this year been reduced in some portions of this county from one-half a crop to less. The wheat crop may be put for the last five years at 20 to 25 bushels per acre. Our county agricultural society have awarded their first and second premiums to crops varying from 40 to 50 bushels per acre. In 1847, first premium crop, 53[illegible] bushels; in 1848, 47[illegible] bushels; in 1845, 59[illegible] bushels.

The Mediterranean wheat is deemed a very hardy grain, less exposed to the *Hessian fly*, and also, it is now thought, less exposed to the *wheat midge*. It has, therefore, been sown more extensively this autumn than heretofore.

Farmers differ very much in the order of crops in rotation. For a few years, corn, barley, wheat, and clover, in the order named, have been tried by some. This is an exhausting series, and the wheat stands a poor chance. Corn, wheat, and clover have been tried. But wheat sown so late in the autumn, (after the corn is cut up and removed,) has this year been greatly injured by the midge. Corn, barley, clover, mowed or pastured one or two years, and then wheat, followed by clover, are now strongly recommended.

Indian Corn.—The varieties cultivated are the small eight-rowed yellow, the large eight-rowed yellow, the twelve-rowed yellow, the eight-rowed white flint, and the twelve-rowed white flint. Some very intelligent farmers in the eastern part of this county cultivate only the white flint, contending that it is two weeks earlier, and also the most productive. This grain is raised in much larger quantities than it was in this county previous to 1847. Good farmers now raise an average of 100 bushels of ears on an acre—often, 120. The county agricultural society have awarded premiums to crops of from 88 to 90 bushels shelled corn an acre. Many farmers select for this crop old meadows or pastures, put on them all their green manure in April, and plough them in the last part of April and the first week in May, harrow thoroughly, mark it three-and-a-half feet apart each way, and plant, from the 5th to the 20th of May, about six kernels in a hill. As soon as up so that the rows can be seen, pass through with a one-horse cultivator, dress the hills with one handful of compost, one-third plaster of Paris, and two-thirds leached ashes. On loamy, clay soils, I would suggest a compost of one equal part of plaster, ashes, and sand. The element wanting in clayey soils for corn is probably *silex;* hence sand, such as is suitable for mortar, may, perhaps, in a compost as above, supply the appropriate nutriment to the plant.* From the time Indian corn comes up till the 5th of July, a cultivator, harrow, or shovel plough, may be run twice between each row as often as the farmer can do it, if once a week. The operation is best and most profitably performed as soon after showers of rain as the soil will allow of working. Average yield of this crop from 40 to 50 bushels of shelled corn to an acre. It has been raised in this county at a cost of six to eight cents per bushel of ears, or eleven to fifteen cents per bushel of shelled corn.

The stalks of corn, if they are cut as soon as the kernels are hard and before a frost, are very good fodder for cattle or sheep. In 1850 I tried the following experiment: on the 15th and 16th of September, when

[* Sand can do very little, if any, good in a compost. A mixture of three parts of unleached ashes, one of plaster, and one of common salt, is a cheap and valuable fertilizer for corn and potatoes.]

the stalks were green, I had seven acres of corn cut up at the roots, and put in shocks of eight hills each, one hill, round which the seven others were set up, not being cut, and all tied together at the top, the butts being spread out as much as possible. The stooks stood a few days, the weather being very clear. The small stooks were then put three or four together, and firmly bound at the top, and allowed to stand till husked in October. These stalks were almost as bright and green as good hay. They were all cut by a cutting machine, (T. D. Burrall's,) moved by the power of one horse, and fed to cattle. My stock consisted of nineteen head of cattle, viz: four oxen, eight cows and heifers, two yearlings, and five calves. The stalks of seven acres of corn were nearly the support of nineteen head of cattle for three months. The cattle were in good condition. Full four-fifths of the entire stalks were consumed. What were left were daily shovelled from the mangers on to their bedding, and thus used as an absorbent for the manure.

Barley.—The amount of barley raised in western New York is annually increasing. This grain is sown as a crop next after Indian corn, or on sward land newly turned up. The crop varies from 20 to 50 bushels. Premium crops have been as large as 55 bushels. A sandy or gravelly loam is best suited to this grain. Where clay predominates, unless thoroughly underdrained, barley rarely produces more than 25 bushels per acre. Premium crops for five years past from 41½ to 55 bushels per acre.

Oats.—This crop is sown to a greater or less extent by nearly every farmer in this county. Oats are fed almost entirely to horses and sheep. Average crop, say 40 bushels per acre. Largest or premium crops, 70 to 78 bushels per acre.

Peas and Beans.—Peas are sown only in small quantities. This crop is greatly affected by the bug and mildew; and our farmers have generally, of late years, neglected it. Beans are not extensively cultivated, except for domestic use. From 20 to 25 bushels on an acre is reckoned a good crop. Premium crop, 34½½ bushels.

Grasses.—Clover is sown for pasturage and hay; also timothy. Red-top comes in naturally into moist lands in this region. Two tons of cured hay per acre are a good yield. Leached ashes have been found an excellent top-dressing for lands in grass. One bushel of clover seed is sown on five acres; 10 to 12 quarts of timothy on one acre. For pasture, 15 pounds of clover seed to the acre. Plaster is readily obtained in this county at $1 75 to $2 per ton, or 20 bushels; and a dressing of from 1 to 2 bushels per acre is commonly given to new-sown clover.

Hogs.—For several years the fattening of hogs, except for the farmer's own use, has not been thought a remunerative business. During this year the centre of this county has been connected by a railway, terminating in the Erie railroad, and thereby opening a direct route to New York city. The price of pork is now nearly $6 per cwt. Many farmers raise pigs, and sell them when seven or eight months old. They readily bring on foot from $4 50 to $6 a head, without much feeding on grain. This is considered more profitable than the usual mode of fattening pork.

Breeds.—Berkshire, Leicester, and grass. No experiments are conducted with exactness to determine how much grain of any kind will make a pound of pork.

Sheep and Wool.—The merino, both Spanish and Paula, the South Down, and a few Leicesters, are kept in this county. Of the former, there are choice flocks, yielding fleeces from about 4 pounds to 5 pounds apiece, and readily, this year, selling at 44 cents a pound. The flocks of South Downs have multiplied largely during the 2 or 3 years past. Their wool brings from 30 to 35 cents a pound; but their fleeces do not exceed 3 pounds each, on an average, in any flock in this vicinity. But their carcass is superior in quality and weight. South Downs, at 18 months, dress at 75 to 80 pounds. Our two railroads—one to Albany and Boston, and the other to New York city—have made well-fattened South Downs readily sell here at $5 a head. Some farmers, who have tried the Leicester sheep, deem them too tender for our storms and winters to be profitable. Still, others are trying them, and some are crossing them with the South Downs. The last experiment I consider of doubtful utility. The South Downs are a very hardy sheep; the lambs grow up handsome and fine in form, at 2 months of age, and are then sought for by the butcher as eagerly as the merino or native at 3 months. Yet for wool, the French or large merino are thought to be far the best, yielding a fleece readily bringing about $2 each year.

Roots.—The culture of roots in this county is not extensive. Farmers who come to this country from Scotland and England, after a few years' trial, usually come to the conclusion that Indian corn is raised with less labor, and will make more fat, than the same cost of roots. Carrots are raised by some farmers for milch-cows and horses.

First premium crop of carrots, 1,486 bushels per acre; second premium crop, 1,056; third premium crop, 728.

Potatoes.—Since the disease of this tuber—so world-spread—has prevailed, potatoes have greatly diminished in their average yield. I have raised 300 bushels on an acre; now, 100 bushels is a fair crop. On soils clayey and inclined to moisture, the potato generally rots. On sandy and light loamy soils, the potato is usually sound. For two years past, I have had a sound crop on *new* land. This year I underdrained a few acres of land, a part of which had never been ploughed, though it had been cleared of timber so long that nearly every stump had decayed. The field was planted to Indian corn. On one side two rows of potatoes were planted. Those grown on the land drained and never before ploughed, were of extraordinary size, weighing from one to two and a half pounds each, and still remain sound. They were what are termed here ox-hearts, a round pink-eye variety. So pleased have I been with this experiment, that I have drained about two acres of similar land for a potato crop next year.

In the year 1847, I tried the following experiment: I prepared about sixty rods of land in the following manner: one-half was highly manured with horse and cow manure, which had been piled in a heap the autumn before. The other half was treated in this manner: one-third of the drills were plentifully filled with leached ashes; one-third with ashes and lime; and one third with ashes, lime, and manure. The yield was at the rate of 360 bushels to an acre. The potatoes remained sound till about the 20th of September. About half were then dug. There soon followed a warm rain, and hot days, when I discovered that those not dug began to decay. They were immediately dug and placed on a barn floor. Those first dug were placed in a cool cellar. Those in the barn were soon one mass of putrefaction. Those in the cellar soon began to decay, and not five bushels remained fit for the table. Four varieties were planted: Moshannocs, pink-eyes, peach-bloom, and merinos. In June, 1846, I had purchased a load of merinos, and, a portion of the seed end being cut off previous to cooking, they were found to be a most excellent summer potato. The farmer of whom I bought them, and who raised them in a sandy loam, assured me they had decayed the least of any potato in his vicinity, (town of Victor, Ontario county, New York.) The soil of my lot was a clayey loam, inclined to moisture, the clay predominating.

Fruit.—The cultivation of fruit, especially of apples, is now commanding great attention. The apples of this county, and of western New York, are of excellent quality. Railroads now afford a ready mode of sending apples to market. This autumn, apples have quickly brought, delivered at the railroad depot in Canandaigua, from $1 to $2 per barrel. The amount exported from this county must be very great. It is estimated that from 400,000 to 500,000 bushels are sent from Wayne county. This estimate is founded on Erie canal clearances. This county, it is believed, exports a larger amount.

Quinces are raised also, and many barrels sent both east and west—$1 75 per barrel.

Manures.—Farmers begin to feel that the making, saving, and using of manure is a matter of great importance. Gypsum is found in extensive beds in this county, and is used for clover, corn, and, in light soils, for wheat. Leached ashes are valuable. Lime is used by some farmers. It may be had for 16 to 18 cents a bushel. On stiff clay, lime is thought to have an excellent effect, rendering it loose and friable.

Draining.—No improvement in farming promises more than draining. Where the water is abundant and flows over the surface, open drains, or ditches, should be made. Where the land is soft, moist, or springy, *under-drains* should be dug. These may be filled with stones, if they are to be had on the farm; if not, draining tile may be used. Tile for draining are now manufactured in this county, in West Bloomfield, of good quality, and at reasonable prices. Pipe tile are now esteemed the best. They keep their place better than the horse-shoe form, and the water soon finds its way into them and is freely discharged.

Thorough draining, as practised in England, (see Colman's European Agriculture,) may be too expensive for imitation in this country. Perhaps it is not necessary to any great extent. But there are very few farms which do not embrace a few acres needing some drains. *Swales*, places having small springs, swamps, hollows running some distance between high lands—all need underdrains. Ofen, by uniting these drains, a living stream may be secured, which it, on many farms, an ample remuneration for all the expense of underdraining.

The reader will allow the writer to refer to his own experiments: I have a small farm—140 acres. Most of it is rolling land. Yet every field had land, more or less, on which spring crops, and much more winter crops, would drown out. I have had made 200 rods of open drains, and about 650 of underdrains. I have used 5,000 tile, making 375 rods of the underdrains, and the rest is filled with stone. Allowing each rod to draw the water on each side only 16½ feet, I have drained 1,700 rods of land, or 10⅝ acres. Of these, 5 acres were never before ploughed, by reason of water. They mainly produced wild grass, blue flags, &c. The expense of draining is as follows: Open drains, 16 cents a rod; under drains, 37½ cents a rod—amounting to about $276. I paid $50 per acre for my farm; five acres redeemed land, at $60, amounts to $300. I have raised the best wheat, barley, corn, and potatoes on the land thus drained, by at least 25 per cent., compared with the average of the whole field. I estimate that, by expending about $75 more, there will not be a square rod on my farm (excepting a wood lot) which cannot be ploughed and made to produce both winter and summer crops.

Besides, I have now three new watering places during, at least, ten months each year; one of which furnishes a copious supply to two lots of 20 acres each, on which no water was to be found above ground during the whole season of pasturing. And if I wished now to dig a well, to afford water for cattle, I know *where*, as I have marked several places, where there are springs—permanent springs, I have no doubt—by digging ten feet deep.

I regard the saving and increasing of the supply of manure and draining, connected with deep ploughing and thoroughly working of the soil, and a proper rotation of crops, as the sure means of good, successful, and remunerating farming.

Yours, most respectfully,

HENRY HOWE.

THOMAS EWBANK, Esq.,
Commissioner of Patents.

SPRING WATER, WESTHILL,
January 18, 1852.

SIR: Having received the Patent Office Report, and feeling an interest in its general usefulness, I take the liberty to address a few lines to you, although not having been requested to do so; and first permit me to suggest some additional questions to your numerous correspondents:

First.—A description of the soil and timber in each locality, as nigh as may be. Second.—The price of land, means of transportation—whether navigable streams, railroad, or canal—and the distance of the correspondent from the same, and the town he lives in. This will enable those wishing to change their location to form some opinion of the merits of the different sections. Having suggested the above, I will proceed to give some general information.

The surface of the soil in this region is very broken and hilly, affording numerous mill sites, which are generally occupied with saw-mills, grist-mills, furnaces, and all necessary machinery for the convenience of the farmer. The soil on the ridges is what I should call a sandy loam, rather destitute of vegetable matter, but producing clover and other grasses in moderate quantities where plaster is used. The lumber is different kinds of oak, chestnut, and, in places, considerable pine, which is getting mostly used up; and in the low grounds, or feet of the ridges, and along streams, beach, maple, basswood, and some red-oak, which last is generally converted into staves. These are the principal kinds of timber, although others are occasionally found. This part of Livingston county is rather newly settled and cleared; consequently, any regular system of farming is not generally adopted. Some tolerable crops of winter wheat—I think mostly Soule's—are raised on summer fallow, which is generally ploughed twice, and sometimes three times. Product per acre, from 10 to 25 bushels; average, about 15. Grass yields from 1 to 2½ tons; average, about 1½ ton. Most farmers have a small patch of corn, which, with good care, and what manure can be spared, usually produces a tolerable crop—say 20 bushels per acre. The small yellow corn, that which ripens early, is preferred. Plant from 15th of May to 1st of June; usually ripens the last of September. Oats are generally sown, and do well, on reclaimed swamp-lands, often yielding 40 and 50 bushels to the acre; amount sowed to the acre from 1½ to 3 bushels. The ridge-lands in this vicinity are not calculated to produce good crops of oats unless highly manured. Barley is beginning to excite some attention, and does well on good oat-lands. Each farmer raises all the horned cattle he can keep in tolerable condition, which can only be made to pay for their cost by consuming the straw and coarse products of the farm. Hay is usually worth about $6, but sometimes sells as high as $10 per ton. Three-year-old steers sell from $20 to $30 each, according to quality. Cows, in the fall, to keep over winter, are worth from $12 to $15; and in the spring, with a calf, from $18 to $25. Cattle in this vicinity are of various pedigree—few that can be traced to superior stock. Horses are very high, ranging from $75 to $125. Sheep I consider the most profitable stock, leaving out horses, that farmers in this vicinity can raise. In the first place, I consider them the best stock to improve land that farmers keep. The Paula merino I think the most approved breed for our latitude. They are hardy, yield a heavy fleece, and, with proper care, will raise good thrifty lambs; and, with wool at 40 cents per pound, it will pay all expenses and interest on the money invested, leaving the lambs clear profit. Flocks in this vicinity average about 3½ pounds to the head; some yield considerably higher. A flock of ewes well cared for will raise ninety lambs to one hundred ewes. Potatoes have, in many places, proved a total failure; while some have succeeded in raising a tolerably good crop. The pale reds—some call them Sardinia reds, others Lake Erie reds—I consider least liable to rot; while pink-eyes and flesh-colored, or peach-blow, are pretty sure to rot. It is of little use for me to speculate upon the probable cause of the rot. So far as my observation extends, plant upon dry, sandy soil without manure, which will produce medium-sized potatoes, less liable to rot than those having rapid growth. The much-mooted question about seed-potatoes is about as difficult to settle as the cause of the rot. I have raised good potatoes from large and small potatoes, and even from potato-peelings. I think there is more in the ground, season, and manner they are tended, than in the size of the seed. If I planted large potatoes, I should cut them and scatter them about in the hill. Our market is mostly at Dansville, eight miles distant, although we have several mills nearer, which buy more or less grain. The Buffalo and Cohocton Valley railroad runs over the highlands in this vicinity; it is now being built, and, when finished, will give us a direct market to New York city

Under the head of fruit, I would say that not much at present is raised, although some interest is felt in this branch. I have had considerable trouble with the apple borer—a grub about an inch long, white body and black head. I know of no way of exterminating them but to open the bark where you see they are working, with the point of your knife, and cut them out. Month hands get from $12 to $15 per month for six months on a farm; day-laborers get, for haying, $1, and for harvesting, from 10 to 12 shillings per day. Land sells—just about where I live, or rather, I should say, the owners ask—for from $20 to $40 per acre, according to situation, buildings, &c. I do not know that I ought to trouble you further.

Yours, respectfully,

C. GARDNER.

Hon. Thomas Ewbank,

Commissioner of Patents.

Prattsburg, Steuben Co., New York.

Sir: Your Circular of August, 1851, is received. The inquiries embrace many topics of interest, and are calculated to elicit much valuable information.

In this county the clearing up of lands, and lumbering, have heretofore trenched greatly upon the tillage of the soil; and the culture of cereal crops was greatly neglected. But, as the timber disappears, agricultural pursuits receive increased attention; and, for the last ten years, wheat, oats, and barley have been successfully cultivated.

Wheat.—In the culture of wheat, guano is not used in this vicinity; nor, indeed, are any fertilizers applied to the crop, except gypsum and lime. Our lands are mostly new, and, as yet, unexhausted. With proper tillage, they may, for a series of years, yield fair crops.

Our farmers do not study the difference in soil, or any of its defects, for the production of crops. This will occupy their attention after the soil has been exhausted of its original fertility by improvident culture. Not until then will the science of soils and manures open a resource for successful tillage and improved crops.

The ploughing in this vicinity is generally hastily and carelessly performed. And the average yield of wheat is, consequently, not more than from 10 to 16 bushels per acre. I prepared a lot, that had not been much tilled for years, by ploughing it 12 inches deep, and crossing it twice; upon which I sowed, the last week in August, two and three fourths bushels of Soule's wheat per acre. The seed was rolled in plaster when sowed. It ripened, and was cut the third week in July, and produced 34 bushels per acre. A small lot of white flint wheat rather exceeded that in its yield. The time for sowing wheat is from the 25th of August to the 10th of September. In clay soils it should be sown in August; in warmer soil in September. The agriculturist should study the temperature of his soil and location, and sow his grain earlier or later, as the premises may warrant. The price for wheat has been from 75 to 81 cents.

Oats.—The crop of oats has been unusually productive in this vicinity. Yield, from 35 to 55 bushels per acre. From 10 acres I have harvested 538 bushels; price 25 cents.

The culture of *fruit* is receiving increased attention. Many old orchards are being improved by grafting, and others are produced by planting improved varieties of fruit. In this particular section of the county, we have in bearing every leading variety of the apple suited to our climate. Several new and valuable varieties have been added to the list; among them are the northern spy, the Hawley, the early Joe, the waggoner, the Belmont, or gate. The best varieties for winter use and for exportation, are the greening, the russet, the waggoner, and the northern spy. I have known the russet to keep until October. With proper culture, the apple may be made as profitable as any other product of the farm.

The peach is scarcely cultivated in this town, because it was taken for granted that it could not be produced in perfection. Some two or three of our citizens, by a liberal and careful culture, have succeeded in raising fine and abundant crops, and others are gradually imitating their example. By the application of charcoal and ashes to the roots of the peach tree, and by keeping the ground well tilled, luscious fruit may be raised for a succession of years. But no one ought to expect to raise the peach, nor indeed any other fruit, unless he keeps the soil enriched and thoroughly cultivated.

The idea of a stiff sod and a hard substratum is as consonant with the raising of fruit as with the production of a cereal or root crop.

Forest Culture.—Of the culture of other than fruit trees, all that is practised, as yet, is to cut down and destroy. This is incident to all new countries. Not until a total waste of foliage is produced does the culture of trees receive even an incidental attention. At first, a single tree is planted before the cottage door, *for shade*, and then, perhaps, another, for *uniformity*. Beyond this but a few extend their culture of trees, or even dream of their utility.

This is a subject well worth the study and attention of our citizens; it is so strictly connected with the pleasures of home as to comprise an important source of domestic happiness. Trees, in all their varieties and stages of growth, are as important to our home, to render it pleasant and agreeable, as any other fixture. The shaded and ornamented grounds speak as eloquently of pleasure as does the cheerful fireside or the laughing countenance of its inmates.

The attention of some of our citizens have lately been directed to this subject, and they have entered upon its practice. We have noticed its inception in the ornamented shrubbery and trees around some dwellings—a few at first, and planted without much taste or design. But this constitutes the beginning, and will induce repetition. A gradual awakened and cultivated taste will result.

From the dwelling to the lawn, and the highway, groups will appear, from year to year, until the culture of trees shall be deemed as important as any other branch of labor.

As this subject is intimately connected with rural taste and rural enjoyment, it is destined to be cultivated, for the time, by those of our citizens only in whom education and associations have awakened refined feelings, and a sense of the beautiful. So long as it remains a *mere amateur*

occupation, it will be confined to this class; but as our country becomes older, it will become profitable, and then the planting and culture of trees will receive general attention, and the subject be ranked among the useful employments of our citizens.

We feel the want of an agricultural school in our State, in which the sciences intimately connected with farming and rural occupations may be taught. As it is, we merely glean the periodicals of the day, and attain such information as enlightened and educated agriculturists around us can impart.

Respectfully, yours,

G. DENNISTON.

To the Commissioner of Patents.

Big Flatts, Chemung County, N. Y.,
September 24, 1851.

Sir: I received a Circular from you, requesting such information as I might be in possession of in relation to the agricultural interests of this county. With this I will cheerfully comply, believing that the information gathered by such means as you have adopted will be of vast advantage to the agricultural interests of the United States. Although I may be able to contribute but very little to the great object, I will give you the results of my experience in the cultivation of the soil. In the first place, the land I cultivate is an alluvial soil, or a sandy loam, of a very good formation for all the agricultural purposes incident to the climate.

Wheat.—My best success has been in a rotation of crops, in the following manner: First, the land should be seeded with clover of the middling quality. This, after pasturing one year, (the clover should be well sowed with plaster,) should be turned under with three horses, so as to plough it about ten inches deep; then plant with corn; next sow with barley; finally plough the barley stubble, and sow with wheat, which yields, on an average, about 30 bushels per acre—in some instances as high as 40 bushels per acre. I consider this the best system.

On my soil, (stiff clay,) the fallow system would be better, in order to pulverize the soil.

As to *corn*, proceed as stated before, until planting; I then plant the berry, yellow, in drills three feet apart; I then drop plaster and ashes, equally mixed, in the proportion of about 2 bushels to the acre, which makes a small handful in each hill; then drop the corn on the ashes and mixture, and cover the same with about 2 inches of earth; then plough well, hoe twice, and plaster again, when up, with plaster alone. With this process I have prevented the worms, and have increased the product 30 per cent. The best method to feed corn, undoubtedly, is to grind and cook it. Animals are then able to extract all the nutritious matter from it. Corn stubble makes the best preparation for lands designed for oats. I have raised 80 bushels to the acre; but oats impoverish the lands too much; consequently I do not raise them to any extent.

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Barley.—I sow this on my corn stubble; get a good crop without injuring my land, and still prepare it better for wheat. Yield per acre, 40 bushels.

Average price of the above crops here in the market—wheat, $1; oats, 31 cents; barley, 63 cents; corn, 1 cent per pound.

As to *dairy*, I keep just cows enough to make the rotation of crops and to eat my clover. The information that I could give on this point would be of no importance.

Tobacco is now cultivated here to some extent, and bids fair to be extensively raised, as it grows well, and will, no doubt, pay well when the people become acquainted with its culture.

As to *potatoes*, the best place I have found to raise them is on sandy soil, in order to prevent them from rotting, as this is the chief thing we have to contend with in their culture. The theory about insects and mildew, in causing them to rot, is but the result of a brilliant imagination; as I have seen two varieties planted in one hill, where one would be entirely rotten and the other wholly sound. The most successful method I have practised is to plant them just as I do corn, using the same kind of manure, and in the same way.

I think I can speak of the system of farming I have laid down with some confidence, from the fact that the farm which I cultivate was, ten years ago, considered worn out; but by deep ploughing, and a rotation of crops, the product has increased from 5 to 20 per cent. per year, and still continues to increase, but not to so great an extent. In the mean time I have husbanded all the manure that would accumulate from such a system. I have purchased no fertilizers but ashes and plaster. Lime would, no doubt, be of vast importance; but the cost here is too much to make it profitable—70 miles being the nearest place it can be procured. Guano has never been employed here; consequently, I cannot inform you whether it would be profitable or not.

Yours, respectfully,

JOHN HAGGERTY.

FALLSBURGH, SULLIVAN COUNTY, NEW YORK,
December 30, 1851.

SIR: Your Circular, calling for agricultural statistics for the current year, was duly received, and would have been answered sooner had it not been for a delay in order that I might furnish you with a meteorological table, kept at the Liberty Normal Institute, which I could not get until the end of the year.

I remark that in replying to your questions I shall mention such articles as I am familiar with, and those based principally on experience.

Oats and Rye.—Oats are extensively raised in this county; average yield would not vary much from 30 to 35 bushels per acre. This crop has deteriorated very much of late years. The true cause is, I think, that the land has been exhausted of some of the necessary elements for producing this kind of grain. I use 3 bushels per acre for seed. Some farmers only use 2½. The best acre of oats that was exhibited at our county fair, to which was awarded the first premium, was 66 bushels. The average yield of rye is from 10 to 12 bushels per acre. From 28 to

41 bushels have been on exhibition at our county fairs. From 1¼ to 1½ bushel of seed used. I prefer the latter quantity. I consider rye the least exhausting of any grain we raise, and the oats the worst.

Neat Cattle.—I have never kept an account of the cost of rearing. Heifers in calf at 3 years old are usually worth from $18 to $22. Good dairy cows in the spring sell for $25 to $30. There is very little difference in the prices in spring or fall. Since the Erie railroad has been in operation, new milch cows are eagerly sought after, at all seasons in the year, by men who furnish the New York market by that road.

"*How do you break Steers to the yoke?*"—Our usual custom is to put them in a yard that is clear, and yoke them together; never tie their tails together, as was an old custom, to prevent their turning the yoke. Put a halter on the near-side one to prevent their running away, and, with the halter in one hand, and a whip in the other, commence driving them gently, seldom using the whip. If they are stubborn, urge them gently. Harshness only makes them worse. If they are disposed to run, let them have their way. The yard will prevent them from getting away from you. After worrying awhile, let them run a little while alone, for an hour or two, occasionally giving them a drive. They should not be driven to make them tired or leg-weary. This is the cause of some oxen lying down when they get a little weary. When they get a little used to driving, they should be fastened to something light, to learn to draw. A pole or a sapling is very good. After a drive of a few hours every day, they will generally get gentle enough to partially dispense with the halter. It should wholly be dispensed with as soon as possible. After they get a little used to drawing, they should be put to a cart or wagon and taught to back. It is a very good plan to commence backing where the ground is a little descending at first. Oxen, if properly managed at first, can be taught to back nearly as much as they can draw, which is often important. After they get so far broken that they will draw light loads, they should be driven a short distance and stopped, and be learned to hold up their heads. This is generally easily done. At first it will be necessary to lift up the yoke on the near steer by hand; and putting the right knee under the bow, and a little motion of the foot under the off-side one's chops, will bring his head up. A little practice in this way and a motion of the whip will make them raise their heads at the word when they stop. This always makes oxen show to good advantage. When I have a well-broken pair of oxen, that for size will match tolerably well with steers, I mismatch them together. In this manner they get broken much sooner. Oxen and steers should never be hallooed at as if they were deaf, much less whipped, only in case of necessity. Patience and kindness should be freely exercised in breaking steers. A good whip with a light slim lash is best, and, when it is necessary to use it, let it be a snap rather than a stroke with the whole lash. An ox should never be used to expect a blow before he starts, but learned to start at the word, and, if they are not overloaded and mauled to make them draw, instead of their becoming drones, they will be spry and active, and will perform with nearly as much activity as the horse.

Horses and Mules.—With mules I have no experience; with the horse I have. I consider raising horses of good stock and character a profitable business to the farmer, but those of inferior character a dead loss. Horses of an inferior character always sell at low prices, and it is generally to such men as are hard to get pay from; while those of a superior class sell readily to men who are able to pay down.

I have never kept any account of rearing until three years old. One thing I am certain of—it costs but little more to raise a colt than a heifer or steer. As respects the keeping a brood mare, I can hardly determine. I have raised some excellent colts, and worked the mare the year round; others I have reared, and scarcely worked at all; and I have never been able to discover that the colt was any better at the age of three years. Great caution is necessary, in working a brood mare, not to overheat or overwork her. When a mare runs without work, she gives a larger flood of milk, and the foal depends on it. The reverse is the case with a mare that works. The foal soon learns to depend on its own feeding; and when weaned, will seldom pine away, like a colt that has always had a full supply of milk. I have generally found it easier to keep a colt in thriving condition the first winter when the mare has been worked than when she has run idle. This I account for from the fact that the colt has sooner learned to depend on its own resources. As respects the profit of keeping a brood mare at work, or one that does not, I consider the balance much in favor of the former. It is very expensive keeping horses, unless they are kept at work.

"*What is the best way to break Horses?*"—I consider this an important question, and as much overlooked, perhaps, as anything relating to rearing and fitting horses for service. A well-broken horse is what every man wishes for, and will command a readier sale, although he may be somewhat inferior in other respects. Such a horse only can be depended on. When I speak of a well-broken horse, I wish to be understood one for farmers' use; and such a horse, I believe, will answer all purposes that a horse is used for. I shall only speak of breaking to harness. I will simply say that my opinion is, a colt should not be used under the saddle until it is at least four years old. I think breaking to harness should commence at three years, but never put to hard work till six years old. In order to break a colt as he should be, it is of great importance to have a horse that is qualified to break him with; and, in order to make myself understood, it will be necessary to describe some of his qualifications. In the first place, he should be, in every way, perfectly true and kind. A horse that will bite a colt is unfit for the purpose. He should be a good stepper, because this is indispensable to a good traveller. The step is what tells in the journey. There is many a horse that can trot fast, and is at the same time a poor traveller. When a good stepper is found, it almost invariably follows that his other gaits are in proportion. He should also be well broken to the word. Now, I would put the colt in the stable, and put the harness gently on him, keeping the doors all shut, and let him stand in the stable a few hours in each day for a few days until he gets used to the harness, and occasionally lead him out doors to get him accustomed to it. After he gets over showing fear of the harness, he should be placed beside the horse he is to be driven with, and the two harnessed together. Great care should be used not to frighten him. After getting all ready, a person should take him by the head, and another hold off the lines with a whip, and begin to lead him along. If he is disposed to run, hold him in gently; never jerk him in the mouth; humor him in the bit until he gets use to it. After driving him around an hour or two, if he is not afraid, you may attach him to a wagon that is not too heavy, and drive him on a walk, if possible; but, if he is disposed to trot, bring him to the walk as soon as you can, and drive him on the gait, and, if possible, never let him break the walk till he is learned to walk as fast as he possibly can. Much may be done, in the breaking of a colt, to increase his speed for a traveller. Driving him on a walk will not worry him; consequently, he can be kept longer in the harness than if he was driven fast. As soon as he appears to get a little tired, unharness him carefully; see that every part of the harness is unloosed before you attempt to take it off. His breast should be washed with cold water. The next day he should be harnessed and driven as before, unless his breast shows symptoms of being galled, which will be discovered by the hairs being wet under the collar. He should never be harnessed when there is the least appearance of his breast being sore. Great care should be used in turning about, for fear the wagon-tongue may strike him suddenly, and cause him to kick. After he has been driven day after day till he has become accustomed to the harness and carriage, and learned to walk as fast as it is possible for him to do, you may commence the trot, in which he should be as thoroughly learned as to walk. It will not do to drive him far at a time; but drive him a little way, and stop till he gets rested. It is as necessary to teach him to stop and to start as anything else. After he gets thoroughly broken to the trot you may let him walk or trot occasionally; but be sure not to let him get both gaits mixed up together, which will spoil both. Make him understand his business thoroughly, whatever it may be. You may now commence drawing light loads with him, but be sure not to put a heavier load behind him than the break-horse can easily draw, and get your carriage in a position that will start easily. Be sure to have your break-horse ready to start when the word is given. In this way he should be trained till he thoroughly understands his business. Always bear in mind that the gaits above described are of the utmost importance to the value of the horse; and whether driven to a load or light, close attention should be paid to his gaits till they are thoroughly understood by him. Now, another kind of training will be necessary for the farm. That requires another kind of gait. I have always found that the best kind of work to put a colt to at first was to put him to harrowing ploughed ground. This is work that will soon make him leg-weary a little, and it will be easy to bring the quick step to a slow one, which is always necessary for ploughing; and whether for ploughing, or dragging, or whatever the work may be that requires the horse to go slow, he may be trained to this gait without injuring his step before the carriage. But let him thoroughly understand what his business is, and in after-life he will never forget it, and it will add to his value as long as he is able to work. In driving on a walk the lines may be a little slack; but he should always be taught, when the line is drawn tight, to start off free; and, when the line slackens, to come to a walk. Great pains should be taken to learn him the word to stop or to start. "*Whoa*" should never be said to him unless it is intended for him to stop. Those who are unaccustomed to thorough breaking may say I am taking a great deal of unnecessary pains; with such I will have no controversy. I will only say to them, try your kind of breaking, or rather no break or gait at all, with a thoroughly-broken horse on the road, and satisfy yourselves. I am confident that whoever will follow my made of breaking will feel themselves well paid for their trouble. I am well satisfied that there are many that would have been valuable horses; but, for the want of thorough and proper training, they have become nearly worthless. There are some persons who have not a suitable horse to break a colt with. When this is the case, it would be better for the owner to put his colt into the hands of some man who has the proper means to do it. I have broken a number of colts, and never had one that proved unkind in my own hands. Some of them were very high-mettled animals. With such much care is necessary in training. Such horses are generally much more to be depended upon when they are broken.

Two years ago I received a small package of rye-grass seed from the Patent Office that bids fair to be valuable in this section of country. It starts earlier in the spring than any other grass I am acquainted with, and I think will produce two crops in a season. The seed ripened here by the 8th of July.

I have harvested the second crop of multicole rye from the small package I received from the Patent Office. It appears to be of an excellent quality, and I think will prove productive.

Root Crops.—Since the failure of the potato crop, the rutabaga and flat field turnip have been extensively raised, and I think are rather on the increase. Carrots and beets are only raised for culinary use.

Irish Potatoes.—Since the potato disease first made its appearance, the average yield per acre has fallen short of what it formerly was, with most varieties. Many of those that were formerly considered the best for culinary purposes have entirely disappeared, while a very few varieties have continued. Among those that have been the least affected by the disease, the yam potato stands first; and I do not know that I can do any better than to refer you to the Transactions of the New York State Agricultural Society for 1849, page 571. In addition to that, I can say that I have raised, ever since, excellent crops, without the least symptom of rot. In each year since, I have raised several other varieties, most of which have rotted more or less. Some have rotted the last summer. I have, in the last three years, shipped several hundred bushels of this variety to different ports, and in some six or seven States; and, so far as I have heard from them, they have been entirely free of rot. They are very firm and crisp, and require the whole season, in this section, to mature.

We have a wire-tooth horse-rake in this section that answers an excellent purpose in our stony country. It has, I believe, nearly done away with the revolver, and is a great labor-saving machine. Its superiority over the revolver is that it works nearly as well on the stony ground, where the stones are not too large, as anywhere. It is simple in its construction, and is easily repaired. The price is about $8 or $9.

Annexed is a *meteorological table*, that was kept at the Liberty Normal Institute, in our county, which was kindly furnished me by the proprietor, John D. Watkins, M. D.:

1851.	Mean temperature.	Water fell.
January	25° 4′	2.47 inches.
February	28 0	7.69 "
March	33 6	3.15 "
April	41 0	10.91 "
May	54 18	3.69 "
June	60 0	4.88 "
July	66 0	2.68 "
August	64 3	2.22 "
September	38 0	3.49 "
October	48 0	2.68 "
November	31 7	3.64 "
December	20 3	3.88 "
		51.38 "

I remain, most respectfully, your obedient servant,

LOTAN SMITH.

NEW JERSEY.

Hackensack, Bergen County, N. J.,
December 16, 1851.

Sir: Our postmaster, Mr. Peter V. B. Demarest, having resigned the office held by him, requested me to answer the Circular issued from your office in August last. Our location is about 12 miles from the city of New York; and being thus near the market, we are about as much gardeners as farmers.

In regard to *wheat*, with us it is chiefly raised for home-consumption; and barn-yard manure is ordinarily used; the product averages about 20 bushels to the acre; it is sown about the 1st of October, and harvested about from the 5th to the 15th of July. We soak the seed in pickle, and then mix with dry ashes or plaster, and use about 1½ bushel per acre. The yield is increasing. My neighbor sold 150 bushels of this year's crop for $1 15 per bushel.

Corn produces about 50 bushels per acre; cost about $15. My plan is, to plough up old mowing ground, 9 inches deep, as soon as the frost is out, and plant about the 10th of May; then apply about one gill of unleached wood-ashes per hill before the corn is up; hoe twice, and plough between as much oftener as I can until the corn is about 2½ feet high. I cultivate the southern horse-tooth and the northern white-flint (no mixture) in preference. I feed the southern corn whole to horses and swine, as it is easier to masticate, being softer, and have the flint corn invariably ground for feeding, except for poultry. I have never sold the flint corn for less than 75 cents per bushel, and meal $1 50 per hundred weight. I do not sell until about November, when, in our section, it is scarce. Of oats we use about 2 bushels seed, and the yield is about 35 bushels per acre; of rye, about 1 bushel of seed, and the yield is about 18 bushels per acre. Clover yields about 1½ ton, and timothy, or herds-grass, 2 tons per acre. Mowing-grounds are not manured, as they are not generally cut for more than four years, when the ground is again ploughed for corn. The cost of producing hay is about $5 per ton, and it is now worth, by the load, loose, $17 per ton in the New York market.

Neat cattle, at 3 years old, are worth $18; good cows, in the spring, are worth $35; in the fall, $25.

Tobacco is beginning to be experimented with. I have tried what with us is called seed-leaf, which is valuable for cigars and wrappers. It has been quoted in the New York market, through this year, at from 16 to 20 cents per pound. Our good average crop is from ten to fifteen hundred weight per acre; but upwards of a ton has been raised from an acre. The cost of producing is about $4 per hundred weight.

Turnips are on the increase. They are generally sown broadcast, and are of the Aberdeen variety. The yield is from 400 to 500 bushels per acre. There is no after-tillage; and I find them as valuable as beets for cattle, with less than half the cost of production.

Potatoes (Irish) will not yield one-half as much when cultivated in the usual way as they did but a few years ago. I use lime liberally on the land, and think it is a preventative against the rot. I this year more than doubled my product by using the following: For a small lot of 2½ acres, I carted out and put in a heap 30 loads of barn-yard manure. I took 10 gallons of sulphuric acid, diluted with 30 gallons of water, in which I dissolved two-thirds of a barrel of ground bones; then diluted the mixture with 2 hogsheads of barn-yard liquor, and put it evenly over the heap of 30 loads of manure; mixed it well by turning over for two days. I then carted and spread it out, and ploughed in while wet. Where I used double the quantity of barn-yard manure, I had not half as many, or half as large potatoes; consequently, I shall be induced to try it again.

Manures.—We use no guano. We have abundance of salt-meadow hay, from which we make manure; we use lime liberally; plaster, sparingly; ashes, as much as we can get from New York and elsewhere. Swamp muck is getting in repute as a fertilizer. It is carted on heaps, and mixed with one-tenth its bulk of lime, or one-fifteenth of ashes, and generally lies 6 months before using. I have found the muck mixture equal to barn-yard manure for corn, potatoes, grass lands, or the cereal grains, and at less than half the cost; and as the supply generally is abundant, there is no limit to the amount we may make. I will only say that our section, in regard to farming, is vastly improving. Agricultural associations have been formed, which give a perceptible impulse and create competition among the members by the various experiments made and facts deduced. I think we produce full one-third more on the same land than we did ten years ago.

With great respect, sir, I remain, obediently, yours, &c.,

DAVID R. DOREMUS.

Hon. Thomas Ewbank,
Commissioner of Patents.

Post Office, Woodbury, Gloucester County, N. J.,
October 28, 1851.

Sir: Not being a farmer myself, I handed your Circular to one of our best practical farmers; and his remarks upon the same I herewith send you. The articles of sugar-cane, rice, tobacco, and hemp are not, that I know of, cultivated in this county; consequently, I can say nothing about them. Hoping the information I send you may be of service, I am, with great respect, your obedient servant,

ALEXANDER WENTZ.

Hon. Thomas Ewbank.

Wheat.—In this county guano is but little used in the production of wheat, and has proved uncertain in its operation where it has been tried; average product per acre, about 15 bushels; best time for seeding, 1st of 10th month, (October;) harvesting from 1st to 10th of 7th month, (July;) 1½ bushel sown per acre. Plough twice—the first 6, the last 3 inches deep. The average per acre may be increasing, owing to the improvement of the land; but the quantity grown must decrease, because there are many crops better than wheat, at $1 per bushel, that can be grown.

The rotation is corn, potatoes or some kind of truck; wheat, sown with timothy and clover grass-seeds, to remain from 3 to 5 years.

Corn.—Guano is not much used with corn, which is the most profitable of all the grain crops, producing from 30 to 50 bushels without manure. The best culture is with the cultivator and plough—one of which should be used every fortnight from the time the corn is large enough until it shoots in tassel.

Clover and Timothy are the favorite grasses for upland, and yield about 1½ ton per acre. Marl or green sand is much used for the production of grasses, and is, with lime and plaster, the best of fertilizers.

Neat Cattle.—Raising cattle to 3 years old costs about $20, which is about the selling price. Good dairy cows are worth from $25 to $30. More meat is made in a Durham than native animal by the same food.

Horses and Mules cannot be raised to much profit, as it costs from $60 to $70 to rear them to 3 years old, which is about the average value. To handle them while young, and use gentle means, is the best system of breaking.

Wool-growing is not profitable, but raising lambs for the butcher is; when from 3 to 4 months old, they bring, in Philadelphia, from $2 50 to $3 per head. Large, open-wool ewes are preferred, and will average 1¼ pound each. The most productive system is to pass the whole flock (except the bucks) into the hands of the butcher during spring and summer, and renew in early autumn.

Hogs.—A cross with the Berkshire makes a good breed of hogs. Let the pigs come as late as will allow their mother to get fat by New Year. Keep them well during winter, and turn them on clover in the spring, when they will grow and do well without other feed until fall, when some offal, potatoes, &c., will prepare them for the pen, where from 5 to 8 bushels of corn will make them weigh 200 pounds, which is as heavy as desirable for the selling of hams and shoulders. One of the best receipts for curing is, for 80 pounds meat, 1 pint fine salt, 4 ounces brown sugar, 3 ounces saltpetre, pulverized and well mixed together; rub the meat all over with it, laying them singly on a board; let them remain 24 or 36 hours; then pack them down in a tub, and add 2 quarts of fine salt for every 80 pounds; let them lie 15 days, and then hang them up for smoking.

Turnips.—The cultivation of turnips is rather on the increase. It is found to be a good plan to plant them directly after digging early Irish potatoes, without any other than the manure put on the potatoes. To use a drill is the quickest way to plant them. Thin and hoe them as soon as possible, when they may be cultivated with a cultivator. Average crop from 300 to 500 bushels per acre.

Irish Potatoes are planted much with marl, without any manure; the yield is about 100 bushels per acre. The crop may be increased by mixing manure with the marl; the mercer variety most in favor.

Sweet Potatoes.—Cultivated in hills 3 feet apart each way; a small shovelful of manure, well rotted, put into each hill, which has but one plant put in it, previously sprouted in hot beds; should be ploughed and hoed about 3 times; yield about 125 bushels per acre; worth from 50 to 100 cents per bushel.

Fruit is not receiving the increasing attention it demands; for an acre of well selected apples, or other fruit, suitable for the market, would yield more profit, if properly taken care of, than if cultivated with grain. For the feeding of hogs and other animals they would not compete with grain or vegetables. The Roman stem and wine-sop apples are, of late, among our best for keeping.

The best plan to preserve manure from waste, is to apply it to the land soon after made; and the best way to make it, is to collect all the vegetable matter possible, and put it in the barn-yard and pig pens, &c.; also, when the manure is left in the yard all summer, it is good to cover it with soil, muck, and plaster. Lime is much used—from 30 to 50 bushels per acre. Plaster is also used on clover and on Irish potatoes—about 1 bushel per acre.

PENNSYLVANIA.

WARREN, WARREN COUNTY, PA.,
October 3, 1851.

SIR: In reply to your Circular, I have to say that the circulation of your Report, however valuable and useful for the agricultural interests, rarely finds its way to the practical farmer. But the political bar-room politician and professional man are generally the only recipients of such favors, and, unless you can adopt some different mode, it will be rendered unprofitable to the cause of husbandry. Would it not be within the scope of your duty and office to circulate it more fully through agricultural societies, who would readily furnish their lists of officers, and be furnished through their secretaries? I have never had a copy but once or twice sent me, and that happened through a friend, then a member of Congress. But, as the fates have it, we never had him returned, nor any one of his stripe, from this district. Now for the grain:

Wheat is not very extensively cultivated in this county—winter growing only on the rivers, flats, and bottoms, or on some oak and chestnut ridges; the main reliance being on spring wheat. Guano is not used in this county as a manure for this or any other crop. The average crop of spring wheat of the Black Sea variety may be 20 bushels per acre; but of the other varieties, not to exceed 15 per acre. Fall or winter, 25 bushels. For the latter, summer fallowing, as a preparation, is still resorted to. But late fall wheat is raised frequently from corn-fields and potato-ground by one ploughing, if the soil is adapted; if not, the following spring. Spring wheat, ploughed late in the fall, and sowed as soon in the spring as the ground will admit, gives the best returns. Good crops have been raised of fall wheat from meadow land, broken up after the crop of hay has been removed, ploughing only once; common depth of ploughing, from 4 to 5 inches. I think, of late, a better system of farming has been practised in raising wheat; and I think it is on the increase now. In this, of course, I do not mean to take into account the primitive crop raised on virgin soils newly cleared. Very little system as to rotation of crops prevails. Wheat after corn, and other hoed crops, being manured, seeded down to grass; broken up again, sowed to oats, next rye, and then to buckwheat; then corn, and with all the manure. But many get good returns, and practise planting corn on green sward, ploughing immediately before planting. Rust is the greatest disadvantage we labor under here. The county being greatly engaged in lumbering, we have a market at home for all descriptions of grain; wheat usually commands $1 per bushel. The average of this is probably 50 bushels per acre—costs, per bushel, 25 cents.

Corn.—I think that corn is the only crop that will stand the effects of barn-yard manures, as they are applied in the spring, as they ought to be, to get the full benefit of all their qualities. You ask to "State if you can how much grain the manure from ten bushels of corn consumed by hogs will add to an acre, if carefully saved and skillfully applied, at or before time of planting." In reply to this, I would say, that I have never seen it carefully saved nor skilfully applied; but if skilfully saved, by adding to the sty a full supply of straw and other materials, which hogs would incorporate into manure by their excrements, it would add one-fourth to its value.

Oats, average yield 40 bushels; *barley*, 25 bushels; *peas*, 20 bushels; *beans*, 40 to 50 bushels per acre. Least exhausting are rye and peas. Peas are not cultivated as renovating, but buckwheat and clover.

Clover and Grasses.—From 1 to 1½ ton may be said to be the average yield. The best fertilizer is gypsum, excepting on naturally wet meadow, where it has but trifling effect. Timothy seed is generally preferred; but on the flats and gravelly soils, mixed with clover—mostly the small kind of clover; but the large clover I prefer, as it accords more with timothy in maturing. Four quarts of good clean seed are sufficient, particularly if prepared by an application of gypsum.

Dairy.—130 pounds of butter, on an average, and 350 pounds of cheese, from a cow; comparative cost—say 6¼ cents per pound of butter, including all expenses; 4 cents per pound of cheese. Average price of butter is one shilling, cheese 6d.

Neat Cattle.—Cost of rearing till 3 years old, $18; price at that age, $25 to $27. Value of good dairy cows, in spring, is from $25 to $30, and in fall $20. The Durham half-breeds seem to feed easier than the purely native, and yield more according to the food consumed. Begin young with calves to accustom them to a light yoke, and they seem no more to forget it; and it makes a very pleasant pastime for the boys. This is the best mode with all animals—frequent kindly handling.

Horses.—In rearing good horses there is some profit, and a certainty, too. I think it costs $60 to rear a colt till it is 3 years old. Taking into consideration the keeping of a mare purely for breeding, this is a low estimate. In ordinary cases—say $45 to $50, using the dam at the same time. Breed mares and colts should have free open air in winter, but a good shelter, when they wish it, at their control; good clean bedding there; a supply of water also at their hand, and plenty of hay, and some small supply of grain; ground or boiled oats are best. In summer, plenty of grass and good water, with a shelter to run to from sun and rain, and the pitiless storms of the spring and fall. This last is within the reach of all. Get some slabs to make a shed—can't you?

To raise superior animals, I have found it best to breed every alternate year, giving the colts a full chance with their mothers till the early grass of the second spring; then weaning them. Of late, I prefer handling early colts; as there is nothing, in my opinion, to be gained, as was supposed, by leaving them till more mature in their spirits and carriage. That springs from other sources, and cannot be so easily accomplished by art.

Wool growing is profitable; price, the present season, from 35 to 45 cents per pound. The large sheep for mutton; small for wool. I think there is no material difference in the cost of producing fine or coarse wool. What is lost in carcass is gained in wool, and *vice versa*. The coarse are more prolific than the fine-woolled sheep.

Hogs.—Difference of opinion exists as much on this as on any other subject. I think the Berkshire the best.

The cultivation of *roots*, as a field crop, is not resorted to to any great extent; and as for potatoes, I should beg to be excused—it is beyond my skill. I shall try planting in fall, and recommend early planting in all cases to bear a crop.

Fruit.—I am happy to say, fruit is getting more attention from our farmers, and is a good remunerating crop.

Manures.—The best plan of making manure, I must say, is not so often resorted to as it ought to be and merits. A good yard, well supplied with straw, and cattle kept there, and not allowed to run in the roads, as is too often the case, through the winter, will make and preserve it. A little gypsum used in the yard, after cleaning out of stables, adds greatly to the quality, and makes the premises more healthy and agreeable.

This has swelled beyond my intentions, and will greatly outweigh its merits.

I am respectfully, sir, your obedient servant,

P. FALCONER.

HILLSGROVE, SULLIVAN COUNTY, PA.,
December 10, 1851.

SIR: An Agricultural Circular was received through the Hon. Joseph Casey some time since, soliciting such information on the above named subject as may be useful to embody in the Report for the present year.

I do not suppose I will be able to give any information on this subject worthy of so prominent a place; but, as I have a deep interest in this

branch of our national industry, I will give such suggestions as my limited experience will admit of.

As the culture of *potatoes* is an important branch of agriculture, and one that is exciting considerable interest, owing to the prevalence of disease for the last few years among them, I would state a few facts from observation of several seasons:

Those planted earliest and on light soil have done much the best, viz: from the 1st to the 10th of May. Light, sandy soil, without manure, has turned out a tolerable yield, with scarcely the appearance of disease among them; and being dug as soon as, or shortly after, the vines die, they have kept well through the winter; whilst the same kind of seed planted on rich mould, or planted with barn-yard manure, or stable manure, with the same kind of treatment in other respects, have nearly all decayed. But, under all circumstances, those planted earliest have been less affected with the rot than those planted latest. In those places where marl or peat is to be had, composted with a small quantity of lime, it is the best manure that can be used.

Ground that has just been cleared, or new land, providing the soil is dry, is well adapted to the culture of this crop.

Wheat.—In preparing the ground for wheat we choose fallow ground from which corn has been taken the previous year. The ground should be ploughed at least twice. The first time, the middle or last of June; then harrowed and cross-ploughed in August, and thoroughly pulverized; and the grain put in from the 10th to the 25th of September. The difference between once or more ploughing varies according to the previous condition of the ground and nature of the soil; if it is clay land, with much weeds and grass on it, followed by a dry season, it will make nearly a third difference.

Wheat put in with drills will give a much better yield than that sown broadcast under similar circumstances. But where drills are not used, the grain is not so apt to be frozen out if ploughed in as if harrowed. I usually sow about one and a fourth bushel per acre.

My system of rotation of crops is to plant corn on the sod ploughed in the spring or fall previous; then sow oats on the same ground the next spring; and after the oats are harvested, plough the stubble and sow the wheat, putting the manure on the top, and put it in with the wheat; from 25 to 30 bushels being an average crop. One dollar per bushel is the price for wheat in this township and for some miles around, it being a lumbering county; but at Muncy, the nearest point where grain is shipped, the price since harvest has been from 75 to 80 cents.

Manures.—Fifty bushels of lime are commonly put to the acre; but this, as with the application of other manures, should depend on the quantity of other fertilizing properties which the soil contains. Those containing much vegetable matter will admit of heavier applications than those that are poor and sterile—in which latter case it should be put on in smaller quantities and oftener; the same with marl and ashes. The best fertilizer for meadows and pasture lands, where it is to be had, is marl; but after frequent applications of this manure, which usually contains a proportion of sulphur, a light application of lime will be found of great benefit, as it neutralizes and continues with the sulphur accumulated from the marl, forming sulphate of lime. The cheapest vegetable manure is to plough under clover.

The actual cost of raising cattle to three years old is about $12, and that is the business to which this county is best adapted.

Respectfully, yours,

AUGUSTUS LIPPINCOTT.

Hon. Thomas Ewbank,
Commissioner of Patents.

Byberry, Philadelphia County, Pa.,
1st mo., 17th, 1852.

Having been much interested in the Patent Office Reports for several years, and feeling a desire that they should be continued, I will answer briefly the questions in the Circular sent me some months since.

As the *seasons* have much to do with the success or failure of agricultural labor, I would say that we have been visited by a severe drought, commencing in June and continuing until October. There was scarcely any rain fell for some months, and the pasture fields, in many instances, were entirely parched up. The corn and potato crops were materially injured, and the turnip crop a total failure. At the present time more than half the wells in the neighborhood are dry, and some springs that have never failed before are entirely dry.

The *wheat* crop is perhaps larger than for several years. I should think a full average crop of 20 bushels to the acre has been harvested. The price is 90 cents per bushel. The Mediterranean is universally sown; its early maturity being proof against the grain-worm, (a very destructive insect that feeds upon the grain whilst in a milky state.) The quantity of seed sown is from 2 bushels to 2½ bushels per acre, from the middle of September to the middle of October, and the crop is generally harvested about the middle of July. Clover and timothy seeds are both sown with wheat, and the quantity of hay grown is about two tons per acre. The clover is generally fed on the farm. The timothy is carted to the Philadelphia market in loads of one ton each, where it has been worth, the present season, $18 per ton.

Corn is perhaps the most important crop raised in this section. A timothy sod is ploughed, in April, five inches; is well harrowed and marked out with a plough four feet each way; and about the first of May the corn is planted, five grains in each hill, and covered, with a hoe, two inches in depth. Compost, made of manure, lime, plaster, and ashes, is applied in the hill.

The corn is worked principally with the cultivator and hoe; three stalks are left standing in each hill; about the middle of September it is cut up and put in shocks of 36 hills each, which are firmly secured with a band of straw near the top. The husking is done the latter part of October, the corn cribbed, and stalks tied up in sheaves and placed in ricks near the cattle-yards.

In consequence of the drought the crop was below the average, though some farmers had sixty bushels to the acre; the stalks are worth $8 an acre. The price of corn at the mills is 70 cents per bushel.

The gourd-seed is the most common variety; but I have obtained an excellent kind by mixing the gourd-seed, Cooper, and Oregon, in which

are combined large ears, deep grains, and small cob. This is the best variety that I know of.

The crop of broom corn was good, but the price is so low that many farmers will relinquish its cultivation another season.

Oats are generally sown after corn, as soon as the ground can be put in order in the spring—3 bushels of seed to the acre—producing in some instances 70 bushels to the acre; average crop 40 bushels—worth at present 40 cents per bushel.

The *Dairy business* is not extensively carried on; most farmers consider it more profitable to sell hay. A good cow will make 200 pounds of butter in a year, worth in Philadelphia 20 cents per pound. Fresh cows are worth $30 each. A few cattle are fed through the winter, and sold to butchers in the spring.

Potatoes are not extensively cultivated; the crop was materially injured by the drought; 200 bushels to the acre is considered a good crop. Large potatoes are worth at the present time in Philadelphia $1 per bushel.

Roots.—The ruta-bagas (of all the root kind) are the best for feeding stock; but are very little cultivated.

Turnips are sown among corn, and frequently large crops are grown in this manner; but, as I mentioned before, in consequence of drought, there were very few grown in this vicinity the present season.

The best breeds of *hogs* are the Berkshire and Chester county, which will weigh, if well fatted, when one year old, 300 pounds. They are not much raised for market, but principally kept to consume the offal about the farm.

Manure.—As I remarked last year, the main source of manure is the barn yard, where the straw, cornstalks, and refuse of all kinds are collected. Loam, leaves, &c., are hauled in through the fall and winter; and composts of muck, lime, and plaster are often made. Plaster is universally sown on clover in the spring with beneficial effects; and lime is applied generally on wheat stubble at the rate of 40 bushels per acre.

Guano has been used in small quantities, principally on wheat, with good effect; but the high price prevents its coming into general use.

Respectfully,

JAMES THORNTON, Jr.

Hon. Thomas Ewbank.

North Whitehall, Lehigh County, Pa.,
January 19, 1852.

Sir: Your Circular, requesting information on the various branches of agriculture, was duly received.

Permit me to offer an enlarged plan of a *barn*, (with a slight variation to correspond to size,) which I built in 1850, with a view of housing everything that may be raised and grown on the farm—making the most and best manure, and at the same time promoting the health of the cattle.

Fig. 1 represents a perspective of a barn calculated for a farm of 150 acres, seen from the southeast, standing on the margin of a western slope running towards the south. The main building to be 92 feet in front, facing towards the south by 40 feet wide, and 18 feet high, with an addition on the northeastern corner of 22 by 72 feet, and likewise 18 feet high, which gives the eastern side a depth of 112 feet, with a cellar extending under the whole building, a portion of which may be partitioned off for a root-cellar for storing roots and vegetables; a portion may be used for storing wagons, sleds, and implements when they are not used; and a portion may be possessed by a stationary or other horse power for threshing grain, cutting cornstalks, hay, straw, &c.; and the residue for depositing manure. On the rear wall, in the middle of the building, a cistern should be constructed to receive the drainage of the manure pile; the bottom of the cellar in front should be nearly on a level with the ground on the open side, and sloped in such manner that all the liquid may readily run into the cistern.

The manure is thrown through trap doors into the cellar, in the rear of the animals. On an improved farm there can always be more straw raised than can be used for litter. A surplus of straw will then be on hand to increase the manure pile, which should be spread evenly and at suitable intervals on the manure pile; and, as the urine voided by the animals will not be sufficient to moisten all the straw, frequent waterings will be found necessary; and where no hydrant or other running water can conveniently be had, cisterns should be constructed to provide for a sufficient supply of water.

Young cattle may be kept, during winter, on the manure heap; and, indeed, I find it to be of great advantage to have cattle on the manure heap, especially when much straw is thrown on, to have it trodden in, as it will more readily absorb the liquid, and prevent the waste of gases.

Fig. 2, shows the interior of the barn; AAA, the entry; B, horse stalls; C, cattle stalls; the animals stand on a platform six inches high, having a slope of two inches towards the rear of the animals, there forming a gutter to receive the manure; EE, &c., are trap-doors in the gutter which admit the manure to be passed into the cellar; DD, &c., doors; F, a trap-door admitting the surplus straw to pass into the cellar on the manure heap; GGG, three threshing floors, two of which may be used as bays for storing grain, hay, or straw; H, bay; I, granary.

As regards the health of the cattle, I find this plan greatly preferable to the old-fashioned bank, or Swiss barns, which have their cattle-stalls in the cellar, or lower story, generally too damp to be wholesome, which, by following nature, may readily be recognised to be so; for example: in a warm summer season, cattle never show a disposition to go into their stalls in a bank or Swiss barn; while my cattle have, ever since I have stalled them in my new barn, every evening, summer and winter, manifested a disposition to go into their stalls, which are in summer cool and airy, and free from any pungent smell. I have made it a practice to clean the stalls daily, and strew loam on the floor, which absorbs the gas and other nauseous odors, rendering the apartment cool, and, by proper ventilation, airy, and thereby acquiring a valuable addition to the manure pile, which, especially in summer seasons, when cattle run in pasture, may be greatly augmented, as their excrement is then more watery, and, consequently, more loam and litter are required to be

mixed with the excrement, to absorb the liquid and odors; while, on the other hand, if cattle be permitted to remain during the night in the yard, this acquisition is principally lost.

I had almost forgotten to acknowledge the receipt of a package containing a variety of German *garden seeds* in the spring of 1850. The result was, several kinds of seeds did not vegetate at all; the others, with the exception of one kind, produced only inferior vegetables; of the seed labelled "*German white fall turnip*," only a few grains vegetated, which produced enormous turnips. These I have preserved for seed. Last season I raised a considerable quantity of seed of said turnip, which I have distributed among my neighbors and others; but the last season was so uncommonly dry, that no fair sample could be raised. I have also to acknowledge the receipt of a copy of the Patent Office Report for 1849—agricultural.

Very respectfully, yours,

EDWARD KOHLER.

Hon. THOMAS EWBANK,
Commissioner of Patents.

HARRIS TOWNSHIP, CENTRE COUNTY, PA.,
December 24, 1851.

SIR: In reply to your Circular, the following notes of our agricultural position and prospects are at your service. Those referring to stock and dairy management are contributed by Mr. Samuel Gilliland, of this township, and are the results of his personal experience.

Situation and Soil.—The floor of Penn's and Nittany valleys is almost wholly limestone clay, with remnants here and there of overlying slates and sandstones, which compose the mountain boundaries. The limestone beneath is broken and cavernous, forming natural and perfect drainage, and rendering the soil, though naturally heavy, warm and dry. Penn's valley and Buffalo valley, with the connecting narrows, offer an inviting route for a railroad in a direct line between Pittsburg and Easton, *via* the Anthracite coal regions.

Manure.—A large proportion of the farm-buildings are near the streams, for convenience of water; and in too many cases the richest half of the manure is washed away.

Clover grows with the aid of plaster, and is much depended upon for meliorating and enriching the heavy soil. Its large roots, in decaying, break up the solid texture of the soil, and render it permeable to air. Most farmers sow clover after taking two crops of grain, and many sow it in the cornfield after the last working, preparatory for wheat. Plaster is universally used, and could not be dispensed with at present. Lime is but little used, and is not so manifestly beneficial here as in other places; yet examples of its profitable use are not wanting.

Culture.—Our most successful farmers now plough 6 to 8 inches deep. But many are discouraged from deep ploughing, both by the heavy texture of the soil and the bad results which usually follow from bringing up a thick layer of clay at once. The subsoil plough has scarcely been introduced. It would seem useful in breaking up the subsoil and preparing it for the surface. If brought to the surface raw and fresh, it bakes, and becoming impervious to air, the plants growing in it perish.

Crops.—Wheat and Indian corn are the main crops. Of 100 acres of clear land, 40 acres are usually in wheat; 30 in corn; 10 in oats, rye, potatoes, and sometimes barley; 10 acres of mowing ground and 10 of pasture; 12 to 15 acres of good timber are required for such a farm, but the mountains supply much timber to the valleys.

Four horses are necessary here to work a farm of this size, and it keeps about 20 sheep, 12 to 15 head of horned cattle, (4 to six cows,) and 12 to 15 hogs—kept over one winter. The average yield of wheat in 1840 was 20 bushels per acre. In 1851 this township would not average more than 10 to 15 bushels. Corn is, at present, the most profitable crop. Wheat has not averaged over 75 cents during the past year. The price of land is from $10 to $60 per acre.

Fruit Trees grow and bear as well here as in most parts of the middle States. In the lap of the mountains (elevated ground close to the foot of the steep ascent) frost is seldom destructive, and crops are sure; but the trees become exhausted, and the fruit is not as fine as in the valleys. Apples yield a full crop once in 2 or 3 years, and fail entirely once, perhaps, in 10 years. Peaches bear abundantly once in 4 or 5 years, and fail once in 5 or 6 years.

The finer kinds of cherries and native grapes do well where they have been tried. Plum trees are as yet free from black knots, and there seems to be no difficulty in arresting them if cut away promptly. The trees bear abundantly, but the curculio takes the lion's share. This insect was not so numerous as usual the past season. Keeping the soil of the plum-yard bare and firm, and allowing free ingress to pigs and poultry, have proved effective against the curculio, and aid the growth of the tree.

A majority of the peach trees in the country have been destroyed by the yellows; and the disease, through an ignorance of its nature, has been more advanced than checked. Trees affected by the yellows ripen their fruit prematurely, and seeds of these are too often planted in the hope of raising early sorts—most of the native seedling peaches being rather late. Pear trees flourish, compared with their growth in other places; yet very few good pears are to be found. The common sorts are very austere.

Of cherries, the common mazzard, the late pie cherry, and the morello are the only kinds generally known. The mazzard is a very poor bearer—often of bitter and very small fruit; the morello is subject to black knots; and many, judging all cherries by these examples, swelter through the heats of early summer without enjoying nature's own refreshing and grateful provision for the season.

In a few years there will be a better supply of fruits. Young orchards are springing up, and are beginning to receive their due share of culture. Of apples most farmers have orchards of from 50 to 100 trees, mostly grafted, but generally with a meagre assortment.

Mr. Christian Dale, a leading orchardist and farmer of this township, says: "I consider good apples the most wholesome of all fruits. I have a family of 12 constantly, besides day-laborers. We use 5 barrels of cider and 18 bushels of apples to make apple-butter for a 12 months' supply, and 1 or 2 barrels of watered cider for vinegar, considering it preferable to any made from poisonous alcohol. One family will consume *two hundred bushels* of apples in a year, if they have an orchard yielding a full supply of the best sorts, in regular succession, say—

"100 bushels summer and fall apples for eating, cooking, drying, &c., at 25 cents per bushel	$25 00
100 bushels best winter apples, at 50 cents	50 00
5 barrels cider, at $2	10 00
18 bushels sweet butter apples	4 50
2 barrels watered cider	2 00
Value of apples consumed in one large family	91 50

"Where a farmer has not a good supply of fruit, a great deal of money is carried to stores to purchase molasses and other substitutes, not so good or so wholesome for a family of children."

"*Stock and Dairy.*—The average stock of dairy cows here is $16; the yearly produce of butter 190 pounds. We strain our milk into earthen crocks; in warm weather we keep it in cool spring water, in a stone spring-house; in winter we keep it in the cellar till cream rises, which requires about 36 hours. Keep the cream in a large crock till it gets thick, then churn. The average price of butter is 10 cents per pound, and the cost is from 8 to 9 cents per pound. The milk is fed to pigs.

"The cost of raising neat cattle till 3 years old is $17, and their value at that time is $21. During the first 2 months of feeding corn to a steer of that age, 100 pounds of corn will add 15 pounds to his weight; after that, not so much. Of pork it will add 20 pounds.

"To break steers to the yoke, take them when 2 years old, get the yoke on, and tie their tails firmly together, to prevent them from turning the yoke; then put them into a field and let them walk about, to become familiar with the yoke. Get a long hickory, and, by its motion and the word of mouth, you can get them to follow. If you have a yoke of cattle that are broken, put the young ones behind them; hitch to a sled or log. Good breakers of oxen never put a line on them.

"When a *mare* is with foal, she should be worked but gently; she should not be confined closely; she may be worked till her time of colting. Let her rest 7 or 8 days after she has her colt. When the colt is 6 months old, take it from the mare; in good weather, keep it in a grass lot, but stable it in cool or stormy weather. Put a halter on it and tie it to a manger, so as to oblige it to raise its head up when it eats. If a stud, let the manger and the windows be quite high, so as to strain the muscles of the neck. He should occupy a separate stable after he is 18 months old. Occasionally let him out into an open lot for free exercise. When a colt arrives to the age of 2½ years, it is time that he should be bitted. It is of great consequence that he should be at first gentled by some person who understands the management of horses; as *first impressions* are never entirely removed from man or beast."

Seeds.—The seeds distributed from the Patent Office generally come under the care of the farmer's wife or daughters. Many new, and some quite superior, vegetables have appeared—some so entirely new and strange that neither as gardener nor cook could the good housewife make out what to do with them. These seeds, collected in far corners of the earth, and presented to the quiet and grateful tillers of the soil, are seeds also of good will—blessings both to the giver and the taker.

Very respectfully,

WM. G. WARING.

Hon. THOMAS EWBANK,
Commissioner of Patents.

LEWISTOWN, MIFFLIN COUNTY, PENN.

SIR: Your "Circular" of August, 1851, was handed me by Colonel Butler, the worthy postmaster at Lewistown, with a request that I would respond to its inquiries. This I have briefly done in such cases as a personal experience of 30 years in agricultural pursuits would enable me to do with some sort of confidence, leaving to others the task of replying on subjects with which I was not conversant, or could not speak with the necessary precision. Doctor Rush has said that there were more false facts in medicine (by which terms he designates the false conclusions so often drawn from inadequate experience) than were to be found in any other science; but I must think, had the learned Doctor turned his attention to agriculture, he would have found that there were more of this kind of facts current on subjects connected with this pursuit, and incorporated with its literature, than are to be found in all the other callings taken together. The thousand-and-one infallible remedies for the potato rot, the smut and mildew in wheat, the peach destroyer, the bee moth, &c., &c., are a sufficient confirmation of at least this one *veritable* and humiliating fact. Such will ever be the case as long as men will persist in publishing their crude and visionary theories and fallacies, resting, perhaps, upon a single ill devised experiment on subjects wherein, to arrive at any satisfactory conclusion, it would require long and patient investigation, and numerous and carefully-diversified experiments.

Soil.—The valley of Kishacoquillis, in which I have resided the last 30 years, comprises the largest and most productive body of land within the county of Mifflin, and will bear a comparison in agricultural improvement and fertility with the finest portions of our State. The soil is highly calcareous, and is based upon the lime-rock No. 2, in the geological series of Professor Rogers. Flint or horn-stone, in rounded masses, has been in many districts profusely scattered over the surface; and such as are so large as to interfere with the plough or harrow are hauled off the fields. But in all these localities the same material in smaller fragments, diminishing to the size of coarse sand, enters largely into the composition of the soil; and although wheat suffers more upon the flinty grounds from exposure to the frosts of a hard winter, yet during the spring and summer months it will outstrip, in vigor of growth and product, the grain upon other lands which, in the early part of the spring, had presented a much more promising appearance. Where this ingredient most abounds, our heaviest crops of corn are raised; and there can be no doubt that our

flinty lands retain moisture better, and sustain a severe drought longer, than any other.

Wheat.—A clover-sod is turned down for wheat in April or May, with a three-horse plough, as deep as it can be well laid over. The ground should be rolled and harrowed before and after harvest, to pulverize the soil and keep down weeds. Before sowing, the ground is stirred and harrowed smooth. Seeding commences the 1st of September, and harvest about the 1st of July. A bushel and a half is allowed to the acre when drilled in; a peck more when sowed broadcast. Our wheat crops have certainly been increased from 10 to 15 per cent. by the general introduction of the drill.

The average product is between 15 and 20 bushels per acre; but 30 is not uncommon amongst our good farmers, and fields have reached even 40 and upwards. Average weight, 61 or 62. In the year 1845, wheat averaged 65; and some Mediterranean reached the unprecedented weight of 69 pounds. Some white-flint, the seed of which I got from Rochester, New York, weighed over 68, and was the most beautiful specimen of wheat I ever beheld. *This* and the white blue stem are two of our best kinds, and the latter is the one most generally now cultivated. The average price of wheat at our nearest market (at Lewistown, on the Juniata river) in 1851 was 80 cents. From this place there is a canal and railroad transportation of 170 miles to Philadelphia, and about the same distance to Baltimore. The best remedy yet found for Hessian fly is plenty of manure and good cultivation; for this pest, like other parasites, preys upon the weak and sickly. The bearded wheats, and particularly the Mediterranean, resist its ravages better than the bald kinds. I have never been troubled with weevils, nor have I heard many complaints from this cause.

Corn.—Guano is not likely to be much used for this crop so long as gypsum, which is much cheaper, is attended with its present beneficial effects. Our system of culture is to turn down a clover sod with a three-horse plough late in the fall, any time through the winter, or as early as possible in the spring. By this means we escape the ravages of the cut-worms, which are destroyed, in their embryo state, by being turned up to the frost. The ground is effectually pulverized by repeated harrowing without turning the sod, and lightly scored out across the furrows at the distance of 3 to 3½ feet apart in the rows. No preparation is used for early planting; but when late, there is much time to be gained by soaking the seed over night and rolling it in gypsum. The best times for planting here are the last days of April and first week in May. As soon as the corn is fairly up, it is harrowed and plastered at the rate of at least half a bushel per acre; one-half of this quantity, in combination with wood-ashes, has been found to be equally efficacious. The plough and cultivator are the only implements afterwards used.

Varieties are ever changing from intermixtures with other kinds. The sorts preferred here at present are the larger yellow-grained, and particularly such as ripen earliest. To many it may not be known that there is much advantage to be gained by occasionally changing our seeds of wheat and corn for the better kinds of northern climes. Such seeds, in addition to their early maturity, acquire increased vigor when transplanted to a more genial climate; whilst the very reverse (as I have found at some cost) will be the case with regard to seeds brought from more southern latitudes, and which will require many years for their acclimation. Corn, which I raised from seed of the early Sioux from Maryland, was much damaged by our early frosts. From these facts I am led to infer that the Mediterranean, from its early maturity and hardy properties, must be a northern wheat, and has probably reached us through the waters of the Black sea. Our average crops of corn may be safely estimated at 30 bushels; yet 50, amongst our good farmers, is quite as common, and, under very favorable circumstances, even 80 bushels have been reached. Did our farmers generally take the time to chequer the ground, and give it the additional culture required by this process, the average product might be increased at least twenty per cent. The clover sod has the same effect of mulching above ground, in retaining moisture around the roots of the corn; and, with the aid of gypsum, has more than doubled the product of this grain. Nothing is so detrimental to corn as working it when wet, and it is never too dry for this purpose. The most economical way of feeding corn is to have it ground with the cob, and to give it raw to horses and cattle, and cook it for hogs. The cheapest pork I ever made was with boiled potatoes, mashed while hot, and mixed with one-third or one-half cob meal, scalded with the water in which the potatoes were boiled, and made into a thick slop, slightly salted, and well peppered with hickory ashes. By having two vessels, I kept the slop in a state of fermentation, which improves its fattening qualities very much.

Oats.—For this crop our corn stalks are turned down as early as possible in March or April, and sown at the rate of 2 bushels to the acre, and harrowed in. The manure is strewn upon the oat stubble, and turned down to wheat, to be sown the following spring with clover. When we have two fields of corn, one of them should be sown after the last ploughing with clover. This is a much better course than to leave the ground so long fallow, as, without injuring the corn, it affords a couple of months of good pasture the following season before it is broken up for wheat. Oats are considered our most exhausting crop; but by means of manure the land is kept up to the proper tilth, and we gain an extra crop by it. The average yield of oats is from 40 to 50 bushels per acre. The earliest are generally the best, exceeding in weight the later sown.

Rye, Barley, Peas, and Beans.—Small quantities of the first two of these grains are occasionally raised, but they do not hold a regular place in our system of rotation.

Clover and Grasses.—Our wheat fields are sown in March with clover seed, at the rate of 4 quarts to the acre, followed by at least one peck of plaster as soon as the young clover is up. This application, in addition to the vigorous growth it promotes, is a protection from the effects of drought, so often fatal to the tender plants in May. Negligence in this respect has been often followed by a total failure of the clover crop. Of the ill consequences of such a failure, it would be difficult to form an estimate, as, in addition to the loss of hay and pasture, it deranges the whole routine of operations, and reduces the land, by compelling the farmer to stubble in the fields in which the clover had failed. Clover should be so thick as to cover the ground, to the exclusion of everything else. From the foregoing, it will appear that clover, with us, is mown but once, and pastured but one season—a rotation which requires more seed, but is a great improvement over the old system of cutting and pasturing the fields two seasons. Clover is not strictly biennial, but much of it dies out after once blossoming; and some years ago it was not an uncommon thing to see fields which had been well set with clover kept up for pasture until they were converted into a stiff, blue-grass sod.

Clover, in combination with gypsum, has been the means of renovating our exhausted lands, and has proved to be, after long experience, superior in nutritive and fertilizing properties to every other fodder. In fields intended for mowing, many sow a mixture of timothy seed, which helps to keep the clover from lying down, and is thought to improve the hay for horses. It is better to sow the timothy the fall previous, immediately after the wheat has had its last harrowing, or after the drill, and, if possible, before rain. As soon as vegetation fairly commences in the spring, we sow about half a bushel of plaster to the acre upon the clover fields, both for hay and for pasture; and in June, when about one-half of the blossoms have turned brown, we make from the fields that are mown from one to two tons of hay, according to the season. As this kind of hay is, of all others, the most injured by rain after it is once dry, it is all important that it should be safely housed.

The best grass for natural meadow, if not too wet, is timothy; if wet, red-top is highly recommended; but, in the latter case, it is better to underdrain. *Natural meadow should never be ploughed unless it is desirable to convert it into upland.* If it should become sod-bound, or the timothy runs out, the surface should be well torn with a heavy, sharp harrow, both ways, in September, and sowed with timothy seed, and in the spring with clover and gypsum, to be succeeded by a top-dressing of manure. As the clover dies out, the timothy takes its place, and becomes thicker and stronger than ever.

Experience here is adverse to turning down green crops as fertilizers, and few, I believe, have repeated the experiment. In two instances in my own immediate neighborhood wherein heavy crops of clover were ploughed down in full bloom upon land of excellent quality, the immediate effect, at least, was highly pernicious, as evinced in an almost total failure of the succeeding crop of wheat. I am disposed to attribute this result to the mucilaginous and saccharine matter with which the plant in this state so much abounds, and which, by being buried in the ground and subjected to the united influence of heat and moisture, takes on the acetous fermentation, and thus becomes so detrimental to healthy vegetation.

I do not say that such consequences always follow the ploughing down of green crops, for here experience would seem to be against me; and many circumstances—such as the state of the ground, temperature, rain, or drought—might combine to bring about or prevent such a result. Be this as it may, however, there can be nothing gained by the practice, as clover loses none of its fertilizing ingredients by drying; and hence we find that a heavy mat of dead clover, which has been trodden down by our cattle the previous season, is as good as a coat of manure; and for this reason the farmer whose staples are wheat and corn should not overstock his farm through the summer. A good rule is to keep no more than can be conveniently wintered. Our most thrifty farmers buy up a lot of poor bullocks from the West, in the spring, to feed through the winter; and by this means the heavy crops of straw, which would otherwise be in a great measure lost, are passed through the stable for bedding, and, by the additions there acquired, are converted into rich mines of manure. The beef thus fattened always commands, in the spring, the highest prices.

Root Crops.—With the exception of Irish potatoes, root crops are not cultivated as food for stock, simply because corn is cheaper. If one of our farmers was asked why he did not grow sugar-beet or ruta-baga, he would most probably say that he could not spare the time; and such is the fact, as he well knows that he can raise a bushel of corn with less trouble than he could a bushel of the turnip or beet; and one bushel of corn is worth three of the roots.

The largest and finest potatoes are grown under a clover sod, previously spread with stable manure; the cuttings are planted 8 inches apart, in every third furrow, close to the land side, and well strewed with gypsum before the sod is turned over them. This application, as I have proved from numerous experiments, both improves the quality, and, in dry seasons, more than doubles the quantity. After the ground dries off, it is to be harrowed with a light sharp harrow until *the surface is perfectly smooth;* and if the sod is likely to be turned, the harrow should be preceded by the roller. When the tops appear, each row is to have a stroke of the harrow to disentangle any plants which cannot readily get through. When the tops are a foot high, a cultivator is passed between the rows, which are afterwards enclosed by the plough in a nice box of earth. All that is required afterwards is to pull out by hand any grass or weeds which may arise in the rows, and destroy such as come up in the middles with the cultivator. By the above simple and economical process, I have never failed to produce finer crops of potatoes than I could grow on ground that was fallow under the most careful culture. For planting, I prefer a large potato cut small; which, having the strongest buds, will put forth the strongest shoots, and we will always find the size of the tubers will be proportionate to that of the stalks. But one or two good eyes are left to each cutting. Various kinds are planted for early use—amongst which the mercer is perhaps the best, and also keeps well. The finest variety we have for a late crop is the pink-eye. I regret to add, that crop after crop, and some of the most promising we have ever had, including every kind, have fallen a prey to the mysterious destroyer so universally prevalent. All the potatoes which have ripened before the 1st of August (that I have planted) have escaped the rot; if others have been alike fortunate, the hint should not be lost. Our late potatoes are gathered when the ground is dry; which is put in with the rest of the field in wheat.

Fruit.—Abundance of fine apples are raised everywhere throughout our county, but prices are too low to make it a profitable crop. In fruit seasons the best apples are frequently sold in our orchards for 12½ cents a bushel, and cider at the press for $1 per barrel. The varieties that keep best are the Newtown-pippin, the pound or fallow-water, the gray-house, cart-house, smoke-house, and green pippin. The Rambo, Spitzenberg, French pippin, yellow bellefleur, and black Vandervere, are the favorite fall and winter fruits. The peach once flourished everywhere throughout our State; but, for many years past, the worm and the yellows have been so fatal to it, that its culture is almost abandoned. The only remedy yet found for the yellows is the extirpation of the whole stock of trees on hand, replacing them with healthy kinds from uninfected districts. Trees have often been preserved a long time in a healthy condition by constant vigilance in picking out the worms with a sharp-pointed knife, and pouring boiling water around the roots spring and fall. Tobacco-leaves are much spoken of as a preventive; also, an ointment of train-oil and tallow, containing a small portion of mercurial ointment. There is an accurate colored engraving of the peach-destroyer, (*Egeria exitiora,*) in its winged state, in Say's Entomology. The blight in pear-trees may be avoided by ingrafting the Seckle, the Bartlett, and other hardy varieties of recent origin upon *seedling stocks.*

The Vine.—My experience with the grape has been sufficient to prove that its culture might be turned to profitable account, particularly in the vicinity of our larger towns and cities, where there was a market for the fruit. I had, for many years, from one to two acres under cultivation. After unsuccessful trials of the French and Rhenish vines, I finally turned my attention to the native kinds only, of which I found the Eichelberg, or York Madeira, and the Catawba the best. From the former I made a red wine, without addition, which somewhat resembled good claret, with a very pleasant flavor of the fruit peculiar to itself. From the Catawba, with the addition of some sugar at the press, I made a rich, strong wine, which now, after twelve years, retains all its good qualities. This fine fruit is seldom left upon the vines till perfectly ripe; and after it appears so to superficial observers, it should be permitted to remain several weeks, during which time the pulp becomes softer, the skin thinner, and the juice richer and more saccharine. One principal cause of failure in the culture of the vine arises from planting it in too rich a soil, from which it acquires an unnatural luxuriance of growth; the bearing-shoots will be long-jointed and spongy, with two much pith; the wood does not become sufficiently ripened, and is attacked with mildew, and perishes in the winter. In a congenial situation the bearing-shoots will be small, short-jointed, and solid. A light sandy or gravelly soil, with a southern exposure, should be selected. Very little manure is required; and a compost, into which the virgin soil from the woods and fence-rows enters largely, with a small addition of ashes and foreign or domestic guano, is the best.

Manures.—Lime has been used to some extent, and with various results, and its complex operations upon different soils are still involved in much obscurity. When mixed with argillaceous earths, it has a highly beneficial operation, not possessed by any other agent, of changing the texture of the soil, rendering it more crumbling and permeable to water, and assimilating it to that which is naturally calcareous. When applied to a good limestone soil, its beneficial effects, of course, are not so apparent; but even in this case we have the most decided proof of its favorable operation in the change it produces in the suite of plants which are the spontaneous growth of every kind of soil. In fields which have been well limed, instead of the blue grass and sorrel, so injurious to our crops, there will spring up the weeds peculiar to the richer soil of our gardens, such as the lamb's quarter, (*Chenopodium album,*) mallows, (*Malva rotundifolia,*) and Spanish needle, (*Bidens bipinnata.*) When applied with a view to its durable operation upon the soil, from 100 to 200 bushels should be allowed; and I have reason to believe that, in combination with manure, double the highest of these quantities might often be advantageously used. It is applied in smaller portions with great advantage—in many places, as a top-dressing; but in such cases its good effects will be proportionately less permanent.

Very respectfully, yours,

JOSEPH HENDERSON, M. D.

Hon. THOMAS EWBANK,
Commissioner of Patents.

RISKWAYVILLAS VALLEY, MIFFLIN COUNTY, PA.,
December 18, 1851.

SIR: In reply to your Circular of August last we beg leave to state, first, as to *wheat:* although over 40 bushels per acre have been raised in this region, it is not supposed that the average yield of the best farmers would much exceed 20 bushels per acre. The average yield of Mifflin county, however, it is believed, is not more than 15 bushels per acre.

Guano has been but little used in this region. We have sown two-thirds of guano, mixed with one-third of plaster, broadcast previous to harrowing the ground in preparation for drilling in the wheat. Where the ground was poor, it was put on thickly; and where the ground was rich, less was put on. The result was an extraordinary crop all over the field. The gain cannot be stated, as it was not applied in equal quantities.

Fallow ground in this region is generally ploughed twice; sometimes it receives three ploughings from 6 to 7 inches deep, with intermediate harrowings.

The most general preparation of seed wheat is to let it become thoroughly ripe, and to separate it from the seeds of all kinds of weeds. The time of sowing is from the 10th of September to 1st of October.

Harvest comes on about the 1st of July. The best remedy for the Hessian flies is to manure the ground well; and, if the flies attack the wheat in the fall, to turn the cattle on it in dry weather, so that the ground may be well tramped, or to roll it with a heavy roller.

We are not much annoyed by weevils. No general system of rotation prevails. The common practice is, first, corn, or a close sod; plough late in the fall or early in the spring; next, oats. The ground is then manured, and the wheat drilled in at the rate of one and a half bushel to the acre. White blue-stem is the most productive; Mediterranean is less esteemed than formerly. Clover seed is then sown in March or April, and not unfrequently timothy seed is sown; it ought to be sown immediately after the drill. The ground is then mowed or pastured for one or two years.

Clover ground is also fallowed to a considerable extent, and not unusually wheat is raised on a clover lay. After the ground is first mowed, the clover is permitted to grow up previous to ploughing; the harrow is passed over it in the direction which it is intended to plough. After the clover is carefully turned under, the harrow or cultivator, or both, should be freely used to pulverize the ground previous to drilling in the wheat. Although the yield per acre of the better farmers is, by a judicious system of manuring, on the increase, and, although the use of the drill has increased the yield per acre in general, yet, upon the whole, the fertility of the soil is supposed to be decreasing.

Our nearest market is Lewistown, and the average price of wheat for 1851 is about 80 cents per bushel.

As the difference in the cost of raising a bushel of wheat in various parts of the United States may be a matter of interest, we present the following estimates:

Estimate of the cost of producing a bushel of Wheat in Mifflin county, Pennsylvania.

Interest on land (one acre) one and a half year, $70, at 6 per ct.	$6 30
First ploughing one acre	1 50
Twice harrowing "	40
Second ploughing "	1 00
Twice harrowing "	40
Seed, 1½ bushel "	1 50
Drilling "	40
Harvesting "	1 50
Hauling and stowing in barn	40
Threshing "	1 60
	15 00

Which $15 ÷ 20 is the average 75 cents, the cost of raising a bushel of wheat.

Estimate of the cost of producing a bushel of Wheat in the State of New Hampshire; by Henry Huntoon, of Unity, N. H., 1847.

Seed, 2 bushels, one acre	$4 00
Interest on land	2 00
Ploughing	2 00
Harrowing	1 00
Harvesting	3 50
Threshing	2 50
Manure	7 00
	22 00

Costing, at the rate of 20 bushels to the acre, $1 10, to raise a bushel of wheat in the State of New Hampshire.

Estimate of S. M. Bartlett, of Lasalle, Munroe county, Michigan.

Interest at 6 per cent. on one acre, worth $15 00	$0 90
Twice ploughing	2 00
Twice harrowing	50
One and one third bushel of seed	1 00
Sowing and harrowing	50
Furrowing and clearing furrows	50
Harvesting, &c	1 50
Threshing and cleaning	2 00
	8 90

Which, at 25 bushels, the average per acre, would be thirty-six and four-fifth cents for producing a bushel of wheat in Michigan.

Mr. Bartlett raised an average of $25\frac{1}{8}$ bushels of wheat for 8 successive years, at an average cost of $34\frac{3}{4}$ cents per bushel.

From the preceding statements, it would appear that the cost of producing a bushel of wheat is 66 per cent. more in New Hampshire than in the fertile and easily cultivated soil of the State of Michigan.

In 1848, we sowed 2,000 pounds of guano, mixed with one-half ton of plaster, on a 15-acre field of *corn*, which had been under cultivation for 70 years; and which, owing to excessive cropping, produced only a half-crop of clover the previous year. The mixture was sown broadcast immediately after planting the corn. After the corn was from three to four inches high, it was harrowed, and soon after the cultivator was passed between the rows. When the corn was from eight to twelve inches high, it was ploughed about three inches deep, and the surface containing the guano thrown in towards the rows. The yield was about 50 bushels to the acre. The following spring this field was sown with *oats;* and, although the outcrop this year was short in the straw, and light in general, the yield of this field was over 40 bushels per acre. The straw was much longer than any we noticed in the neighborhood during that season. While growing, this field of oats had a remarkably striped appearance, which was visible at a considerable distance from the field. Although the oats were even in length all over the field, the parts which had been occupied by the rows of corn were of a much darker green than the parts between the rows; proving conclusively that the effect of the guano was not all exhausted in the first year upon the corn, but that it contributed largely to the production of a fair yield of oats. When ploughed for corn, about one-half of said field was subsoiled with Prouty & Mears's subsoil plough. No difference, however, could be noticed between the part which had been subsoiled and the part which had not received that extra work—neither in the corn nor the oat crop, nor in the wheat crop which followed.

The cost of the guano and plaster, and the cost of preparing and applying it, was $4 45 per acre. The gain of the guano alone could not have been less than 300 per cent.

The average crop of corn of the better farmers is about 60 bushels in favorable seasons.

The cost of producing a bushel of grain varies much, as well as the number of bushels produced on an acre, and depends on the quality of the soil, as well as a judicious application of manure and cultivation. On the whole, we put the average cost of producing a bushel of corn at 35 cents per bushel, and the average number of bushels produced at 36 bushels per acre. The average yield of oats we estimate at 28 bushels per acre.

Oats are believed by some to be very exhausting to the soil. This opinion, we think, is in a measure owing to the looseness of the soil after a crop of oats; which, on soils naturally friable, causes wheat sown after oats to freeze out, or winter-kill. As wheat generally follows a crop of oats, a coat of barn-yard manure ought always to intervene between the oat and wheat crop. Land treated in this way seldom fails of producing a good crop of wheat, and will, if properly managed, increase the fertility of the soil.

The improvement of the breeds of *horses* and *neat cattle* has been much neglected. Some superior breeds of cattle have been attended to; but as a proper system of crossing and improving has not been attended to, they have generally degenerated. The recent organization of our State agricultural exhibition at Harrisburg has done much to attract the attention of farmers to this subject, and will no doubt excite them to action.

What we have stated in relation to neat cattle will also apply to sheep and hogs.

The cultivation of *fruit* is receiving increased attention; but is yet, by many, too much neglected. In the townships of Union and Menno, in this county, extensive orchards abound, containing most of the better varieties of apple trees. Cherries and plums are here, also, tolerably plenty. Pears and peaches are more scarce.

I find no difficulty in preserving the peach tree. My method is to keep the trees well mulched, and to apply boiling water to the roots, near the trunk, in the month of April. Before the water is applied, the soil should be removed from about the roots, near the trunk of the tree; and, if any worms have penetrated into the wood, they ought to be laid low by a sharp knife. By mulching, we mean the placing of straw or any other substance around the tree, in sufficient thickness to rot the sod, and to keep the ground moist in dry weather. In no case, however, ought anything of the kind to be permitted in the winter, or in time of snow, as the mice will harbor in it and peel the trees. It should always be applied in the spring, and removed before the first snow in the fall.

Respectfully, yours,

SHEM ZOOK.

SWATARA FALLS, NEAR MIDDLETOWN, DAUPHIN CO., PA.

SIR: Having been favored with a copy of your Circular, soliciting information relative to agricultural crops, modes of farming, &c., &c., I cheerfully comply so far as my experience and knowledge of the various points belonging to rural affairs will enable me to do so. Before I proceed, however, to answer the points set forth in your Circular, permit me to make a few general remarks on this important subject, confining myself entirely to my own county. In this county the practical farmer has long since accomplished all that can be accomplished without the aid of science. Inhabited for years by an industrious German population, the experience of the father handed down to the son by tradition, the cultivation of the soil has been brought to great perfection; but not until within a few years has the aid of science been sought and studied by our farmers generally; and great improvements have already been made in the productiveness of the soil, as well as in the saving of labor and expense in its cultivation. Within this year a State agricultural society has been formed, with an auxiliary county society in this and many of the other counties of the State. The State society had a fair a Harrisburg, in this county, which far exceeded the most sanguine ex pectations of its friends. This has given our farmers a new and powerfu impulse; and the time is at hand when, by the aid of science, and th experience and industry of our farmers, agriculture in this county wil be brought to its highest degree of perfection.

Wheat is extensively cultivated in this section. Guano has been used in the production of this crop, but only within the last few years, in small quantities, by way of experiment. It has not been sufficiently tried to test its value fully, but promises to answer very well. When two crops of wheat are raised in succession on the same ground, the ground being dressed with stable-manure for the first crop, and the guano sowed on broadcast, 300 pounds per acre, and harrowed or drilled in with the wheat in the second crop, in this way, the product of the second crop of wheat will be materially increased. It should be harrowed in immediately when sown, or its value will be much diminished by the escape of ammonia. I think to mix and sow a small quantity of plaster with it would be an advantage in preventing the ammonia from escaping. The average product of wheat per acre is 30 bushels, though 45 and 50 are frequently raised. Time of seeding, from the 1st of September to the 1st of October; of harvesting, from the 4th to the 15th of July. Wheat is never harvested here before it is fully ripe. Some experiments have been made by cutting when in the doughy state; but, as far as I know, this mode has not been approved of. No pains are taken in the preparation of seed, except to have it clean from everything but good, sound, plump wheat grains, which is readily accomplished with the excellent winnowing mills in use here. The quantity sowed per acre, when drilled in, is 1¼ bushel; when sown broadcast, two bushels. We plough twice for wheat; and all good farmers prefer ploughing as deep as they can without turning up the subsoil. The average depth is about eight inches. The average yield of wheat per acre is rapidly on the increase here. I have no doubt in ten years hence it will reach 40 bushels per acre. Our system of rotation in crops is, first: when the land has lain in sod 2 or 3 years, we turn down for corn, followed with oats or tobacco; then manure with stable manure, and follow with wheat, sometimes with two successive crops; and sometimes the first is a wheat crop followed with rye, then timothy and red clover; and very frequently the first crop of wheat is followed with grass. This is the most certain way to bring good grass. Sometimes a crop of clover is turned down for wheat. This was much practised before lime was used; but since, the crop is generally taken off before the sod is turned down. This produces a good crop of wheat, but is apt to generate blue grass. The Hessian fly has not troubled us much for some time. The only remedy we know of is late sowing. Weevil, good farmers are not much troubled with here. If a barn is full, clean it out well of chaff or short straw, such as gathers in the mow if not cleansed every year. Stack your grain out one year, so as to leave the barn empty during one winter; then keep clean as above, and you will have no trouble with weevil. The leaves of box-elder, thrown among the grain when housed, will check them considerably. Our old farmers say, to put a flock of sheep in a mow that is full of weevil every night for several months, when the mow is previously cleaned as above, will destroy them effectually. Average price of wheat at our nearest market in 1851, 75 cents per bushel.

Corn is, next to wheat, the principal crop here. Guano is not used in its production, except that, within a few years, a little has been used by way of experiment. There is no doubt but, if properly applied, it will materially increase the product of the crop; but those who have tried are unanimous in the opinion that the same per cent. of increase can be effected with lime and plaster at a much less expense. The average product per acre is 50 bushels; but from 80 to 100 are frequently raised. The yield per acre is increasing rapidly. Our system of culture is so identically the same as that given in your Report for 1850, from the pen of Jacob B. Garber, of Columbia, Pa., that it is unnecessary for me to give you any more here but a reference to his, found on page 415. Ground and cooked is much the best method of feeding corn to cattle and hogs; if fed to horses, ground and mixed with cut hay is the most economical; for cattle, I prefer it ground with the cob; for hogs, ground without the cob. We have not more than half an average crop of corn this season, owing to the drought. We had no rain to soak the ground from July to November. Average price at our nearest market, 60 cents per bushel.

Oats are much cultivated, and are considered exhausting to land. Quantity of seed sown per acre, 2 bushels; average product per acre, 50 bushels; average price, 35 cents.

Barley and Rye not much cultivated. *Peas and Beans* not cultivated as a renovating crop.

Neat Cattle.—Not many are raised for sale in the county. *Mules* not raised. *Horses.*—Not enough raised to supply the demand for them in our own county. They are not considered profitable to raise.

Hogs.—The Berkshire and Chester county are much preferred here; but our stock needs improving very much.

Sheep.—There are some kept for fattening; but wool growing is not considered profitable here. *Tobacco* is considerably cultivated, and, at present prices, is very profitable. Guano is used with great advantage on this crop, producing a very rapid growth; which is very desirable in a crop that is exposed to so many injuries by worms, and consequently requires great attention. We sow broadcast before planting, and harrow in. It is generally grown in rotation with wheat, oats, corn, and grass, always following corn; and if grown in this way, I am certain it is no more exhausting to the land than corn, and much less so than oats. I have frequently had part of a field in tobacco, and part in oats, both followed with wheat and grass. Both the latter crops were perceptibly better on the tobacco than on the oat-ground, the whole field being situated exactly alike in other respects. The soil, a sandy loam, or river bottom. Average product per acre, 1,000 pounds. Price, from 10 to 12 cents per pound at nearest market.

Potatoes, (Irish.)—Not very extensively cultivated; but every farmer cultivates some; seldom, however, many more than he wants for his own use. At least, our county produces few, if any, more than are needed to supply its own population. The long red, or rowan, are decidedly the most prolific, but the mercer and pink eye are preferred for table use.

Manures.—The best way of preserving stable-manure from waste is to keep it under roof, and throw plaster over it once a week. The plaster prevents the ammonia from escaping.

Plaster is used extensively here, and is annually, about the beginning of May, sown broadcast on the grass at the rate of from 80 to 100 pounds per acre. It is also used by nearly every farmer on the young corn when about two inches high, applied by hand, from 100 to 150 pounds per acre. Some few persons, after steeping their seed-corn in copperas water or saltpetre, throw plaster over it until it is dry by mixing. This is commonly called rolling in plaster. This plan is much esteemed by some few farmers; but the former application is more generally practised.

Lime is much used here, and its use is annually on the increase, and it will no doubt continue to be the principal fertilizer in this section of country for years to come. We have the limestone and coal in abundance in our county, and consequently no fertilizer brought from abroad can ever exceed it in cheapness; it is now sold at 6 and 7 cents per bushel (all over the county) at the kiln, ready to put on the land, and by canal shipped for an additional cent per bushel within a mile or two of the farm where it is to be used. So powerful is its effect on poor soil, if properly applied, that on many farms in this county where it has been used, the value of the land has been increased 200 per cent. with less than 100 bushels per acre. It is applied to the soil in various ways; but the most common, and, I think, decidedly the best way, is to spread it, when slacked, over corn ground, after it is ploughed, and before preparing it for planting. It is also frequently put on ground with stable manure when preparing it for wheat, and some farmers spread it on sod. This I do not think an economical way, it being too much exposed to the action of the atmosphere. The quantity used varies from 30 to 100 bushels per acre, and I have known persons put on 200 bushels per acre; if the soil contains plenty of vegetable matter, or if plenty of stable manure is put on with it, this quantity will do no harm; but if the soil is deficient in vegetable matter, so large a quantity will destroy vegetation entirely for some years. If any regard is paid to economy, this is not the proper quantity. Lime being disposed to work down in the soil, the subsoil must be very close if it does not get below the reach of the roots of the plants before they can take it all up, if so large a quantity is put on at a time. On limestone, slate, or gravel, and clay loam, 100 bushels per acre, repeated every eight years, is the proper quantity; on red-shale and sand, 50 bushels per acre, repeated every four years. It will take at least eight years to exhaust the soil of 100 bushels of lime per acre by our system of rotation in crops; and if the subsoil is of a porous nature, such as in red-shale soil, it will not retain it that long within reach of the roots of the plants.

Grasses.—The only kinds cultivated are timothy and red clover; 4 quarts of each sow per acre when sown together, and 6 quarts of timothy and 8 quarts of clover per acre when sown separate. Average yield per acre, 3 tons. Average price of hay: clover, $8 per ton; timothy, $10 per ton. There is now no ground kept expressly for meadows here; all must take its turn in the rotation of crops.

Very respectfully, yours, &c.,

DAVID MUMMA, Jr.

Hon. Thomas Ewbank,

Commissioner of Patents.

East Brandywine, Chester Co., Pennsylvania,

11th month, 24th, 1851.

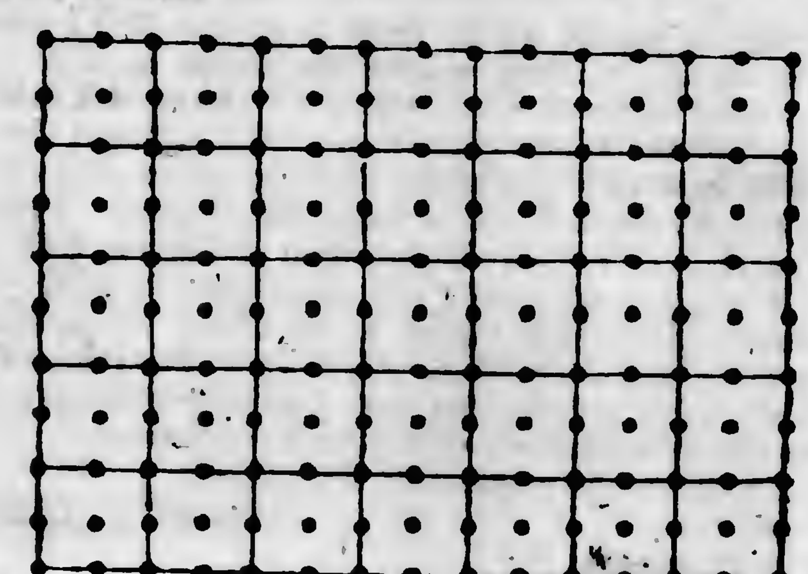
Sir: Having received a Circular from the Patent Office, containing important queries in relation to agriculture, and feeling, as I do, the most lively interest in those matters, I regret that my want of leisure will prevent me from making more than a few hasty remarks.

Wheat.—The present crop, for quantity and quality, has never been surpassed. I have heard of no failure in the State.

Corn.—This crop in our vicinity is very light; and I should judge, from reliable sources, that in that portion of the State east of the Susquehannah there will not be more than one-half of an ordinary crop, owing to the dryness of the summer.

Oats.—The oat crop, somewhat affected by drought, was attacked in many places, while ripening, by vast numbers of grasshoppers. In some cases they have destroyed half the crop. They have done great injury to the late pasture, and whatever came in their way. In walking over a field occupied by these hopping gentry, one feels astonishment at their unlimited numbers. "To count them all, demands a thousand tongues, a throat of brass, and adamantine lungs." Their appetites are scarcely less surprising than their numbers. I noticed none that appeared to have symptoms of dyspepsia. I have no doubt that every observing farmer has noticed the rapid increase of the insect tribes as the feathered races are gradually exterminated by gunners. One would suppose that the beauty and innocence of the latter would protect them from harm, independent of their invaluable services to man. Were the legislatures of the several States to enact heavy penalties against their destruction, they would, no doubt, confer a great favor on agriculture.

Labor-saving methods of Planting Corn.—For several years past, I have endeavored to discover some way to shun the ordinary tedious mode of furrowing off ground for corn, which, with us, consists in making, with the plough, a furrow each way of the field for each row of corn, in order to save the use of the hoe in cultivation. Failing to invent an implement capable of making two or more furrows, correctly, at once, I changed the direction of my pursuit, and was agreeably surprised in finding out the fact that we had been making twice as many furrows as were needed. Although this may appear paradoxical, I proceed to describe my improvement. Whatever distance apart I desire to plant, I mark out double the space each way of the field, thus: suppose I desire to plant four by four feet, I furrow off eight by eight feet at right angles, and the field is then ready to plant. I then plant at the intersections, half way between the intersections, and in the centre of each square, the field over, as shown below, the lines representing the furrows, and the dots, the hills of corn:



The unmarked rows, which run at right angles with the direction of planting, need the greatest care of any to keep them straight. One-fourth of the hills are planted on the surface of the ground, but no difference was perceivable in the growth of the corn. I have planted two crops in this way, and never had the rows more regular. It appears to possess other advantages besides saving half the labor of marking. The ground is less liable to wash by heavy rains prior to cultivation. It shuns about one half of the balks usually made by the plough in the old way. It causes no fatigue to the eye or the mind to divide the spaces in dropping. A person having the phrenological organs of *form* and *size* small might not be able to drop correctly. Of this I cannot say. I estimate it to be worth at least eighty cents per acre to furrow off ground for corn in the ordinary way. A farmer who adopts this plan will, in marking off ten acres, save about four dollars' worth of labor, or forty cents per acre. From the best means I have of judging, there are about nineteen millions of acres planted yearly in the United States; if the above mode were adopted, it would save seven millions six hundred thousand dollars' worth of labor annually. Some allowance should be made, however, for that which is planted with drills, &c. The writer feels desirous, through the kindness of the Commissioner, of presenting these hints to his brother farmers throughout the Union. Should it lighten in some degree their toil, or prevent the unnecessary wear of muscle, it will be a source of unfeigned pleasure to him. Under the impression that furrows are no advantage to the growth of corn, and not content with the above imperfect release from toil, I continued in pursuit of the object I had in view until I had attained (as I believe) the point desired, which was, to discover a means by which furrows could be rendered unnecessary. The instrument for this purpose is constructed on the principles of geometry; but its simplicity has, no doubt, enabled it to elude observation, as but few persons, on seeing it, could conjecture its design. It will require two boys, with a little instruction, at the beginning. It will need a straight line at the side of the field to start by, or it may begin in the middle of the field. It will require about one-fourth more time to drop the corn than the usual way. For all practical purposes it need not cost above $2. Should it possess the two essentials—novelty and utility—I would be much pleased to have a knowledge of it placed in the possession of every farmer in the United State. But justice to myself would seem to require that I should ask some little remuneration, as it will enable the farmer to drop corn with great regularity, (any desirable space either way,) and will save nearly double the amount of the former expedient. I feel diffident about offering any notions of my own; but, as the Circular seems to invite replies of this nature, I hope mine will not be found out of place. I have been much gratified in reading the last Report from the Patent Office, and I cannot conclude without expressing my admiration of those judicious recommendations to Congress in regard to the Office. I sincerely hope that honorable body may enact them all; I view the Patent Office as having been the nursing parent of so large a portion of those incomparable advantages which we possess over former generations.

The foregoing remarks are respectfully submitted.

MORDECAI LARKIN.

Hon. Thomas Ewbank,
Commissioner of Patents.

P. O. Montrose, Susquehannah County, Pa.,
November 19, 1851.

Dear Sir: Some time since I received a Circular from your office, soliciting information in regard to the agricultural products of this (Susquehannah) county. I handed it to Mr. Thomas Nicholson, one of our best farmers; and herewith you have his reply.

With much respect, your obedient servant,

B. CASE, *Postmaster.*

Thomas Ewbank, Esq.,
Commissioner of Patents.

The principal productions of Susquehannah are wheat, corn, oats, hay, butter, and cheese; together with neat cattle, sheep, and wool.

Wheat.—Till within a late period the principal part of the wheat raised in this county has been grown on new land; but as the land is mostly cleared, it is now grown on ploughed ground, but not in quantity for more than a home supply, as the soil is not of the nature suitable to a profitable production of this grain. Guano is not used, and summer fallows are generally relied on for a good crop with barn-yard manure. The average is about 8 bushels per acre, and the yield is rather increasing, owing to better cultivation. No regular system of rotation is pursued. We are not troubled with Hessian fly or weevil. The price will average about $1 per bushel.

Corn is a very important crop in this county, and gives a handsome remuneration to the farmer. The usual average is about 30 bushels per acre. No guano is used. The system of culture best adapted is to plant upon green sward, turned over in the fall, or early in the spring, with or without manure, as the land may require. Where the land has had a previous crop, it is ploughed and ridged before planting; plaster and ashes are applied to the hills.

Oats.—The average yield of oats is 30 bushels per acre; 2¼ bushels seed per acre are used. Oats are considered an exhausting crop; but large quantities are grown, as there is a ready market, and the crop is sure.

Hay is the great crop of Susquehannah county, as it is peculiarly a grazing country. Timothy is the most approved grass, making incomparably the best hay; but, in seeding land, it is exceedingly beneficial to mix with clover. The average per acre is about one ton.

Potatoes.—In consequence of the rot, no more potatoes are grown than are necessary for the supply of the table; but formerly they were the main reliance for fattening hogs and feeding stock. The quality in this district cannot be excelled.

Butter and Cheese.—Within a very few years the products of the dairy have greatly increased; so that upwards of 1,200,000 pounds of butter were made in the county last year, and the quality is equal to any in the United States. Cheese is not much attended to as yet, but the quantity is increasing. The time is not distant, and may be said to be at hand, when the dairies of this county will be highly celebrated. Average yearly products of butter per cow, about 80 pounds. In the larger dairies the milk is churned, but on the small farms, the cream. Average price of butter 12½ cents per pound.

Neat Cattle.—Large numbers of young cattle are raised, and sold to the drovers, principally two and three years old, together with a fair amount of oxen; but no cattle are fattened for the city market. Oxen are much used for farm labor, and are broken in at two years old. Much attention is now paid to improve breeds for stock, and the show of Durhams and Devons at the late fair in Montrose was exceedingly creditable.

Sheep and Wool.—The hills of Susquehannah county are finely adapted to the growth of sheep and wool, the flavor of the mutton being peculiarly fine, and the wool, whether long or short, of excellent quality. Large flocks are not kept, but every farmer keeps a number for his own use, and has generally a surplus to part with. It only requires the business of wool-growing to be entered into intelligently to be made profitable.

Fruit.—Apples are the main productions in this line, and are receiving increased attention. The quality, when cultivated, is fine, and can be made highly profitable; but, hitherto, has been much neglected. The soil appears very conducive to the production of this fruit, which is now beginning to find a ready market by means of the communication to New York by the Erie railroad.

NEAR UNIONTOWN, FAYETTE COUNTY, PA.,
November, A. D. 1851.

SIR: Having received your Circular, dated United States Patent Office, Washington, August, A. D. 1851, in answer, I must say that there are many branches of agriculture inquired after that do not come under the notice of our accustomed agricultural pursuits.

Wheat is raised to a considerable extent in our county; a large portion of our land is well adapted to its culture, being a limestone or clay soil. For many years heretofore our cultivation has been bad, and the soil has become much reduced; but our lands abound with limestone and stone coal, and many farmers have seen the utility of applying lime to their lands, and have brought them into a good state of cultivation.

We generally apply about 200 bushels to the acre, and by the use of clover it does not want renewing for several years. The product of our soil is evidently on the increase in proportion to the advances made towards scientific cultivation.

Many are now receiving a fair remuneration for their labor—say from 10 to 25 bushels per acre, according to the quality of the land and manner of cultivation. But, taking the general average, I should suppose it would be from twelve to fifteen bushels the acre. The most general kinds of wheat we sow of late years are Mediterranean and Zimmerman; they appear to be the most productive. The most usual time of sowing is from the 1st to the 20th of September. They stand the winter better than many other kinds, and are not so subject to the fly or rust. The Mediterranean ripens about the first week in July; the Zimmerman some days later. Either kind generally weighs from sixty-two to sixty-five pounds per bushel. Our wheat harvest was good this year; the market price per bushel from fifty-five to sixty cents. Counting

the interest on the price of our land, and all the other expenses attendant on raising a crop, our wheat costs us about fifty cents per bushel.

Corn is an important crop with us, and generally compensates the cultivator for his labor. It is generally fed to stock of different kinds. Some feed it whole, and others get it ground with the cob, which is certainly the most profitable way. I think that in ordinary seasons the general average crop is from thirty-five to forty bushels per acre. This year we have had a long drought, and the crop fell short fully one-third. We think from the 25th to the last of April is the best time for planting corn, as the ground is generally drier then than in the first week of May. Corn is worth 45 cents per bushel this fall. From calculation of all expenses attendant on raising a crop of corn, it costs us about 23 cents per bushel. Our corn is generally of the yellow kind; thought to be the best to feed stock. Take the best gourd-seed corn, and cultivate it for a few years, and the nature of our climate is such that it will merge into a mixture between the gourd-seed and yellow flint, which make a heavy and valuable corn.

Oats.—There have been large crops of oats raised in our county heretofore; but some are gradually reducing their cultivation, considering them more injurious to the soil than other grains.

Our common time of sowing is from the 20th of March to the 10th of April; they ripen then by the time the wheat harvest is through with. The most common yield is from thirty to thirty-five bushels per acre. Oats are now worth 25 cents per bushel. The entire expense of raising them ready for market is about 15 cents per bushel. The most general kind of oats raised in my neighborhood is the one-sided head, or Poland, which is considered to be the most productive.

Hay.—In ordinary seasons our meadows, on an average, cut from one ton and a quarter to one and a half per acre. Many, for want of natural meadows, mow their upland that is sown with timothy and clover; which is a valuable substitute. This year, owing to a long drought, our grass fell short nearly one-third.

Potatoes are not cultivated very largely in our county, being principally grown for family use. I have not heard much said of their suffering from the rot this season; but, owing to the drought, the potatoes were small, and consequently of but small yield. The sweet potato is cultivated for family use, and yields tolerably well.

Horses and Mules.—The principal part of our farming is done with horses; the mule and the ox do but a small part of the ploughing. Horses are the every-day drudge for man in our county, both for saddle and harness; and, consequently, the raising of them is considered profitable. The probable expense of raising a good colt until he is 3 years old would be from $40 to $50.

Sheep Husbandry has declined in our county to some degree; but, as I am not in that branch of business, I will leave it to those that are able to give a detailed account of it.

The breed of cattle has been much improved with us of late years. A number are paying particular attention to their improvement, to whom I must leave the honor of giving a practical account of it.

Our most accustomed method of farming is, if we have lime, to spread from 150 to 200 bushels to the acre on grass sod, plough it under, harrow it well, plant our corn in hills about 3½ feet each way. We generally try to leave not less than 2 or more than 3 stalks in a hill; sometimes, if the ground is strong, leave 4. Those that cultivate oats sow their stalk ground in oats in the spring, with about 2 bushels to the acre. After the oats are taken off, put out our barn and other manure, plough it under, and not stir it. Sow from 1½ to 2 bushels of wheat to the acre, broadcast. Some harrow both ways, and some only one way. Those that sow wheat or corn ground cut up the corn in the fore part of September, plough it well one way, and sow it broadcast, as above.

The wheat-drill has been introduced into our county, but has not been sufficiently tested yet to give a definite opinion. I have used what we call a slide on my wheat this fall, instead of a roller. We take a log as long as a common roller, split it in two, hew it straight, with one edge a little bevelled, put a tongue in the centre, and drag it, instead of its rolling. When we use this we only harrow one way, and pass the slide immediately after the harrow. My wheat came up well, and continues to look well; but when we come to harvest it, we will be better able to judge of its utility.

Very respectfully, your obedient servant,

SAMUEL WISCOM.

Hon. Thomas Ewbank.

DELAWARE.

Lewes, Sussex County, Delaware,
January 15, 1852.

Sir: Your Circular of August last was received by me in September, asking information on agricultural subjects. I will give the practical experience I possess upon the culture of corn, wheat, barley, &c., and the use of guano as a fertilizer.

Corn.—In the first place, I plough my corn land 8 inches deep; sow guano, 300 pounds to the acre; and plough it in, 6 inches deep. I then lay off the rows 3½ feet each way, leaving 2 stalks to the hill, and till principally with the fluke harrow. My average crop in 1851 was 30 bushels per acre on 130 acres. In 1850 I broke up a few acres of wet, flat land, entirely unproductive; I spread 50 bushels of lime to the acre in 1849; in 1850, after ploughing, I sowed 200 pounds guano to the acre; ploughed it in, 6 inches deep; planted in corn, 3½ feet each way. It yielded 28 bushels to the acre. In 1851, applied 200 pounds guano to the acre; planted in the same way, and raised 40 bushels per acre. I intend the next spring to give the same land 300 pounds guano to the acre, and plant again in corn.

Wheat.—My wheat crop the last year was small, having sown very poor land, with a small portion of guano, (the price in 1850 being $60 per ton). I sowed the last fall about 70 acres in wheat; ploughed the ground 8 inches deep with the Prouty plough No. 5½; sowed 300 pounds guano to the acre, and ploughed as deep as I could with a three-furrowed plough; harrowed the ground, and drilled in the wheat, 1½ bushel per acre.

Barley.—In 1850 and 1851 I sowed a small quantity of barley on poor corn land; put 200 pounds guano per acre, seeded 1½ bushel per acre, and raised 20 bushels per acre. I consider barley a very profitable crop—more so than wheat or oats; and I design, the coming spring, to substitute barley in lieu of oats.

Guano.—I have used guano for several years past in different ways and quantities, and, judging from past experiments, I believe 300 pounds per acre, ploughed in 6 inches deep, is the most profitable way it can be used.

The farmers in this section are using lime, slacked at the kilns before being brought here. It probably pays better than guano, taking 10 years together. We get it from New York at 6¼ cents, and from Schuylkill at 8 cents per bushel. Guano has a most powerful effect on the poor lands here, and our farmers, although slow in their improvements, are begining to see that farming is but a poor business without the use of lime and guano. The poor lands here will, in most cases, yield 10 bushels of corn for every 100 pounds of guano.

Very respectfully, yours,

S. P. HOUSTON.

Hon. Thomas Ewbank,
Commissioner of Patents.

Near Seaford, Sussex County, Delaware,
December 3, 1851.

Sir: The county of Sussex, in which I reside, has an extremely level surface and sandy soil, interspersed with extensive swamps and numerous ponds, which, in past years, have tended to make the climate very sickly; but our farmers having lately adopted the plan of ditching their lands, the climate has become comparatively healthy, and land which had been rendered almost useless for the want of this improvement now exhibits a wonderful degree of natural productiveness, yielding in some instances from 50 to 75 bushels of corn per acre, without the aid of manure. I regret to say, however, that in a considerable portion of the county there has been, and there still is, a great deal of bad farming; and so great is the desire of the owner of land to make it pay for itself by the lumber which can be cut on it to supply a city market, that he neglects the improvement of his land altogether. Land soon becomes waste and worthless by such means. I am happy in having this opportunity to state that in this immediate section the method of improving the soil has been for a few years undergoing a great change for the better, and is still increasing in interest and energy. The manuring of land was formerly deemed a matter of small importance, but now it is considered *the* indispensable requisite to good farming. Old causeway gutters, ditch banks, fence rows, and muck holes, instead of being left to breed disease, are cleaned out, and their contents turned into compost to improve the soil.

Our purchased manures consist of lime, ashes, guano, bone-dust, and poudrette. The quantity which is usually brought to our little village, (Seaford,) and used in this vicinity, I have no means of ascertaining precisely, but, from the best calculation in my power, I would say that from 60,000 to 80,000 bushels of lime at 7 to 8 cents per bushel, and from 40,000 to 60,000 bushels of ashes at 12 cents, are delivered here annually, and 80 to 140 tons of guano, besides bone-dust and poudrette—the quantity unknown.

Corn is the chief staple of this county; but the land, when improved for the production of other grains, is found capable of making a satisfactory return for labor bestowed.

There are many varieties of corn in our crops, since but little care is taken to select the pure grain for seed, and the different species have an extreme natural tendency to mix when planted indiscriminately. Yellow corn was formerly preferred, but white corn has recently commanded the best prices, and consequently this is now the favorite with us.

It is not considered well for a person to speak much of his own transactions; but, as a planter can speak more understandingly of his own mode of cultivation than of that of another, I presume that I may be excused. My plan is to run the plough 5 to 7 inches deep through a clover sod about the 1st of March; follow this with the drag-harrow in the same direction; then strike off a two-furrowed list from 3 to 4 inches deep, and about 4 feet apart, from centre to centre; cross the list by single furrows, the same distance apart; drop 4 or 5 grains in a hill, and, as soon as the corn is sufficiently high, thin out to 2 or 3 stalks in each hill; apply the cultivator twice in a row each way, then the plough 4 times; and, lastly, the fluke-harrow twice; which finishes the tilling. When the corn is hard, I top and strip it, stock the fodder when cured, gather the corn in the month of October, and then cut, haul, and rick the stalks for provender and manure.

The Wheat Crop of this year is an average one. There are many varieties; but the blue stem, white, and Mediterranean are the favorites with us; the former being thought to be better adapted to our soil than any other; the latter being of earlier growth, and more able to withstand the fly and the rust. My mode of culture is to plough from the middle to the last of August; then use the drag-harrow, and commence seeding about the latter part of September, and finish about the middle of October. Sow broadcast, from 1 to 1¼ bushel per acre, plough it in 3 inches deep, and then run the roller over it, in the same direction as the plough. Begin to harvest about the 1st of July, or sooner; reap with the ordinary scythe and cradle; bind and stack, and secure as soon as practicable. An average crop on improved land is from 15 to 20 bushels to the acre.

Oats are thought to have a tendency to impoverish the land, and therefore are not much attended to.

Barley.—None raised in the county to my knowledge.

Rye, Peas, and Beans but little raised.

Grasses have not generally been sown until a few years past; but now this enterprise is deemed a matter of considerable interest and importance. Clover is the principal grass sown here; I sow it on my wheat ground immediately after ploughing and before rolling.

Fruit is needlessly neglected in this county, for the land is particularly adapted to the culture of almost all kinds of fruit, more especially the apple and peach. These would thrive here and live to an old age.

I think the grape also would do well, for there is on my land a native vine of one foot diameter.

But this subject, we may hope, is attracting more attention, since more fruit has been shipped from the county this year than in any previous

year. As my time is sufficiently employed for other purposes, I raise fruit merely for domestic use.

The subject of *manure* has already been attended to. Allow me to say something more:

I commence in the latter part of the fall to haul pine-shatters, woods-dirt, and the contents of fence-rows and muck-holes, and other substances of the kind, and spread them over my pounds one load deep; feed my stock upon them with coarse provender until the 1st of May; haul in as before, and cover the pounds one load deep; pen the stock during the night only in the pasturing season; and about the 1st of August dig and turn over the manure in the pounds. Besides this, my horses and oxen are housed in stalls 7 by 10 feet, the like substances being put into the stalls as into the pounds, and they cleared out every two or three weeks to give place to more. About the 1st of November the manure thus accumulated is hauled into the field intended for corn, composted, and left there until the following spring, when it is spread over the field and then ploughed in. By this method I get manure enough to cover the whole of my corn-field, (some 50 acres.) A portion of my hogs also are kept up all the year, and supply manure sufficient to cover from five to six acres.

Of lime, I use from 40 to 50 bushels per acre, during the summer or fall, on ground intended for corn the next season.

Ashes are applied in like quantities, and a top-dressing of corn or wheat ground.

I have used guano to some extent, both for corn and wheat, at the rate of 200 pounds (Peruvian) and 300 pounds (Patagonian) to the acre, and have derived considerable advantage, but not so much as other farmers have, according to their statements. I am of the opinion that the article is entirely too high for the profit which it yields.

My experience in farming is limited to the short period of five years; but in that time I have been able, by the method which is herein detailed to you, to make quite an improved farm out of a very poor one. I purchased the land (300 acres) in 1845 for $1,200, and rented it out in 1846; for which I received, as one-third of the products, *three* bushels of wheat, about fifty bushels of corn, and fodder in proportion.

I have since that time lived on the premises myself; divided it into four fields of 50 acres each, instead of two as before; and have gathered an increased crop every year until the present, when it amounts to 950 bushels of wheat, 2,111 bushels of corn, and an abundance of potatoes and other vegetables.

In order to increase the interest in the public mind on the subject of farming in this section of the county, we have established a club, consisting of 12 farmers, who meet together once a month, at the residence of each member by rotation; eat a good dinner; walk over the fields, and talk freely and socially together in regard to the *modus operandi* which each has adopted.

Hoping that this communication may meet your wants, I am yours, with due consideration,

CHAS. WRIGHT.

P. S.—The average price of wheat is 70 to 90 cents; of corn, 50 to 63 cents. The range of thermometer from 10° to 50° in winter; in summer 80° to 93°. My neighbor, Governor Ross, has informed me, since writing the above, that he has raised more than 1,300 bushels of sugar beet on 1½ acre of his land.

C. W.

MARYLAND.

Near Jerusalem Mills, Harford County, Md.,
December 26, 1851.

Sir: In replying to the Agricultural Circular, which you did me the honor to address me a short time since, I will observe that want of time will prevent the response to the queries contained in it from being as full and explicit as I would wish. I will take them up, however, *seriatim*, and reply to those which relate to subjects with which I may be familiar. It may not be amiss to state that my observations extend more particularly to that portion of our county contained in the peninsula formed by the waters of Bush and Gunpowder rivers.

Wheat.—Guano is used to a great extent on the wheat crop, and on our thin soil increases the crop, in most instances, at least two-fold when about 300 pounds per annum is applied. The average product of wheat is about 15 bushels. The yield is increasing, and has been since our farmers commenced the use of lime, guano, plaster, and other fertilizers.

The seeding time with us commences about the 1st of September, and lasts until the ground is frozen. Harvest commences the latter part of June, and generally is ended by the middle of July. The number of times the land is ploughed for the wheat crop depends upon the fact whether it be an oat stubble or a clover lay. If the former, we generally plough twice—once immediately after harvest, and again a short time previous to sowing; which effectually destroy the oats that had vegetated from the seed scattered out in harvesting. If a clover lay, we plough but once; and in both cases generally roll and harrow the ground, to reduce it to as fine a tilth as practicable before sowing the seed; which, when sown broadcast, is harrowed twice—once with the lands, then across.

However, our farmers are beginning to appreciate the great advantage resulting from drill husbandry, and are supplying themselves with the proper implements for drilling in their crops, wheat included. The system of rotation in crops, which has generally prevailed with us for some time, and originally derived from Chester county, Pennsylvania, is, first, the land is ploughed for corn, and limed on the furrow; the next spring the land is ploughed and sown in oats; and after the oats, the ground is prepared for wheat the next fall, upon which the stable manure which has collected during the year is applied; and, if not in quantity sufficient for all the land to be sown in wheat, guano, or ground bones, or some other fertilizer, is called upon to make up the deficiency. Grass seeds are sown upon the wheat either the same fall or early in the ensuing spring. The land then remains in grass until again broken up for corn.

We know of no *sure* remedy against the Hessian fly. The weevil we are not much troubled with.

The average price of wheat during the present year has been about 90 cents; it would be safe to say 85 cents.

Corn.—Guano is also used on our corn crop, but not to the same extent as to wheat. It is applied, generally, to the land previous to its being flushed. Some time after planting the land, it is sowr. upon the furrow, and then harrowed in either way. It adds materially to the gain of the crop, increasing it, I should think—when 300 pounds per acre are used—at least two-fold. Guano appears to act as well upon the corn crop as upon the wheat, and our farmers are commencing to use it more extensively upon their corn. The average product is about 30 bushels, but it is increasing.

I presume the cost of production, from the time the seed is planted until the corn is in the bag, to be at least 15 cents a bushel, independent of the cost of any manure that may be applied. I prefer, for feeding horses, that the corn should be ground with two or three parts of oats; for cows, that it should be ground alone, without bolting; and in both cases, mixed, when fed, with cut hay. I have had no experience in cooking food for stock of any description. The bran of corn makes an excellent feed for milch-cows; and farmers, when they send their corn to mill to be ground for meal, should always send another bag for the bran, besides the one sent for the meal.

I cannot state from direct experiment the amount of grain the manure formed from ten bushels of corn, consumed by hogs, will add to one acre if carefully saved and applied at or before the time of planting; but I think I am safe in asserting that, if a pen of hogs are supplied with proper material, and in a properly constructed pen, the quantity of manure made by them, from the time they are penned up till killed, will, if carefully saved and properly applied, cause such an increase of the crop that the gain will nearly, if not quite, amount to the quantity of grain consumed while confined; in other words, pigs will pay for their board, or, rather, can be made to do it.

Oats, Barley, Rye, Peas, and Beans.—The average yield of oats may be set down at about 20 bushels. They are generally sown after the corn-crop, and without manure—this being reserved for wheat, which is to follow, as above stated.

Barley is but little sown, since farmers who apply stable manure, or guano, to their corn-crop follow the latter with a crop of barley, under the impression that it is not as subject to lodge as oats, on land recently manured. As stated before, it is, however, rarely grown.

Rye, of late years, has been but little attended to, owing to the fact of its almost entirely failing to produce a crop worth saving, the cause of which has never been satisfactorily accounted for. Fifteen or twenty years ago, it was considered, in this vicinity, as profitable a crop as wheat, or any other grain.

Peas are cultivated on a small scale; also beans, but seldom in field culture.

The pea has never, to my knowledge, been cultivated in the neighborhood as a renovating crop—clover succeeding so well. We consider, of the last-named products, viz: oats, barley, rye, peas, and beans, that a crop of oats is the most exhausting to the land.

Clover and Grasses.—The average quantity of hay cut to the acre I presume to be about one ton—perhaps one and a half.

The best fertilizers are, (presuming the land to have been already limed,) composts of stable manure with earth, plaster, and bone-dust. I deem the bone to be a most valuable ingredient in a compost for fertilizing a meadow or pasture. For meadows, timothy is preferred to all other grasses. About a peck of seed is sown to an acre. The cost of growing hay, if merely estimated from the time of cutting until safely stowed in mow or stack, I suppose, would be about $2 per ton. To this should be added, however, the cost of setting in grass, interest on land, &c., which, of course, vary according to the difference in soil, locality, &c.

Dairy Husbandry is not much attended to with us, although it is greatly on the increase—the example being set by several families of the Society of Friends residing in this part of the county, who devote considerable attention to this branch of husbandry, and whose labors in it command the highest remuneration in the Baltimore market, as their butter always brings the highest price, owing to the quality of the article, as well as their character for neatness and cleanliness, for which those who prepare it are so justly proverbial. We also have a few enterprising farmers from the North, who are turning their attention to the butter-making, and earning for it an enviable reputation. No cheese made, save it be in small quantities, for home use.

Neat Cattle.—The raising of cattle is increasing with the improvement of our lands, and most of the improved breeds are being introduced. Many of our farmers, as they enlarge and improve their pastures, buy, in the fall, stock cattle, which they keep during the winter in their yards, feeding them on hay and other fodder; and in the spring, as soon as the grass is fit, turn them on their pastures; and during the summer, or early autumn, turn them over to the butcher. It is generally expected that the steer thus treated will sell for at least as much again as the first cost.

Horses and Mules.—For some years past the high prices which horses have commanded with us has made their raising profitable, and considerable regard is paid to the rearing of them. The expense of rearing a colt until 3 years old should not exceed $30. With us, it is generally thought best that the brood mare, during pregnancy, should be worked moderately, and fed with a liberal allowance of generous food; and the same while suckling the colt. For about a month or two after dropping the foal, it would be well, if the services of the mare can be dispensed with, to let her rest from labor. During this time, the best place for the dam and foal, if the season permits, is the pasture. When the mare is taken up for work, then they should be both placed in a roomy stable, where it is best the colt should remain while the dam is at work. One thing is essential—that is, the colt should never be allowed to suck until the mare is cooled, provided the weather and work are such as to produce an unusual degree of heat in her system. After weaning, the colt should have good pasture to run in, if summer, or good hay and occasional feeds of grain, if winter, with a shed, or hovel, to protect in case of storm. In about 2 years, commence to break; avoid temper, use firmness with gentleness, and do not overtask. From the time of weaning until you commence to break to actual service, it is well to accustom the colt to be felt and handled as much as possible, as it will greatly facilitate the breaking. Mules are but little used, except by some manufacturing establishments of cotton and iron, and they are purchased from droves coming from the West.

Sheep and Wool.—We raise but few sheep, owing to the ravages committed on them by the worthless curs with which we are infested. That sheep-husbandry is eminently profitable, or, rather, would be, for the whole of Maryland, is beyond doubt or cavil; but until our legislature provides a proper and efficient remedy for the great nuisance created by the hordes of prowling, half-famished dogs which are to be found in all our agricultural districts, the farmers of the State will be deterred from availing themselves of one of the greatest sources of agricultural wealth.

With great respect, very truly, yours,

JOHN CARROLL WALSH.

Hon. THOMAS EWBANK,

Commissioner of Patents.

WOODLANDS, MONTGOMERY COUNTY, MD.,
December 7, 1851.

SIR: About a month since I had the pleasure of receiving the Agricultural Report from your Office for 1849–'50, under the frank of our estimable representative, Mr. Bowie; and by yesterday's mail your Circular, dated August, 1851, reached me, also under his frank.

Wheat.—The cultivation of this valuable grain is greatly on the increase in this part of Maryland. The crop of this year in Montgomery county will greatly exceed that of any former year, and is, I am confident, as great in amount as the whole raised in any five consecutive years for the last forty prior to the introduction or use of guano; measurably owing to the extensive use made of that fertilizer, and partly owing to the favorable season, as well as to a greater breadth of land sown. The average product is, I think, about fifteen bushels per acre; though as low as twelve, and as high as twenty, bushels are not rare; even thirty-five bushels in several instances, I have heard of from persons that could be relied on. The quantity of guano generally used per acre is about two hundred pounds, but I believe two hundred and fifty or three hundred pounds would be more advantageous on thin land. I have found, from small experiments, that the increase in straw as well as grain was about in proportion to the quantity of guano sown, to the extent of four hundred pounds to the acre; beyond that, I am inclined to believe that there would be an increase of straw, but a diminution of wheat. My usual time of sowing is about the first of October, or as soon after as practicable, and, as I observed in a former communication, thereby escaping the ravages of the fly. The depth of ploughing is determined by circumstances. When an *old field*, (and there are yet too many such in our county,) covered only with hen-sedge, and almost destitute of humus or vegetable matter, is to be fallowed, (preparatory to a crop of wheat,) this should be done (not later than August) to the depth of about five inches, stirred or crossed either with the harrow or double shovel to the depth of three or four inches; in September, guano and wheat sown simultaneously, and turned in with the double shovel in October; and during the succeeding winter, or as early in the spring as the frost will permit, sown with clover seed. I have heard of another method of treating such land, represented as succeeding well, viz: first sowing a heavy quantity of guano, and turning it under seven or eight inches before seeding the wheat. But not knowing anything of it experimentally, I will confine myself to the mode pursued by myself as above; after which, alternating annually with wheat and clover, as described in my communication, page 128 of your Report, 1849-'50.

Ploughing.—In the course I have pursued, I have depended much upon the fertilizing constituents appertaining to clover, and, at the same time was actuated by a desire to improve the greatest extent of land, with the least expenditure of cash (in procuring guano.) And, in turning under each successive crop of that valuable grass, the depth of the furrows was increased an inch or two; thus, when two crops have been turned under, the average has reached eight inches, and in some of the valleys extended to ten and twelve. How much deeper it may be found advantageous to plough, remains to be proved! But I believe that, where clover and other fertilizing substances are turned under, just as deep as is ploughed, so deep will be the soil, and no deeper; and, therefore, the greater the depth, the greater the fertility, and the greater the probability of an increased crop. The best depth to be obtained must be determined by the nature of the land, and the strength of a man's team. In stony land, or through hard-pan, it would be difficult to penetrate to a great depth. *Very* deep ploughing, however, will not improve land in all cases, but should be regulated by the quantity of manure or fertilizing substances to be ploughed under. A gentleman, who moved into my neighborhood a number of years since, conceived the idea that he could render his land at once productive by simply ploughing it *deep;* put four powerful horses to his plough, and turned it up to the depth of twelve inches; the result was a total failure! And, after experimenting with it for a year or two, he endeavored to correct his mistake by turning it back again to the same depth, but in vain; the trifle of fertility that the surface possessed previous to the experiment had been buried too deep, and became incorporated with so large a mass of sterile clay as to render it inoperative. Neither will it, from my experience, answer to cross or stir the land, fallowed for wheat, more than from three to four inches; but let *that* be thoroughly done. I once almost entirely failed in making a crop by cross-ploughing a field as deep as it had been fallowed, and stirring it until it was as light as it could well be made before sowing it down in wheat. The winter's frost or something else destroyed it, and, instead of obtaining from fifteen to twenty bushels per acre, which it was capable of producing, I reaped but little more than I had sown. This, to me, was doubly mortifying, as a portion of it was sown with beautiful white flint wheat, procured from western New York, at an expense of three dollars a bushel by the time it reached me.

In preparing a different description of *old field* for wheat, I have pursued a different process: one covered, or thickly set, with broom-sedge—the botanical name of which I do not know, but have no doubt it will be at once recognised by most of the citizens of a great part of Maryland and Virginia, as well as some other States—and resembling in its appearance the natural grass I have seen (more than twenty years ago) on the prairies of Illinois and Missouri. Knowing that it increases the chances of making a good crop of wheat, if the land is previously cleansed from all noxious vegetable matter and rendered friable, I have, by means of a strong team of horses or oxen, ploughed such land, from one to three inches below the roots of the sedge, as early in the fall, or during the winter months, as possible, covering the sedge under by attaching a heavy chain in front of the mould-board; and in April harrowing, first lengthwise with the furrows, and cross-harrowing; then, checking off with the plough, planted it in corn; dropping, in every check with the corn, a handful of plaster and ashes mixed, or a handful of guano to two checks; and in others a shovelful of domestic poudrette, covering the whole with loose dirt, scraped and drawn over with hoes. (The poudrette was manufactured by hauling alluvial or rich dirt, and mixing it in the proportion of three or four to one of human ordure, taken from the privies, which I have found both quick and powerful in its effects.) The corn, during its growth, tended by frequent stirrings of the surface, so as not to disturb the sedge, with small harrows and double shovels. During the fall, winter, or early the following spring, ploughed again, when some of the tufts of the sedge-roots will be found troublesome, but the sedge itself tolerably well decomposed; (and I believe, if plaster or lime had been strewn over it before the first ploughing, would be completely so;) after which, well harrowed, and sown with five pecks of oats, and from one to one hundred and fifty pounds of guano to the acre, and both turned under with the double shovel—the stubble of the oats fallowed and treated with guano and wheat, in the manner before described. By this process, I have produced moderate, but remunerating crops of both oats and corn for the labor bestowed, the quantity of each determined pretty much by the amount of rain that had fallen during the period of their growth, (for it is a fact, that the action of guano, without the aid of moisture, is greatly diminished,) and effected a good preparation for wheat, and for a more permanent improvement of my land. Some of my neighbors have used the drill, for putting in their wheat, with great success; which induced me to get and use one of "Pearson's," (Delaware,) last fall, with which I put in from eighty to ninety acres, at the rate of one bushel and a peck to the acre. The wheat has come up with great regularity, and looks strong and vigorous. This implement, I am inclined to believe, will be found very advantageous to all who will take the necessary precaution to prepare their land properly for its use, as it places the seed at a proper depth and distance with unmistakable accuracy, and requires so much less seed to the acre than the old method of sowing broadcast. I have dwelt much longer on the subject of ploughing than I had intended, because I view it as the *foundation* of success in agricultural pursuits; and "in giving in my experience," my remarks may be treated with derision by the fortunate occupiers of rich, alluvial, or calcareous soils; yet by others, (like myself,) who have (or may have) to *make* a soil from exhausted land before it becomes productive—impoverished heretofore by the cultivation of tobacco, or other exhausting crops—by those, possibly, they will be more favorably received.

Condition and prospects of Montgomery county.—The system pursued by the early settlers in Montgomery was destructive to the soil and injurious to her best interests—cutting down and clearing as much land during winter as they could plant in tobacco—each emulous to exceed his neighbor in the *amount* he could produce—and continuing to plant it in that weed for a year or two, until it would produce tobacco no longer; and then wheat, corn, and oats until *they* were no longer profitable; after which, thrown out, they soon became *old fields;* their only change, whilst one piece of land was in a course of exhaustion, was to attack a fresh piece, and treat it in the same manner. Such a system, pursued for a succession of years, would impoverish any land where nothing was returned to sustain it; and such, unfortunately, was the case here throughout a great portion of the country; and "Poor Old Montgomery" became a familiar term to designate the desolation, from which many of the inhabitants fled for refuge to the fertile lands of the West, rather than "face the enemy," and, possibly, your correspondent from Indiana among them. (Page 455 of your Report for 1849-'50.) To this condition of things (40 years ago) he evidently points, where he tauntingly assigns it as one probable reason for the failure to grow "cheat" I mentioned in a communication to your predecessor. And, as he appears to apprehend that *that* communication may have an evil tendency, I will so far endeavor to prevent it by saying that, since then, I have repeated the experiment, and *did* succeed in growing it. Nevertheless, the thing called chess or cheat is still to me a mystery, for I have noticed many fields, where only clean wheat had been sown, after being injured by the fly, produce from a fourth to a third of cheat; and also, near turning rows, where horses or other animals had passed and nipped off the top, tufts of cheat were to be found—all of which, to me, had the appearance of an abortive effort of the plant to produce genuine wheat. Be this as it may, there is now but little danger of cheat being sown with wheat, since the introduction of the improved fan, which separates this as well as all extraneous matter that differs in size from the grains of wheat. Pardon this digression into which I have been led in order to notice the communication above alluded to, headed "Wheat *vs.* Cheat." But now, what a great and glorious change has been effected by the sons of those Montgomerians, and others, who remained and battled with the "enemy," (before alluded to;) and instead of the unsightly sedge, everywhere, in extensive "spots," in their season, verdant fields of wheat are to be found, promising a rich reward for the energy and industry exerted in conquering and reclaiming them from their former impoverished condition. The day is not distant when Montgomery will become (if it is not at present) one of the most desirable localities in the State—possessing land, as it does, almost any of which is susceptible of the highest improvement by the application of fertilizers at hand in Baltimore and the cities of the District. Already emigration, instead of from, is setting into the county. And let them come, provided they bring with them the necessary qualifications and means of improvement; there is ample room for them in the yet unreclaimed portions of the county, which are to be had at a low figure—inviting such as may wish to change their location to come and participate in the enjoyment of as healthy a country as can be found from Maine to Texas—five to six hundred feet above tide, rolling and interspersed with beautiful little valleys that still retain a good deal of fertility, derived from the surface soil of the adjacent hills, washed into them by the rains, when formerly under cultivation, and abounding in delightful springs of water, of unsurpassable purity: surely, such inducements are worthy the attention of emigrants who are about to locate themselves, and to pursue agriculture as a vocation; particularly when combined with the advantages of a market for their surplus in Washington and Georgetown; where "creature comforts" can be had in great abundance, and at moderate prices, within distances varying from 5 to (nearly) 35 miles from them; in the midst of an intelligent, hospitable, and respectable population; convenient to churches of various denominations, mills, and a considerable number of mechanics of various descriptions. All that are required to insure success are a sufficiency of capital to commence operations with, a judicious application of that capital, and an indomitable spirit of persevering industry; and, with the blessing of Providence, there will be no such thing as fail. As a proof of which, I will briefly state that there is a small settlement of Germans about 3 miles from me, who a few years since (with little or nothing beyond their physical abilities to aid them) seated themselves down on a poor, miserable looking old field, and have, by their industry, and means obtained by working round amongst their neighbors, effected a change that is really surprising and pleasing to behold; and who will, I have no doubt, become wealthy, provided they remain prudent, as they have hitherto been industrious.

It may be objected to this communication, that I have not confined myself strictly to the inquiries contained in your Circular, or to agricultural statistics; but I trust that, when it is known that not only this, but other counties in Maryland, and likewise in Virginia, are similarly situated, and present a picture corresponding pretty much with the one I have endeavored to portray, it will, I hope, be conceded by every lover of his country that my observations will not be misplaced in your forthcoming Agricultural Report, where they will have a wide circulation, as I think the object I have in view must be apparent to all—a desire to attract, and if possible intercept and *fix*, that description of emigrants who will be most likely to renovate and improve those portions of our county that remain unreclaimed; and, by so doing, improve their own condition, increase the valuable productions of the country, and thereby promote the public weal. To the refined, intelligent, and wealthy citizen, desirous of exchanging his more sedentary for an active, rural life, this county, I think, likewise presents peculiar inducements. Removed from panics, occasioned by fluctuations in trade and monetary affairs, he can here not only invest, but employ his capital profitably, and at the same time find pleasant employment and recreation in the improvement and embellishment of his property; obtain the choicest delicacies from tide within a procurable distance; mix with congenial society in many parts of the county; and, by way of relaxation, attend the debates in Congress, when in session; but, over and above all, his chances for the enjoyment of good health (without which all other sublunary blessings he may possess are insipid) cannot be surpassed from "Dan to Beersheba," or in any portion of our blessed Union; and long may that Union be perpetuated and remain a blessing to us and to all future generations.

In conclusion, I will only remark, that all the valuable kinds of grain and grasses congenial to this climate can be grown here, by the aid of guano and other fertilizers, to as great perfection as can reasonably be desired; and, by a judicious system pursued in the application of them, and the addition of lime, the lands can be rendered, I think, permanently productive.

Very respectfully, your most obedient,

E. C. CLOPPER.

Hon. Thomas Ewbank,
Commissioner of Patents.

VIRGINIA.

Fairfax, Virginia, *February* 20, 1852.

Sir: In complying with the request for a communication from Fairfax, I would state that, in appearance, the county is so changed in many parts that a traveller who passed over it 10 years ago would not now recognise it.

Thousands on thousands of acres, which had been cultivated in tobacco by the former proprietors, would not pay the cost, and were abandoned as worthless, and became covered with a wilderness of pines. These lands have been purchased by northern emigrants, the large tracts divided and subdivided, and cleared of the pines; and neat farm-houses and barns, with smiling fields of grain and grass, in the season, salute the delighted gaze of the beholder.

Ten years since, it was a mooted question, whether Fairfax lands could be made productive, and if so, would they pay the cost? This problem has been satisfactorily solved by many; and in consequence of the above altered state of things, school-houses and churches have doubled in number.

I think, after an experience of 11 years, that the best mode of cultivation is what we term the three and two-crop system, viz: corn, oats or potatoes, wheat, or potatoes and wheat; always seeding down the wheat to lay in grass two or more years, according to circumstances, and keeping as much land in grass as possible; and, if near the Alexandria, Washington, or Georgetown markets, to keep a dairy and cut hay, as butter and hay pay a better profit than grain or stock.

Potatoes are also becoming an important crop. Although we cannot grow them quite equal in quality, or as many in quantity, as at the North, yet no crop pays so well at present.

When I first came to Virginia, but few persons would purchase potatoes grown here; all preferring those grown at the North, and depending on the North for their supplies. But the introduction of the mercers, and possibly some improvement in the culture, have improved the quality of the potatoes grown here; which, together with the loss sustained by many by the rotting of the northern potatoes, makes ours now a ready sale. The rot has not, thus far, seriously affected us here, though some cases have occurred.

As the greater part of our land was, and is yet, very poor, *manure* is all important.

Guano, though costly, is so quick and certain on all crops, that it stands No. 1. Although I am satisfied that plaster does good, I have never seen its effects except on land I had previously limed with 50 bushels shell lime per acre. And here the effects are so visible that I am induced to use both. I have also used soap-boilers' ashes with very good effect; yet, after all, my chief dependence is the barn-yard, which I clear out twice a year—in the spring for potatoes and corn, and in the fall for wheat.

Horses, as a whole, are of a medium quality, and there are but few bred in the county.

Cattle.—The great majority are natives, small in size, and without any particular quality to recommend them; yet we have some excellent cows, and with care in the selection, a good yard for a dairy may be obtained. We have, also, several herds of Devons, which are the favorites of all the improved breeds, and I think deservedly so for Fairfax. That they do not deteriorate, is proved by Mr. Lewis Baily, he having been a successful competitor with them for 7 years at the Maryland State Agricultural Fair, held in Baltimore. There are many fine working cattle in the county, but mostly imported.

Sheep.—Comparatively few kept. There have been a considerable number of fine-woolled sheep brought on from New York and Vermont; but from some cause or other, do not seem to get into favor.

Messrs. S. T. Stuart and Jacob Haight have excellent flocks of long-woolled sheep, and have had pens at our agricultural fairs which have been much admired, and would compare favorably at any agricultural show.

The fear of dogs prevents many from keeping sheep; and, until some law is enacted on the subject, the hazard will be more than the difference of profit between them and cattle.

Swine.—A very great improvement is observable within the past 10 years by importations from the North of various breeds; and our hogs may now be called a medium quality.

The above is respectfully submitted.

Truly yours, &c.,

THOMAS CRUX.

To the Commissioner of Patents.

Tappahannock P. O., Essex Co., Virginia,
November 15, 1851.

Sir: Your Circular of August last has been received by me from the postmaster of the town of Tappahannock, with a request that I would furnish the information desired by it.

Wheat.—Guano is used in the production of this crop; the quantity applied per acre, about 200 pounds; the yield, from 10 to 15 bushels per acre, and that on the poorest lands—lands which, otherwise, would hardly produce as much as the seed required to seed them. The quantity seeded per acre, about one bushel, on corn land, at which time the guano is applied broadcast, and both turned under by a one-horse plough about three inches deep. The depth for the guano is one more of convenience than choice, wishing to keep the corn-beds single, and not to ridge them too high. To reverse the beds would require the corn stubble to be ploughed up. Some plough in the guano with a double-horse plough, and then harrow in the wheat; but there is some difference of opinion as to the better way of the two.

The guano is passed through a sieve before it is used, to clear it of lumps; after which the lumps are beaten fine. A common hand-sieve was used, but it was found slow, and very disagreeable to the person using it; and I sent to Baltimore and got a piece of wire, two feet in length, and about 20 inches in width, with meshes three-eighths of an inch, and made a frame for it, with handles like a lime-sieve, and nailed it to the bottom of the frame. Two pieces of plank, five feet long, and four inches wide, will do for the side pieces for the box and handles, through which a quantity can be run in a short time, without much trouble or inconvenience to the person using it. Some carry the guano to the field, and there sprinkle it. The better way is, when not too lumpy, to sprinkle it before sifting, and to let it remain a day or two in bulk; or, to run through the sieve in the morning what will be wanting for the succeeding day, and then to sprinkle it and return it to the bags; either way will give sufficient time for it to become uniformly damp throughout the mass. This year I have used seven tons of guano with my wheat, seeded on corn land. The *white flint*, *blue stem*, and the *early purple straw* are the kinds mostly cultivated. For some years I cultivated the *red chaff*; after which, for many years, the *late purple straw*. Wishing to exchange the *late purple straw* for some other kind, I was at a loss, from the conflicting opinions of others; I therefore made a small frame, a foot square, and drew cords across it two inches apart each way, and planted a grain of wheat at each intersection, of one kind, then moved the frame on, and, in like manner, planted another kind, until I had planted all the kinds intended; this was done on some half a dozen different places in the field, then in wheat, and continued in like manner, for three years in succession. Four kinds of wheat were tried: the *white flint*, *red chaff*, *Mediterranean*, and *late purple straw*. The result was, the *late purple straw* made the least, the *Mediterranean* next, the *white flint* and *red chaff* the most, and about the same in quantity, and were more uniform in their annual product; since which, I have cultivated the *white flint*, and, on the same field, made about one-fourth more than I made of the *late purple straw*. The soil on which the experiments were made was neither light nor stiff, but an intermediate one.

Corn is planted in rows from five to five and a half feet wide one way, and from two and a half to three feet the other; single stalks, on beds formed by throwing six furrows together with a two-horse plough, cutting about five inches deep. When the corn is up and large enough to work, a furrow is run on each side of the corn by a single-horse plough, and the dirt thrown from it. It is then hoed, after which, there is not much uniformity in its cultivation—some preferring one way, and some another; and various agricultural implements are then used to suit different views. Guano is not used in the production of this crop; the cost prevents it. It is regarded as more profitable to apply to the production of wheat.

Peas.—Many varieties are cultivated—the black-eye; the clay cow-pea; a light yellow; and a dark-red pea, also called a cow-pea. There are three

varieties which may be considered the best. It therefore may not be amiss to make some remarks respecting them: The black eye is raised for family use and for market; very productive; the leaf and vine small, compared to the other two, and therefore it is not so good to sow as an improver of [illegible]. The other two have large leaves and vines, and continue to [illegible] in the season. The clay cow-pea is a beautiful looking [illegible], and if damaged, from its light color can be easily seen. The dark-red is just the reverse. In quality, the yellow is supposed much the best, and is said to be preferred by man and beast to the red; neither, however, appears to me to be fit for table use. Peas are seeded in spring, about a bushel to the acre, broadcast on fallow land, or land that was in corn the previous year, and turned under about the time of seeding wheat in the fall, and the wheat then seeded upon them and harrowed in. This has been attended with great success here, as well as elsewhere. Some seed peas among the growing corn when they give it the last working with a hoe, to turn them under for wheat; and it is said this has also been attended with like success; but I doubt its profitableness. In early life, impressions were made upon my mind that peas could not be profitably raised among growing corn; in consequence of which I have never raised peas among growing corn on high land but for family use, and confined their further cultivation for market and stock, to swamps, where the corn is usually injured or destroyed by the worm. But of late years I have been induced to make some experiments on a limited scale by sowing them broadcast amongst the growing corn when given the last working, which is immediately after the wheat harvest. The experiments have proved perfect failures, mostly owing to dry weather. This year I determined to try another experiment. I gave a piece of corn on ordinary land its last working the day before I commenced my wheat harvest, sowing so many rows broadcast, then leaving so many unseeded. The peas soon came up and began to grow, and the corn began to fade, and never regained its color, and did not make more than half as much as the unseeded row. The unseeded rows may give a better wheat crop than the seeded ones; but how far one crop should be sacrificed for another, presents many things for consideration. Crops of small value may be sacrificed for crops of more value; but the corn crop is one of great value, and cannot well be sacrificed for another more uncertain, like that of wheat, without the risk of loss. Had the peas been seeded after harvest, instead of before, it is reasonable to suppose the injury would have been in proportion, though not as perceptible to the eye. It is not here as it is in the South, where there is more length of season There the corn can even mature, and be severed from the land, and the land then seeded in peas, and heavy crops be produced; but here, in latitude near 38° N., where peas are seeded amongst growing corn, it may be said the corn and peas live and die together, struggling for their proportion of food during their existence, to the injury of both. Nor can so many late peas be easily saved by the ordinary force upon a farm, as to sow a large portion of the farm, and the corn-field also, at the rate of one bushel per acre; for late peas ripen during September and October, at one of the most sickly seasons of the year, when the hands are busily engaged in saving fodder and seeding wheat.

Horses and Mules are generally raised, but not quite enough to supply the demand, and the deficiency is mostly made up from those raised in the West, and brought here and sold; but the horses reared here are better formed, more durable, freer from defects and bad qualities. The Western horses are too often defective in sight or limb, and their qualities no better; if one can pull down a fence, another can run away with a carriage. Were we about to sell a portion of our horses, we should not like to sell the best and keep the worst for our own use; and when we consider the distance they have to come, and the numerous trades to be made on the way, it is probable they reach here with as few defects and bad qualities as could reasonably be expected.

Cattle.—The breed of cattle are mostly of the native stock; but many have been crossed more or less with the fine imported breeds. I have had some experience with Durham and Devon cattle, and their crosses upon the native stock; and that at a more early day than the present. Mr. Coke, of England, sent to Messrs. Patterson and Caton, of Baltimore, some Devon cattle in 1817; and in 1825 I purchased a pair of calves of Mr. Caton at $250. I crossed them upon my cattle of the native breed. The cross, I thought, was superior to either breed. In 1828 I purchased of Colonel J. H. Powell, of Philadelphia, a Durham short-horn male calf, at $300, and crossed upon my cattle of the native breed. The cross was larger and finer than the Devon cross; but whether they were larger and finer in proportion to the food consumed I do not know. My stock of cattle, from that time to the present, has been mostly half-Durham and half-native. Devons are said to make the finest work-oxen in England. I think they would make as good here as any other breed. I worked half-Devon and half-native oxen for more than ten years; along with them, the most of the time, half-Durham and half-native oxen worked. The cartmen were of opinion that the half-Devon oxen were much the best. In early life I became partial to hornless cattle, and, having some, increased their number by a hornless male; but in crossing these with Devon and Durham, too many horns were thrown out. To obviate this I had to cut out the horns of the calves when about an inch long, and connected to the skull only by a gristly substance, and to sear the place; after which some of them would throw out horns two or three inches long, which would generally turn downwards; but after there was turned out a hornless half-Durham male, the descendents of the hornless cows were then hornless. Horns add nothing to the strength of the ox for the yoke, nor to the milking propensities of the cow. Cattle are as easy to halter by the neck as by the horns; and, should an unruly one break loose, none can be gored. Hornless cattle stand together under a shelter like a flock of sheep; and when fed, the weak and strong feed together, the weaker not much fearing the stronger. I have frequently seen the stronger attempt to make the weaker get out of the way by giving them a few slight butts on the side; and, being unable so to do, put their heads under the weaker, so as to shove them out of the way. In agricultural publications we frequently meet with cuts of the improved breeds of cattle of Great Britain; amongst the number is the Galloway, a polled or hornless breed, of Scotland. Were I to judge from the cuts that I have seen, and the character given this breed, I should think it well deserving a trial here. From the cuts, I should suppose the Galloway one of the best formed and one of the most beautiful breeds of Great Britain. The breed is represented smaller than the Devon, generally black or brindle; the male "clothed in a loose and mellow, though rather thick skin, covered with long, soft, and glossy hair." "In roundness of frame and fullness of ribs the Galloway cattle may, perhaps, vie with even the most improved breeds." "They are a hardy race, subsisting on the coarsest pasture, and increasing rapidly when removed to a more favorable situation; they fatten finely on the best parts; their flesh is of the finest quality; and the joints, being of a moderate size, more suitable for consumption in private families than those of the larger breeds; they usually command the highest prices at Smithfield." They are represented not as good milkers as some of the larger breeds; but on coarse and scanty pastures they might give more in proportion to their size and the quantity of food consumed. My impression is that this breed of cattle has never been tried in Maryland or Virginia, so great has been the rage for large cattle, *without regard to pasture*. No cattle in Great Britain could have been imported into the United States at less expense; for Galloway, that portion of Scotland from which this breed takes its name, is the most southern part of Scotland lying on the western shore, with several fine seaport towns, not more than 100 miles north of Liverpool, to which they could have been shipped on any day to Liverpool, at a cost only of $1 or $2 per head. For cuts of the improved breeds of cattle of Great Britain, and their character, see, as well as other publications, the Farmer's Register, vol. 2, p. 199, published at Petersburg, Virginia; from which we have made some extracts.

To break Oxen.—I do not know that I can tell the best way, but I can tell a better way than many practise. Take them in the spring, when about two years old, at the time the manure is to be carried out, put a rope around the neck the day before they are to be yoked, and lead them to and fro for 15 or 20 minutes. This will alarm them at first, and cause them to make great exertions; but they will soon know what confinement is. Next morning yoke them, and put them between two old yoke, and let them work a few days; they will never forget it. Afterwards they can be occasionally worked, as necessity requires. This is a better way than to suffer them to get large and strong, and then to have to put a long rope around their horns or neck, and to have them prancing over the farm, with some half a dozen hands after them with sticks and clubs.

Sheep.—The native breed is most common, but many of them have been crossed by the imported breeds. The native breed is hardy, makes good mutton, and, in proportion to weight of carcass, yields as much wool as the large imported breeds—and that on coarse and scanty pastures. Large sheep appear better suited for market and luxuriant pastures; but here the three-field system is the most common. Under this system the native breed appears more at home. My system is the four-field. This gives more and better pasture. I therefore crossed my breed of sheep a number of years past with the Bakewell; since which I have raised no other than this cross. The wool is of the *very best quality* for family use—better than the Merino or South Down, or their crosses upon the native breed; all which I have tried.

Fruits.—More attention has been paid to raising fine fruits of late years than at any other former period. I have tried a good many varieties of apples, pears, peaches, cherries, apricots, and grapes, and expended much money in that way, as well as time and labor in their cultivation. But it is my intention, on the present occasion, only to notice a few varieties of each kind, nearly all of which have borne with me, or they are expected to bear in one or two years; and, as far as I have been able to judge, they have, with few exceptions, well maintained the high character given them in other parts of the United States.

Apples.—White Juneating, early harvest, summer pearmain, yellow bellflower, and cart-house—none of the fine winter apples of the North—seem to succeed here well. A valuable work on fruit trees was published by William Coxe, of Burlington, N. J., in 1817, with descriptions of several hundred varieties of fruits, and with cuts of two hundred varieties. This work induced me to get from the North some trees of the fruit varieties recommended by him. The apples, when they came to bear, were mostly found not to answer, and the trees had to be grafted over; to the Newtown pippin was grafted the cart-house, a winter apple recommended by Coxe, and supposed to be a native of this State. The tree is hardy, of vigorous growth, and one of the most beautiful and productive; but in maturing its fruit, like all our fine winter apples, it rots too much, often leaving but a small portion to put up for winter use; but when put up, it keeps better through the winter than any other fine apple. It is supposed to be one of the most profitable apples cultivated on the Chesapeake and its tributaries. I see, also, from the Patent Office Report of 1849–'50, p. 437, that it is said to be "one of the most profitable market varieties from one end of the Mississippi to the other." The *wine-sop* has not been named by me before, because in quality it is only second rate; but, notwithstanding, its cultivation is much on the increase. The tree is hardy and very productive; the apples hang uncommonly late, and seldom ever rot; but it will not keep like the cart-house—it is only an early winter apple. Coxe on Fruit says: "The flesh is rich, yellow, and tolerably juicy, pleasant and sweet; the cider produced from it is vinous, clear, and strong—equal to any fruit-liquor of our country for bottling." The English red-streak and the famous old "non-such" have long been extensively cultivated in the tide-water region; the non such under the name of the queen or cathead.

Pears.—Osband's summer, Julienne, Bartlett, (Williams's bon Chrétien,) Flemish beauty, Louise Bonne de Jersey, Beurré Diel, Beurré d'Aremberg and winter Nelis, Madeleine, white doyenné, (the butter pear of Pennsylvania and Virginia,) and the Seckel, in quality are equal to those named before them; but the Madeleine and white doyenné are old varieties, and the trees subject to the blight. I raised several trees of these two varieties, and, after bearing a few years, they were all killed by the blight; they are said to do better West than on the Atlantic coast. The Seckel is considered by many the finest pear known. I have two trees of this variety in my garden, now twenty-odd years old, and the blight has not injured them in the least; but it is a tree of slow growth, and the pears ripen slowly on the tree—from 4 to 6 weeks; during which time storms and high winds beat down great numbers of them. The product at times, though great, leaves the quantity to be consumed but small. In naming some first rate pears, I named, amongst the number, the Bartlett, Louise Bonne de Jersey, and Beurré Diel. These run through the whole period of ripening of the Seckel and white doyenné, and, I think, should be preferred. The trees are of vigorous growth, bear at an early age, are very productive, and the fruit is large and of the finest quality. I have grafted these three varieties to the water sprouts of old pear trees, and in two or three years have eaten the pears from the grafts in a high state of perfection. The Bartlett, in its growth, is rather ornamental than otherwise, and can be planted in the garden if desired. The Diel is a beautiful spreading tree, with large deep-green leaves, and can be grafted to old worthless pear trees, scattered over the farm for stock to repose under; all three varieties can be gathered about the time of ripening, or picked up as they fall, and will ripen as well in the house as on the trees.

Peaches.—Early York, Morris's red rare-ripe, yellow rare-ripe, red cheek Melicaton, Oldmixon cling-stone, Oldmixon free-stone, Crawford's late free-stone, Ward's late free-stone, Heath's free-stone, and Heath's cling-stone. I have had a great number of varieties under cultivation, both native and foreign, but have named only a few varieties, such as will no doubt give general satisfaction.

Cherries.—Virginia May, (the early Kentish of some, early white-heart of others,) Elton, black Tartarian, Downton, black eagle, yellow Spanish, and Downer's late. The black Tartarian and yellow Spanish have long been considered two of the best cherries at the North. Therefore a few remarks as to them may not be amiss: I have a tree of each kind, large and flourishing, set out by myself near 30 years ago. The black Tartarian is very productive, the fruit very large and of the finest quality, its duration short, and, not unfrequently, the last of the cherries have a worm in each. The fruit of the yellow Spanish is very large, and much admired for its beauty and excellence; but it rots sooner than any cherry that I have had under cultivation.

Apricots.—I have tried a good many varieties, but the Moorpark is the largest and finest that I have ever seen. It can be known from others by a perforation through the stone from the point where the stem attaches itself to the stone. There is a groove running along the back of the stone; at the end of the groove is the perforation, through which a pin or needle can be passed lengthwise for about one-third the distance of the length of the stone. Cole, of Boston, on Fruit Trees, gives the perforation of the stone to the peach apricot. All other writers that I have seen give it to the Moorpark.

Grapes.—Catawba, Isabella, Warren, (Herbemont's Madeira.) I have cultivated a great many varieties, both native and foreign. The Catawba and Isabella I have had under cultivation ever since their first introduction to public notice. The Catawba is one of the most certain to mature its fruit well; the Isabella and Warren rot very much at times. For want of space I have not even referred to the character of some of the fruits named.

Lime and Marl.—Shell marl is found in great abundance in some portions of the tide-water region. In some neighborhoods there is more than enough to supply the wants of the neighborhood, and in others none; and, as it will not bear the cost of transportation far, its use is mostly confined to the neighborhood in which it is found; in consequence of which only a few, comparatively, can avail themselves of its advantages. Lime is used here with the same results as elsewhere. Whilst some of the experiments prove highly satisfactory, others appear the reverse; but, notwithstanding, the use of lime is much on the increase. I have this year myself limed over 100 acres. The cost of lime at the landings on the Rappahannock is from 7 to 8 cents per bushel.

The Three-field System.—This system is the most common; the rotation, corn, wheat, and pasture. Lime and guano, under this system, may give greater crops for a time; but it is much to be feared that it will be attended with a future loss, for there can be but little or no general improvement of the soil under this system—so says the whole face of the country of the tide-water region, where it has been long, fully, and fairly tried. More fields than three seem to be required, so as to give a greater rotation of crops; and amongst the number should be clover and peas. Under a proper system, much could be accomplished in a short time in the improvement of the soil in the tide-water region, owing to the many facilities for obtaining the means. But the salt marshes and swamp lands immediately in connexion with the marshes on the Chesapeake and its tributaries cannot be reclaimed in this State, nor Maryland, as they are north and south of the Chesapeake, owing to the little elevation and depression of the tides. The vertical height of the tides along the Atlantic coast, from Charleston, S. C., to New York, may be estimated at from 5 to 6 feet; on the Chesapeake, and its tributaries, not more than about half as much, not giving a fall sufficient for drainage.

EDMUND F. NOEL.

Hon. Thomas Ewbank,
Commissioner of Patents.

Nicholas C. H., Va., *November*, 1851.

Sir: In your Circular, you have propounded sundry questions, to which you desire answers; among others the adaptation of the lands to grass, the annual yield, cost of cultivation; also yield and staple of wool, and the probable cost of production. The greater part of the lands in this county are in the hands of a few individuals, who are disposed to sell only large surveys. The price ranges from $1 to $3 per acre, according to locality. As natural grass lands, they are unsurpassed in the world; the red-top or herdsgrass putting up spontaneously so soon as the under-growth, which is generally very sparse, is "hacked" out, and the larger timber deadened. This is done for about $2 per acre. The yield of hay upon such land is generally 2 tons per acre; the usual price to mowers, 75 cents per day; which is the only expense. Lands so improved are worth about $10 per acre. Heretofore the inhabitants have paid more attention to guano than stock; but a radical change is taking place. More attention is being paid to stock; the population is rapidly increasing, and in a few years this will be the choicest stock-farming county in the State, and perhaps the wealthiest, especially if a more liberal spirit should "creep" into the halls of our legislature. The Central railroad will run through or near the county, and the Baltimore and Parkersburg railroad but a couple of days' travel off. A turnpike is likely to be constructed from the county seat, via Hunterville, in Pocahontas, to Warm Springs, which will turn the tide of travel through the county passing through the very finest grazing lands in the State. No section in the world can surpass this for sheep and wool-raising. But little, if any, attention has been paid to improvement by judicious crossing. Our native sheep are usually healthy, subject to few, if any, diseases, and attain fine sizes. The yield of wool is from 3 to 5 pounds per head. The cost of wintering to the farmer does not exceed 25 cents per head. The increase greatly more than pays the keep, leaving the wool clear. The staple is much larger and finer than is usual to our native breeds, and seldom injured by burrs. To capitalists and others who might wish to turn their attention to stock-rearing—especially sheep—no section holds out such inducements as Nicholas county, Virginia.

Respectfully,

HENRY M. PRICE, M. D.

N. B.—Not only can the staple be raised, but likewise manufactured; the streams affording water power to turn the machinery of the world. The land abounds in cannel, anthracite, and bituminous coal, iron, and fine granite for building purposes. Indeed the day must come when this section must manufacture for the entire Mississippi valley.

Whitehall, near Brownsburg, Rockbridge, Co., Va.,
January 31, 1851.

Sir: Having been slightly indisposed for several days, I have devoted the time to looking over your Report of 1850, kindly forwarded by the Hon. A. H. H. Stuart, Secretary of the Interior, and Hon. John Letcher, M. C.—two gentlemen of sterling integrity, and of whom we feel justly proud in our district.

Your Report presents much varied and valuable information from Maine to Oregon. I have been much interested in reading many of the letters; and your volumes will be carefully preserved for future reference.

I read with interest the report of Edmund Ruffin, giving an account of his harvest operations for the years 1846 and 1848. I do not think it any improvement upon the course generally pursued in the valley of Virginia; and I will endeavor briefly to state our plan of operations during the harvest month. I will suppose a good farm to have 15 laborers: 6 of the best take the cradles; 6 others with light rakes, with long handles and 4 to 6 teeth, follow, raking and binding the wheat, which, when heavy, is tied in large sheaves, with double band; 2 small hands gather the sheaves, and usually an old trusty hand puts up the shocks; 10 sheaves being set up, and 2 put on the top, called hudders.

Thus everything is closed up as fast as the grain is cut down. It is important that the wheat be well shocked, as it often stands out several weeks before being housed. But generally the first cut wheat may, within a few days after the harvest is over, be housed. If the force is not so large, then make half shocks the first round, bringing the wheat up to the edge of the standing grain; then 7 hands will perform the work, as the man who shocks the wheat can also gather the sheaves, and the row of shocks is always completed the second round. A good cradler will cut down 100 dozen per day, which, with an ordinary bind, will make 50 bushels of wheat, and, when the bind is larger, will make a fourth more if the wheat is well filled.

Wheat cut in the dough state makes the fairest flour; and if it can be got dry enough to grind in August, it will make a beautiful family flour, and will keep well the year round. I have, however, found it more apt to heat when put in bulk, than if left to get ripe. After wheat has once gone through a sweat, there is no danger of its heating, unless attacked by the weevil, when it invariably heats; and if it is not immediately ground out, loss ensues. When barns become infested with weevil, it is better to rick out the wheat, thresh it, and put it away in the chaff in pens, the bottom a foot above the ground; the bottom and sides lined with straw, and well covered. It can be cleaned up as ground; and in a few years the barns will be free from weevil.

Our county seat, Lexington, (at which place are located Washington College and the Virginia Military Institute,) is termed by some the Athens of Virginia. It is certainly a beautiful place, has much literary talent, and can boast of many of the refinements of polished life. The mass of the population of Rockbridge will compare favorably with that of any county in the Old Dominion; and, taking our valley from Roanoke to Jefferson, there are few sections of the United States, of the same extent, that can boast of a better country. Vast herds of the finest beeves are driven to the Richmond, Baltimore, and Philadelphia markets. Our milk and butter are equal to any in the world. Our lands produce every variety of grass and grain. Our pork and mutton are ample for all our wants. With a surplus for our eastern friends, almost every variety of vegetables is cultivated. Apples, peaches, apricots, nectarines, pears, strawberries, raspberries, gooseberries, and currants are abundant wherever cultivated with attention. Our mineral wealth is inexhaustible. In fine, there is hardly any good thing that may not be had in this valley with industry and good economy. None need want who have good health, for with reasonable industry all may provide the comforts of life.

Our valley is also making rapid strides in internal improvements; our Central railroad from Richmond taps the valley at Rockfish gap, passes by way of Staunton, and is heading out to Covington, butting, as it were, against the Iron mountains.

The James River canal is opened to Buchanan. The Lynchburg and Tennessee Railroad is progressing rapidly to its western terminus. We are a prosperous—we ought to be a happy people.

This valley will compare favorably with any part of the United States with which I am conversant in point of morals and religion. We are mainly a law-loving and a law-abiding people. Every little community has its church. The ministry are generally men of a high order of talent, particularly the Presbyterian, Episcopalian, Methodist, and Baptist. The churches are generally well filled every Sabbath by a people who voluntarily contribute from $200 to $1,000 annually for the pastors' support.

We have many good schools, and even the German population, who have heretofore done little in educating their sons and daughters, begin to take an interest in these matters.

I must say something of our *servants* in the valley. They are generally a robust, healthy, sleek, well-fed, well-clad, and well-housed people, (I speak of farm hands and house servants.) It is the interest of every master to take good care of his servants; to see that they are not unnecessarily exposed to bad weather; to work them moderately and treat them kindly: in this way they are less liable to disease, more attached

to home, and not given to pilfering, and generally become much attached to the family. In a well-ordered farm there is rarely a necessity for correction. Where method is pursued, you rarely find servants out of place. In winter, breakfast should be early, dinner at noon, and supper at night. In the harvest month when labor is severe and days long, a slight repast between 4 and 5 P. M. greatly strengthens the hands; and I believe this custom prevails extensively in the valley.

It is a good custom to give the hands presents occasionally—say at Christmas and harvest time—or to allow them to cultivate an acre or two of corn, which the master can buy, or give permission to sell elsewhere. Servants well-treated rarely ever run off; but there are bad servants, as well as bad children, and when they need correction it ought always to be promptly attended to. In making this statement with regard to our servants in the valley, it is intended to apply to our well-ordered farms, where the proprietors generally superintend their own hands. There are exceptions to the general rule, and you will find in all communities hard masters, whether they are served by black or white laborers. Some there are who drive early and late. Mammon is their god. To heap up gold, and gloat over their treasures, appear to be all they enjoy in this life; they are of little service to Church or State. They would like to see the country improved, yet they never give one dollar to that end. They like good roads, provided you will make them through their neighbors' lands. Or if, perchance, you must force a road through their premises, the damage asked is five times greater than the injury sustained. They are mere drones, too penurious to live well themselves. You may here expect to see ill-fed and ill-clad, ashey, dirty, looking servants. I feel happy to say these are but the exceptions. The large mass of our valley landed proprietors treat their servants well; they are infinitely better off than the free negroes amongst us; indeed I will go farther, and say they are much better off than many of the poor white families that are found in every community. They never want for the substantials of life; indeed in very many families they live as their masters live, and work no harder. When sick, medical aid is afforded, and generally they are well nursed.

To give you some idea of the general health of our county, I would remark that since I have lived in the country, (my present residence,) 15 years, my physician's bills have averaged about one dollar per annum. My family have ranged from 15 to 20. Present family 20; 5 whites and 15 servants. No medical aid for the last 3 or 4 years. Our meals rarely vary 15 minutes from the appointed time. We usually retire from 9 to 10, and rise from 5 to 6 the year round. We enjoy a good deal of social intercourse with our immediate neighbors; attend the post office almost every day, and the church every Sabbath, when health and the weather permit.

HENRY B. JONES.

Hon. THOMAS EWBANK,
Commissioner of Patents.

WHITEHALL, ROCKBRIDGE, CO., VIRGINIA,
November 20, 1851.

SIR: In answer to your Circular, I submit the following:

Wheat.—Guano is not extensively used in the valley of Virginia, from the fact that it is too expensive. The cost in Richmond is from $46 to $50 per ton, of 2,000 pounds; cost of transportation over a distance of 120 or 150 miles, from $10 to $15. I am using it in a small way this year, at the rate of 150 to 200 pounds per acre, tried in different ways, and will, if living, report the result next year. The article has been but little used in my neighborhood, but, in every experiment, with decided success. The yield has been thought to be equal to a gain of 5 bushels of wheat per acre, where 150 pounds were sown. This, at the present low price of wheat, will not pay here; wheat being now worth only 50 cents per bushel at home, and at Scottsville, our nearest market, about 70 cents. Guano, costing $3 per hundred, would show a loss of 50 cents per acre. The best preparation for wheat is believed to be a clover-lay, ploughed down in June, the clover turned under to a depth varying from 5 to 9 inches. Our best farmers are those who uniformly plough deep. Two or three good stout horses are generally used; 2 are most common. With the Livingston plough, and 2 good horses, the earth is turned over from 6 to 8 inches in depth; this is again turned about the first of September, and immediately sown at the rate of 1½ bushel per acre. If the soil is very good, 2 bushels of seed are sown. With our best farmers, the yield is 20 bushels per acre, or 10 to every 1 sown. I do not think the average of our county would be over 8 bushels per acre; for it must be remembered that a large portion of our farmers put in their crops badly, from the fact that many farm too much land, and, as a consequence, it is badly tilled. A few of our best farmers have made as much as 42 bushels per acre on choice lots of 10 acres. This should teach us the necessity of paying more attention to collecting manures, and properly applying them. From my experience in farming, I am of opinion that every little hand could be profitably employed in saving and making manure; and on large farms, a force could be set apart for this express purpose. With regard to rotation of crops, there is much diversity of opinion, and scarcely any three persons pursue the same rotation. The five-shift system prevails to some extent, 3 years grain and 2 years grass, and in some cases 3 years grass and 2 grain—say corn, oats, wheat, and grass 2 years.

Most farmers sow their wheat without any preparation. When smut prevails to any extent, I have found that soaking my seed wheat in strong brine, and rolling it in lime, answer a valuable purpose; and I never have smut with wheat thus treated. There is, however, some danger in this process if the fall is very dry; as the wheat is apt to sprout, and, with long-continued dry weather, when slightly covered, is apt to perish. This fall, being dry, I simply soaked in strong brine and rolled in ashes. Wheat I mixed in the morning was covered by noon: mixed at noon what would do till night. My wheat came up well and now looks promising. The yield per acre is on the increase, and farming is generally improving.

Corn.—Guano is but little used on corn in this part of the valley. With regard to the corn crop this year, it is a poor one—I think I may say a half crop. Good farms readily produce an average of 50 bushels

per acre; some few go higher figures, but many fall below 30 bushels. This is one of our most valuable crops. We do not, however, always use it to the best advantage, as it is generally fed on the cob. In this way, I am of opinion, it makes the finest and best pork; but it is certainly not the best economy.

A good clover-lay, or sod, is the best for corn; which should be turned over as deep as possible, thoroughly harrowed, and, if the land be rolling, should be laid off as near on a level as practicable, 4 or 4½ feet apart, and drilled to stand, one stalk in a place, 9 inches apart. The sod should not be disturbed; but the crop should be kept clean with the cultivator and hoes. I have never failed to make a good crop of corn when thus cultivated.

Clover and Grasses.—Clover is very extensively in use in the valley of Virginia, and is considered one of the best fertilizers. The seed is usually sown on wheat or rye during any of the winter months, and on oats in March or April. The quantity of seed sown is generally 1 bushel to 8 acres; but of late years, I have sown thicker—say 1 bushel to 6 acres. One gallon per acre would be ample if all the seed would vegetate and grow; but it is better, when seed can be had for $4 50 or $5 per bushel, to put it on pretty heavy, than have a partial failure. When thick it makes the best hay, as the fibres are not so large. The yield on good land is, in good seasons, fully 2 tons per acre. The same remarks will hold good respecting *timothy*. Of the latter grass, less seed per acre will do; one bushel of seed will sow 10 acres.* Light sandy lands will produce good timothy, but not heavy crops. Timothy seed generally succeeds best when sown early in the fall on rye—say from the 20th August to the 1st of September. It is, indeed, now common with many farmers to sow wheat in August, particularly the Mediterranean wheat, which, if sown early, makes good fall pasture for calves. Timothy and blue-grass make the best permanent pastures, and are not so liable to the action of the frost. Clover is often frozen out, in severe winters, when not protected by snow.

Rye.—This crop is not extensively grown with us, and it is principally used for horse-feed, ground, and mixed with corn and oats. The long straw is cut, and makes an excellent feed. The multicole, or Poland rye, is becoming common, and frequently yields 40 bushels per acre—a half bushel to three-fourths sown per acre, from the middle of August to the first of September; but will produce well if sown later. This rye also makes excellent fall and winter pasturage for calves and sheep. The multicole, or Poland rye, was introduced through our minister to France, Hon. W. C. Rives; and was first grown in this State by Wm. Massie, esq., of Nelson county, whose crop, some years ago, averaged about 45 bushels per acre. It has a beautiful bright straw, from four to six feet high; and, notwithstanding the straw is rather soft, it usually stands up well. The seed was first sold at $4 per bushel, but can now be had for 50 cents.

Oats.—These are generally grown, being an excellent grain for feeding horses, mixed with rye or corn, or cut in the sheaf, and mixed with rye and cornmeal. The product is from 15 to 50 bushels per acre;

[* It is an error to suppose that a bushel of timothy will seed sufficiently ten acres of ground. If sown on five acres, it would be thin enough, even if a peck of clover seed is added.]

owing to the soil and preparation for the crop. Thin lands are more generally sown, as the crop is liable to failure on our best lands. They are considered to be an exhausting crop, leaving the land too light. Clover does not always succeed well with oats, particularly if the oat-crop is good. They shade the ground too much; and, when taken off, the hot suns of July and August not unfrequently kill the young and tender clover. The price for several years past has been from 30 to 33½ cents per bushel; are now worth from 30 to 40 cents. Barley, peas, and beans are not much cultivated in our county. The valley of Virginia abounds in fine cattle. I will, however, leave this query in the hands of more experienced cattle-graziers. Fine butter is made, but there are few farmers who give their entire attention to dairy husbandry. Our surplus butter finds at Richmond a ready market at a price varying from 15 to 25 cents per pound, according to quality. The little cheese that is made, finds a home-market at 10 cents per pound.

Horses.—The supply about equal to the demand. Very fine, though rough bred horses are raised in our county. They are mostly [illegible] and strong; fitted for the plough and wagon; are easily broken, and generally taken in hand when two years old. At this age they are much more easily broken, and should be carefully and gently handled, and put to light work. When thoroughly broken and gentle, they may be turned out, and only worked occasionally until four years old, when they can be put to regular work. The price of horses varies from $65 to $120; a large, strong, well-broken horse usually commands $100. Mules are not much raised, or much used, except about our iron-works, where they are found to [illegible] better than horses; will stand harsher treatment and rougher [illegible]. They are mostly brought here from Kentucky. Price about the same as horses.

Hogs.—The Irish graziers and mixed Berkshires are our common stock. The latter come to maturity sooner than the former. The cheapest method of producing pork is a problem I have not yet solved. The farmer is rarely paid for it when sold under $5 per hundred. This year it will command $6, and perhaps more. My plan of raising hogs is never to keep over one winter. My usual average is 175 to 200 pounds. I calculate on 100 pounds after my hogs are put up to fatten, which is generally done in September. A hog, to be profitable, should always be kept growing, and never suffered to become lean. With nice keeping, hogs may be made to weigh 150 pounds from March 1st to December. I usually feed a little corn, with vegetables and slops, through the winter. I get my hogs on clover as early as possible in summer. So soon as the fruit begins to drop, let them have access to the orchard; and about the 1st of September put them up to fatten, giving them fallen fruit, with corn cut up with slop, once a day, closing with corn in November and December. My bacon is uniformly good and firm, producing fine lard and sweet hams. I usually make three killings in November and December, taking the fattest in order. Salt down at the rate of one bushel to 800 pounds of pork. If the weather is warm, I leave my meat in from seven to ten days; if cold, it may lie several weeks. During fifteen years I have not lost a piece of bacon. I salt from 3,000 to 6,000 pounds annually.

Potatoes.—The Irish potato does well with us. I have been but little troubled with rot; usually plant good-sized potatoes, cut and rolled

in lime, and planted on ashes; crop varies from 100 to 300 bushels per acre. Price, this year, 50 cents per bushel; but often falls to 25 cents. The sweet potato is but little cultivated in the valley, and generally from the slip. They are mostly small, and not well flavored.

The farmers of our county are beginning to pay more attention to fruit. Select varieties are introduced, and in a few years the article will be extensively sent to market. I planted a good orchard, fifteen years since, of some 500 trees, from the nursery of James Sinton, esq., near Richmond, Virginia. There is in my orchard much good fruit, and I rarely fail in raising enough for family use the year round. I cultivate the different varieties of pippin, the Baldwin, Swaar, Rhode Island greening, lady-apple, seek-no-further, bell-flower, and different varieties of russets, pears, peaches, nectarines, and apricots—all of which do well. I plant peach-trees every year, and, as many die, other trees succeed them. In this way the stock is kept up, and I rarely fail of having some peaches. I have no remedy for the yellows. Where the cattle tramp about the roots of the peach-trees they generally last longer.

Yours, respectfully,

HENRY B. JONES.

Hon. THOMAS EWBANK.

P. S.—I have kept a diary for the last fifteen years, and have the range of the thermometer at daylight. I send you a table for the months of March, June, and November, for the last three years:

	Table for March.			*Table for June.*		
	1849. (Deg.)	1850. (Deg.)	1851. (Deg.)	1849. (Deg.)	1850. (Deg.)	1851. (Deg.)
1	30	49	30	60	50	58
2	32	34	30	62	54	59
3	33	42	32	60	46	60
4	29	28	30	56	50	56
5	30	26	28	63	*	60
6	31	42	50	66	•	61
7	36	41	34	64	•	70
8	38	42	28	66	•	60
9	38	34	30	62	•	66
10	38	38	35	61	•	53
11	36	30	30	57	•	60
12	40	34	36	56	•	66
13	48	43	35	56	•	60
14	54	55	40	60	•	52
15	44	45	50	62	•	48
16	48	45	55	66	•	55
17	37	46	48	56	66	52
18	50	45	42	60	70	46
19	29	43	34	58	63	44
20	40	29	32	60	65	52
21	55	32	36	62	66	55

* From home from 4th to 17th; the weather fine and clear, with a good rain on the 10th. Fine growing weather.

	Table for March. 1849. (Deg.)	1850. (Deg.)	1851. (Deg.)	*Table for June.* 1849. (Deg.)	1850. (Deg.)	1851 (Deg.)
22	34	36	35	64	65	70
23	32	40	36	65	68	66
24	38	32	40	*70	62	60
25	52	27	40	66	63	61
26	34	31	36	70	65	60
27	35	30	48	66	66	64
28	40	35	60	68	68	67
29	37	31	46	69	65	70
30	44	33	50	70	66	†70
31	42	36	52			

	Table for November. 1849. (Deg.)	1850. (Deg.)	1851. (Deg.)	*Table for January.*	1850. (Deg.)
1	34	42	42	1	20
2	55	40	58	2	29
3	60	44	44	3	30
4	45	46	37	4	40
5	45	46	32	5	26
6	50	47	36	6	32
7	50	50	22	7	50
8	40	36	25	8	32
9	42	34	34	9	40
10	45	30	47	10	45
11	35	40	38	11	38
12	37	44	36	12	32
13	36	40	40	13	36
14	40	34	42	14	32
15	40	35	55	15	38
16	42	46	43	16	44
17	43	30	42	17	44
18	38	28	34	18	26
19	50	42	34	19	13
20	35	42	34	20	26
21	34	36	40	21	‡
22	47	26	31	22	‡
23	46	34	30	23	‡
24	60	34	27	24	26
25	60	34	27	25	31
26	40	52	34	26	33
27	37	50	28	27	44
28	34	60	40	28	48
29	36	64	30	29	40
30	46	44	38	30	12
				31	4
				Feb. 1	12
				2	26
				3	32

* Mercury in last week has ranged, in heat of day, from 86° to 90°.
† Mercury rose to 88° at 2 P. M.
‡ From home. Range about 28°.

The coldest weather I have known in the valley for the last 16 years, the mercury fell to 6° below zero. The weather here in summer is never very hot for many days together. General range of mercury from 75° to 88°. I have known it as high as 96° occasionally, for 2 or 3 days.

Our winters have been mild for several years past, with occasional cold, generally not lasting a week.

Amherst County, Virginia,
January 1, 1852.

Sir: In my communications which have been published in the Reports of the Patent Office, I have answered nearly all of the questions propounded in your Circular; and I must now consider them merely as hints or suggestions in shaping the present reply.

In pursuing the course above indicated, I will make a few suggestions on the subject of *grazing land* with regard to its improvement, and will copy from a short essay I wrote for the "Southern Planter" in the year 1849.

To graze arable land during the whole period it is not in cultivation, is certain to impoverish it; but judicious grazing is often necessary and advantageous. For instance: a farmer has a tract of high land which he wishes to improve, but it is thickly set in sassafras bushes, running briars, and other pests. Now, I contend that "hard grazing," with both cattle and sheep, for at least three years, or until these pests are extirpated, is the more rational system; for if the land be cultivated before they are destroyed, they spring up with the crop, which is injured; and when the field is again cultivated, shrubbing and grubbing have to be resorted to, and a sufficiency of labor expended to pay nearly for the land. On rich land, I think it also advisable to graze clover the first year, as it will keep down the weeds, and prevent their destroying the young clover. On spongy land, also, particularly such as has on it a heavy coat of vegetable matter, trampling the land by cattle is certainly an advantageous practice. But to graze clover the second year, or land almost destitute of vegetable matter, if free from the pests above mentioned, ought not, in my opinion, to have an advocate.

Guano.—I have used guano for the last three years on wheat, oats, corn, and tobacco; and notwithstanding I am pleased with the fertility it imparts, and the increased production from its use on several crops, yet I doubt, with the present low prices of agricultural productions, and the high price paid for the article, whether its general use will be profitable in this vicinity. On land which would have produced about 7 or 8 bushels of wheat without guano, the yield, with the application of 200 pounds to the acre, was about 14 bushels. On poor land, which probably would have made three barrels of corn to the acre, with an application of the same quantity of guano, it yielded between four and five barrels. On oats, the beneficial effect on poor land was greater; but on rich land I could discover no advantage from its use; and on tobacco, the land being very rich, I saw no difference in the plants on which guano was applied, either in their size or early maturity. It is true that clover, following the small grain, is benefited, that a better stand may be expected, and a more luxuriant growth realized. But when we reflect that at least one in three of our wheat crops is destroyed, or much injured by rust or other fatalities, we may well doubt, at $50 per ton, with wheat at 70 cents per bushel, whether it could be profitably used for that grain on such land as mine.

I would suggest that the inspector of guano should be required by law, in each State, to analyze every parcel or load, and brand on each bag the per centage of ammonia and phosphates which it contains. The guano I bought last fall was quite damp; and from that circumstance, together with the smell and appearance, I was satisfied it had been adulterated. But as it was ordered from New York, I was compelled to take it. This guano had been inspected, and marked No. 1.

The analysis of several cargoes by the Maryland State chemist shows that the difference in several cargoes of that which was not adulterated, in the per centage of ammonia and phosphates, was very considerable; for one cargo had as much as 18.14 per cent. of ammonia, and 32 per cent. of phosphates; whilst another had only 12.09 per cent. of the former, and 25.80 of the latter; which makes a difference of at least 25 per cent. in the value of the two cargoes, and proves clearly the necessity of having inspectors qualified to analyze this article, and required, by heavy penalties, to discharge their duty.

Fruit Trees.—I would also suggest to those planting peach trees to remove the earth at the root of their young trees in the month of March, tie broom-straw around the body of each tree, and then replace the earth. The straw ought to extend into the ground as far as permitted by the roots, and about six inches above the earth when replaced. I have pursued this course for several years; and although it is not an entire protection against the worm, yet but few trees were injured where this remedy was used.

Tobacco.—This plant is cultivated very largely in this part of Virginia, but, to be profitable, ought to be grown on very rich land for foreign markets, or on new ground to be manufactured at home; for the cost of cultivating an acre of rich land, which will make from 1,000 to 1,200 pounds, is but little more than on ordinary land, which will produce but half that quantity; and the larger sells generally at a higher price than the smaller. New-ground tobacco, for manufacturing, ought to be fine; consequently, must be grown on thin land, as it commands a much higher price.

The Census of 1840 makes the quantity of tobacco grown in Virginia 20,000,000 pounds; whereas the average crop is estimated at 50,000 hogsheads, which is equal to 70,000,000 pounds. But I suppose the Census of 1850 will correct this error.

Very respectfully,

RICHARD G. MORRIS.

BUCKINGHAM COUNTY, VIRGINIA,
December 15, 1851.

SIR: I submit for your consideration the following observations upon some of the topics embraced in your last Circular, a copy of which has been recently received. The county of Buckingham lies on the south side of James river, seventy miles above Richmond, and is characterized by the same general features as the adjacent counties of Appomattox, Prince Edward, and Cumberland. Our staple productions are tobacco, wheat, corn, and oats.

Wheat.—The varieties most commonly sown are the early purple-straw, the late purple-straw, the golden-chaff, the Etrurian, and the Turkey wheat. The Mediterranean and the red May were extensively sown a few years ago; but these varieties are not as much admired here now as formerly. Very little wheat is sown in the month of September, on account of liability to injury from the depredations of the Hessian fly. The usual time of sowing is from the 1st of October to the 15th of November. Could the farmers sow their whole crop of wheat within a few days, they would probably prefer the first 10 days of October. A bushel and a half to two bushels to the acre are sown on rich lots, as well as fertile low-grounds. There is, however, no question connected with agriculture, in reference to which there prevails a greater diversity of opinion, than that of the proper quantity of seed to the acre. From the age of Columella to the present time, this appears to have been a fruitful subject of discussion among farmers. The greatest foe to the wheat crop is the rust. In 1850 the injury caused by rust was immense, but the crop of 1851 was of fine quality, and more abundant than usual. It is difficult, if not impossible, to state the average yield for the county. Some agriculturists who sow wheat appear to rely infinitely more upon their *faith* than their works or their soil. Rejecting all sober and rational expectations of reaping a reward, such persons, buoyed up by hope, and prompted by a sanguine temperament, sow wheat upon land incapable of yielding anything more than a light crop of straw. Fortunately, there are not many of this character. Excluding these abortive efforts, I think the product on ordinary land may be estimated at 8 bushels per acre; on land above the average fertility, 10 to 15; and on rich lots, or fertile low-grounds, from 20 to 30 bushels per acre. Those who grow wheat after clover plough the land between the 10th of July and the 1st of September, as their engagements and the seasons will permit. Ploughs drawn by 2 or 3 horses are used, as the depth of the soil and the amount of vegetable matter on the surface may indicate. Some intelligent farmers in Albemarle county plough only once, then sow the wheat and harrow the land. In my opinion, a second ploughing with one-horse ploughs before sowing the wheat, and harrowing the land subsequent to sowing, is a preferable plan, and one that will compensate for the additional labor. A second ploughing with a two-horse plough (instead of a single plough) is sometimes rendered necessary by the amount of vegetable matter which grows so luxuriantly, during hot and wet weather, in July and August. The tobacco crop requires so much attention and labor during the summer, that the mass of our agriculturists have but little opportunity for fallowing land for wheat. Hence, their principal reliance for wheat is upon the tobacco and corn land, after these two crops have matured and been removed. Wheat yields better after tobacco than we can obtain upon adjacent land of equal fertility. This fact, well-known among tobacco planters, was a great puzzle to Judge Buel, of New York, who considered tobacco a great exhauster. This is true; but I think corn exhausts the fertility of our land more than tobacco. The latter is grown upon fresh land, or upon land enriched by manure, or by the use of clover and plaster. This fact, considered in connexion with the thorough cultivation required by the crop of tobacco, will explain to northern agriculturists why a good crop of wheat is usually obtained from land which was cultivated in tobacco the preceding year.

Within the last five years, several farmers in this and the adjacent counties have sown guano upon their wheat land; and, while I have heard of some disappointment, the testimony preponderates in favor of guano as a valuable fertilizer. This manure condenses great power in a small bulk; and hence its *portability* gives it a great recommendation with all who properly appreciate the value of labor and time. The quantity generally sown upon wheat land is 200 pounds to the acre. I believe that most of those who use guano in Virginia have acted upon the plan—strongly enforced a few years ago—of *ploughing* in the guano *deep*, then sowing the wheat, and covering it by the harrow or one-horse ploughs. The reason assigned in favor of burying the guano deep, is the tendency of its ammonia to escape rapidly. To guard against this tendency, plaster may be mixed with guano in proportion of one-fourth of the former to three-fourths of the latter; thus combined, the sulphuric acid of the plaster will unite with the ammonia of the guano, and retain it for the gradual nourishment and progressive development of the growing crop. So far as my limited experience has enabled me to judge, I am opposed to ploughing in guano very deep. Instead of ploughing it under to the depth of eight or ten inches, with ploughs drawn by two or three horses, I prefer to plough it in with one-horse ploughs, and to cover the guano only three or four inches. In this way I believe the guano becomes more speedily and more thoroughly incorporated with the soil than at a lower depth, and that the effect upon the wheat crop is more beneficial. I am aware that this method has been objected to upon the ground that, although the effect of guano may be very apparent and very salutary when thus applied, it is more evanescent than when covered deep. On the contrary, I think that the effect of guano is not only more decided and beneficial when it is ploughed in superficially, but that its effects are equally, if not more, permanent. Ammonia is one of the most valuable constituents of stable-manure; yet the almost invariable practice—a practice sanctioned equally by experience and observation—is to plough in this kind of manure superficially. I have heard of no one in Virginia whose success in the use of guano has been more encouraging than that of Mr. Willoughby Newton, of Westmoreland, who has been convinced by experience that guano exerts a more powerful influence when ploughed in superficially than when ploughed in deep, as recommended by others. This manure augments the crop of wheat, and insures a good stand of clover; but in our country its effect is not supposed to continue more than twelve or eighteen months beyond the period of application. Coleman, in his work on the Agriculture of Great Britain, &c., states that upon some of the meadows of England the beneficial effects of one application of guano were quite perceptible for *three years*. Is not this more protracted effect to be attributed to the comparatively low temperature and humid atmosphere of England? In England guano, when sold, is often warranted to contain 16 per cent. of ammonia. The inspection laws of Maryland and Virginia do not enable the purchasers

of guano to ascertain the proportion of ammonia, although this is the most valuable constituent. Dr. Higgins, the State chemist of Maryland, has lately mentioned the result of the inspection of several cargoes furnished him by the city inspector of Baltimore. In these the ammonia varied from 11 to 16¼ per cent.; yet all were passed as No. 1! The inspection laws of both States should be amended, and the price of guano be adjusted in proportion to the amount of ammonia. According to Professor Johnston, this amount has been found to vary from 7 to 25 per cent. in different cargoes imported into England. In Peru the current price of guano is 50 cents per 100 pounds, or $10 for the ton of 2,000 pounds. The price at which this manure is sold in our Atlantic cities being five times as high as the current price in Peru, it is no less our duty than our interest to endeavor to avoid purchasing any unless well assured of its purity. One of the indirect benefits likely to result from the importation of guano, will be the stimulus imparted to the inventive genius of our scientific men. Investigations and researches in agricultural chemistry will be greatly extended, experiments multiplied, and artificial manures of value be probably made. Professor Johnston ascribes the great reduction in the price of guano in England to the efforts of scientific men to make valuable compounds to supersede its use. I trust that the negotiations carried on by our government with that of Peru, in reference to guano, will be successful. If so, the consumption would be much augmented in consequence of the diminished price at which it would be sold. Whether, from any cause, the price be diminished or not, we should not permit ourselves to regard guano as a panacea for the many evils arising from a long-continued system of bad husbandry. Fortunately for us, there are other manures and other means, by the judicious use of which our crops may be augmented and our lands improved.

Corn.—The varieties in use are numerous. This grain is made for domestic consumption almost exclusively in this part of the State. The modes of cultivation are very diversified. However defective the plan of cultivation may be upon some farms, the crop is generally cultivated upon more enlightened principles than those which prevailed some years ago. Deeper ploughing during the winter, and a more thorough preparation of the soil in the spring, by the use of the coulter and harrow, previous to planting corn, constitute a part of the present system of cultivation. After the corn has come up, it is important to keep the land open, to prevent the growth of grass and weeds, and avoid breaking the roots of the corn, as well as to complete the cultivation by the commencement of the wheat harvest. To accomplish these purposes, harrows, coulters, cultivators, and single ploughs are used, as the hilly or level surface, and other peculiarities of the field, and the nature of the seasons, may suggest as most appropriate. Manure made upon the farm, being in demand for the tobacco land, is very seldom applied to land designed for a corn crop. Coarse and undecomposed manure from the farm-yard, if hauled out and ploughed in for the benefit of the corn crop, is more injurious than otherwise in this region. Such manure, when thus used, may be beneficial in other States of the Union—as, for instance, in some of the northern and northwestern States, where the atmosphere is more damp and the thermometer ranges not so high as in middle Virginia. It was this kind of manure which Judge Buel, the former editor of the *Cultivator*, recommended to be hauled out in the spring and ploughed in deep, in order, as he maintained, that the process of decomposition might be completed under the ground, and the corn crop nourished and invigorated at the same time. With great deference for his opinions upon most agricultural subjects, I do not approve of this mode of using coarse and half-rotted farm-yard manure *in this locality*. I think such manure had better be hauled out in the spring, and applied as a top-dressing to young clover. If plaster be then sown upon the manure, after it has been spread, so much the better. We commence planting corn about the first of April. This grain is our chief reliance for bread, as well as food for stock. The average product may be estimated at from 30 to 40 bushels per acre on low grounds, and on high land from 15 to 20 bushels per acre. When the crop has matured, the best portion of the field is sown in wheat in the fall, and the remainder in oats during the following spring.

The *Oat* crop is generally made upon inferior land; hence I think the average product per acre does not exceed 15 bushels. We make no barley or rye.

Peas and Beans are cultivated for family use, but not as field crops. A few individuals only cultivate peas with any view of renovating the soil. No edible root is cultivated in fields. We have turnip patches of one or two acres, but no turnip fields, as the farmers of England have.

Potatoes.—Irish and sweet potatoes are grown for domestic consumption, though not for sale.

Unfortunately for us, we pay very little attention to *meadow-grasses*, and, of course, meadows "are few and far between." The amount of hay obtained may be estimated at 1½ ton per acre. Timothy does not thrive well in our climate; and I regard herdsgrass as the best and most hardy grass we have. Clover succeeds tolerably well; but does not attain that luxuriance of growth here which it does in several counties immediately below the Blue Ridge.

In reference to *Dairy Husbandry*, I have only to remark, that no cheese is made; and, while the planters have milk and butter enough for family consumption, very little butter is sold.

The stock of *cattle* has, within the last fifteen or twenty years, been improved by crossing with the Durham and Devon stocks. You ask, "What is the cost of raising neat cattle till three years old; the usual price at that age; and the value of good dairy cows in spring and fall?" To raise a calf till three years old may be estimated to cost $8; and, at that age, it would be worth $16. A good dairy cow, with her calf, in the spring, is worth $24; by the fall, her value would be reduced to $17 or $18.

Sheep.—We keep sheep, more with the view of obtaining lambs and mutton for our tables than for the purpose of selling them, or because we desire to sell wool. No person in this portion of Virginia keeps large flocks of sheep for the special object of *wool-growing*.

Hogs.—The stock of hogs may be considered fair. The planters raise hogs enough to furnish their families with a liberal supply of good bacon.

Fruit.—The culture of fruit is receiving increased attention, though not to that degree which this subject merits.

Tobacco.—The agriculturists of this portion of Virginia should be regarded more as planters than farmers. Although we sow a good deal of wheat, our principal crop is tobacco. The greater portion of our

manure is annually applied to land intended for this crop. Tobacco is grown upon fresh land, manured lots, and upon land improved by the use of clover and plaster. Some planters in this and the adjoining counties have used guano with success in the production of this staple. I have sown guano at the rate of 200 pounds per acre upon tobacco land, and ploughed in the guano with two-horse ploughs; and I have also used this manure in the hill for tobacco; but the effect upon the crop disappointed me, and was far less beneficial than the effect produced by guano upon my wheat-land. The average product of tobacco in this county may be estimated at 700 pounds per acre. I know of no new process of culture. This crop requires a greater amount of labor than any other; and, if the planters were dependent upon the labor of hirelings, very little, if any, tobacco would be made in Virginia. The attention and labor requisite for the production of this staple preclude the planters from making many improvements, which would contribute not less to the value than to the embellishment of their estates. I do not wish to be understood as maintaining that the agricultural improvements of our country are incompatible with the cultivation of tobacco; but I am confident that our progress in improvement would be much more rapid if the planters generally would reduce the amount of this crop. If they would plant not more than half the usual number of hills, more labor and time could be devoted to other useful purposes. Agriculturists are, however, reluctant to abandon habits to which their ancestors, as well as themselves, have been accustomed. With them, change is a slow and gradual process. Unlike some of the political empiries of the present day, they do not always regard innovation and improvement, alteration and reform, as synonymous terms.

Manures.—We have no marl or lime, and we rely mainly upon the manure obtained from our stables and farm-pens. Into the latter we haul our corn stalks, and feed with straw, shocks, &c. The cattle eat what they want, and trample the remainder under their feet. Occasionally, during the fall and winter, leaves are hauled from the forest and put into the stables and farm-pens. In the spring the stable manure is hauled out, and, being spread, is then ploughed under. The well-rotted portion of the farm-pen manure is used in the same manner. The coarse and undecomposed part of the farm-pen manure is used in the spring for top-dressing clover, or is allowed to remain until the fall, and is then hauled out and ploughed under for the benefit of the wheat crop. Many planters sow plaster upon their manure before it is ploughed under. The abundance of land within the limits of our vast confederacy, the low price at which land is sold by the government and by individuals, the sparseness of population, the high price of labor, and the want of capital, have all tended to retard the agricultural improvement of the United States. The influences of these peculiar circumstances have been great, and they have not ceased to operate. Notwithstanding the rapid increase of population, the price of labor continues high. It cannot now be profitably employed in the cultivation of poor land; and this obvious truth has attracted attention and excited thought. The importance of enriching the soil is acknowledged, and more than ever appreciated. It is also gratifying to know that agriculture is no longer regarded as undeserving the notice of the educated and intelligent. Some years ago agricultural books and papers were derided and denounced; but that day has passed. Works on agriculture are now bought and studied, and agricultural papers are in demand. When men seek to acquire scientific knowledge—when they evince a desire to profit by the suggestions and experience of others, as well as their own—no apprehension of a retrograde movement need be indulged. And if the *planter* should not be able to travel along the path of improvement *pari passu* with the farmer, each should zealously strive, within his own sphere of action, to augment the national wealth, as well as to impart elevation and dignity to his pursuit.

Respectfully, yours,

R. T. HUBARD.

Hon. Thomas Ewbank.

Buckingham County, Virginia,
December, 1851.

Sir: In responding to your Circular, I commence with your first article—

Wheat—which in this part of the State is secondary to the tobacco crop—the latter being more certain and less subject to disastrous seasons; yet there is generally a full seeding.

The crop of the present year, owing to a very favorable season and the use of guano, which we have harvested, is perhaps the largest and most perfect ever made in the State, some lands yielding 30 bushels to the acre and weighing 65 pounds to the bushel.

I feel inclined to state the average in this middle region of Virginia, from the head of tide-water to the mountains, at 15 bushels per acre.

I estimated an acre, seeded with wheat in good style, harvested, and put up in hand-stacks, worth $6. For hauling in, threshing, and winnowing, the offal of straw, chaff, and tail-ends, is abundant pay. Our varieties are early purple straw; stands up well; small grain and red; New York white flint, white, beardless, and beautiful grain, late.

White and red May, (so called,) with forward weak stalk, apt to fall. Old yellow lammas the first wheat seeded in Virginia; red, beardless, and very productive; difficult to obtain pure. Mediterranean, black as rye, suits poor land. Upon good it will tumble, and a tremendous beard. Zimmerman, smooth head, good grain, recently introduced from the continent, is much liked. Every kind has its favorites, and all are liable to fail in disastrous seasons.

I prefer the early ripe purple straw, it being more exempt from rust and mildew, and not liable to tumble, and the Polish or blue stem, some of which I obtained from a neighbor, exclusive of my Patent Office little stock, of which I shall treat in this letter. The Hessian fly, of late years, is scarcely dreaded. The improvement of our lands, and better tillage, with a little later seeding, has lessened their damage greatly. But a new enemy has appeared, called the "joint-worm;" as yet I am thankful that it is unknown to me. Here I will remark that I received from your honorable predecessor (Mr. Burke) three kinds of wheat, about a half pint of each, under the name of red straw, Chinese, and Polish. The first, the red straw, has a smooth tapered head, red, lean, small grain, unproductive; the earliest ripe I ever seeded; yet I do not appreciate it. The Chinese is a lofty, strong-stalked bearded wheat, white grain, large heads, 6 to 7 inches long.

I have strong objections to bearded wheat; touch a beard, and the mesh opens and the grain is lost; besides, the chaff is not fit for food, and the straw is generally harsher and not as good for stock as smooth-headed wheat straw.

Upon upland plantations, off water-courses, where there is less fog and dews, I think the Chinese wheat would probably succeed well. The last, the Polish wheat, I consider acclimated and very productive. I have increased the half pint to 8 bushels in 3 years, which is now drilled in good land and in good style. It is beardless, white, and a very large grain, with strong stalk.

I see, by the last Reports of the Patent Office, that it is very favorably spoken of in New England, under the names of Polish and blue-stem; here, in Virginia, it is called Polish or Woodfin. By comparison, I am satisfied that it is the same wheat, and that it emanated from the Patent Office. I consider it a valuable acquisition to the country, and that the Patent Office is fairly entitled to the credit of its introduction. From the 15th of May to the 27th of July we labored under excessive drought; the entire fall of rain was only 3 inches. The average of the thermometer, in a cool room in May, was 75°; in June, 78°; July, 80°. With drought and heat, the oat crop was rendered unusually short; also the corn crop, a plant requiring more moisture than any other, and is now selling from 60 to 80 cents per bushel, according to the drought in different sections. The kind of corn most preferred is a flinty white-gourd seed.

Guano (Peruvian) is getting into pretty general use, and the results are favorable where judiciously applied.

I will give my own experience. In 1849 I purchased two tons, and applied it to wheat, oats, corn, and tobacco. It was sown broadcast and ploughed in about six inches, seeded in wheat; the guano was 100, 150, and 200 pounds to the acre, and staked off.

The difference in each was according to quantity of guano—the 200 pounds decidedly the best; and I judge, with a view both to profit and economy in its use, that that is about the right quantity.

I estimated that acre to have yielded 25 per cent. more grain, and 10 per cent. more straw, by comparison with adjoining wheat not guanoed. The effect under oats equally good. It was applied to corn, by dropping into the furrow as much as could be taken up with the thumb and two fore-fingers, and earth drawn over it with the foot, and the dropper's track made upon it as a guide to drop the corn. It was applied much in the same manner for tobacco.

The augmented yield was very obvious, but not as great as upon the wheat and oats. Perhaps the quantity applied by the thumb and fingers was not sufficient.

To ascertain most certainly the great benefit of guano, apply it upon very poor land, where but little more than the seed of wheat or oats would be expected, and the yield would be surprising.

Many persons assert that it will insure a good stand of young clover; but if drought occurs, and a hot sun prevails after harvest, I will warrant that much of the clover will perish, unless a dressing of plaster is given.

In the fall of 1850 I purchased ten tons of guano, ploughed it under, as before stated, using about 200 pounds to the acre, and seeded wheat, leaving occasionally beds not guanoed. Verily, the eye said the guanoed wheat would yield double.

The last spring I prepared a lot for tobacco of old corn land that had been in cultivation more than a century, and never a pound of manure put upon it—tended in corn the previous year; the product I estimated at 20 bushels per acre. The ground, when prepared, was checked in squares three feet four inches; a table-spoonful of guano was scattered upon the check; the hilling close up, to prevent the escape of the ammonia; the hills were cut off about four inches above, and planted in May. The drought prevented the plants taking root or bringing the guano into solution. There was no growth whatever till the 27th of July, when we had rain; the growth was then, in a week, wonderful; the plants obtained a fine size. A second drought occurred in September and October, which protracted the ripening, and the plants faded and assumed a yellow hue.

This induced the opinion that guano is a great stimulant, and not a durable manure. It is too costly for general use by small farmers—indeed for the wealthy—when they have heavy transportations to pay. I humbly believe that an article of such vast importance to the world should be regulated by commercial treaty by the different governments. Most certainly it ought not to be under the control of a company of capitalists, to exact their own price.

I recommend renewed efforts to convert everything animal, mineral, and vegetable upon the farm into manure: such as cornstalks, wheat straw, chaff, oak leaves, pine tags, (which are richer than oak leaves,) ashes, and bog soil; and, with proper efforts, much more can be done than has been done. For any deficiency, we must rely upon the great auxiliaries—clover and plaster. By thus managing, we can renovate our exhausted grain fields, and avoid the necessity of selling the bones of our fathers and removing to the fertile lands of the Mississippi valley.

As to *breaking oxen,* I rope them around their horns, yoke them forthwith, tying their tails together very securely, lest they carry their hinder parts out of line, and risk breaking their necks; put an old yoke to the tongue, another in the lead, the young yoke in the centre. Should one prove sulky and lie down, do not whip nor ring the tail; release him from the yoke, and cord a fore and hind leg together; leave him just as he lies. After a while the sulk will pass off, if he has not been beaten, when he will struggle to rise, but cannot, which alarms him. After much struggling, loosen the cord, but make no effort to force him up; it is best that he chooses his own time. Yoke him again the next day. It is seldom they sulk and lie down when they are not beaten.

The former mode of breaking was to tie them to a tree or post 4 or 5 days, to make them gentle; the reverse was the result. Their great efforts to obtain their liberty made their heads very sore, rendering them fretful, more intractable, and often vicious. I am decidedly of opinion that it is good economy to feed corn in the form of meal to horses, mules, and oxen—more especially to old animals that masticate corn imperfectly. I believe that 3 quarts of meal impart as much nutrition as 4 quarts of corn—the former to be well mixed with chaffed hay, straw, corn-shocks, chaff, &c. *Pork hogs* ought to be fed upon meal made into dough, kneading it with a weak ley made of hickory ashes—

salt and cayenne-pepper added often; it is a condiment they are very fond of, and aids their fattening. If cooked, no doubt it would be better. I think a hog that has attained his full growth, should be regularly fed three times a day in this manner, upon a floored pen, good, clear, running water, with a good bed, and never to be disturbed when asleep—never even to be fed. With a plenty of pumpkins, cymblings, turnips, and roots of every kind, at every time of feeding, the stomach being fitted for distention, he might be made to gain 8 pounds of flesh upon the consumption of 100 pounds weight of corn.*

The best *beef* is a poor ox made very fat, or a speyed heifer. To fatten an ox, I would feed on dry meal, with as much wheat bran, dry, also, as would, at any feed, fill his stomach to distention; bleed him once a week, which I know is very beneficial, with the use of the curry-comb; and with this treatment, he cannot gain like the hog. I would judge 5 pounds to the consumption of 100 pounds of corn.

I know not the difference, if any, as to the fattening properties of the Durhams, Devons, Herefords, or other improved breeds. I know I can fatten a Devon upon less food than a Durham, which is a larger animal; and I suppose food is required in proportion to bulk.

In reply to your Circular of the last year, I was very lengthy upon the subjects of curing bacon and tobacco, which appear in your last Report; to which I beg leave now to refer. All which is respectfully submitted.

Yours, most obediently,

CHAS. YANCEY.

To the COMMISSIONER OF PATENTS.

VARIETY SHADE, BUCKINGHAM,
January 1, 1851.

DEAR SIR: I have been so much pressed with business engagements that I have not had a leisure moment before this to reply to the Circular from the Patent Office, of August 16, 1850.

Before I proceed to answer such queries, in the Circular referred to, as I am conversant with, permit me to remark that, whilst I am extensively engaged in agriculture, perhaps to as great an extent as any one in the county, and have given as much, if not more, personal attention to the subject, it has been my misfortune, from some cause or other, to have received but a single copy (that of 1848) of that valuable document, the "Patent Office Report." This valuable document should, in my opinion, be printed, and sent without stint throughout the broad extent of the Union, and thus become a medium of interchange of opinions among the agriculturists of the country.

Wheat.—I have been engaged in farming since the year 1824. I have cultivated almost every variety known or used in the country. The varie-

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[*One hundred pounds of cornmeal ought to produce 25 pounds of pork, instead of 8 pounds; and the like weight fed to a growing steer, or healthy ox, should yield 20 pounds of flesh. Five pounds of corn should never return less than one pound of flesh in meat making. Three and a half pounds of meal gave Mr. Ellsworth, former Commissioner of Patents, a pound of pork. (See Patent Office Report for 1847, page 535.) One hundred and five pounds of meal increased the live weight of two pigs 34 pounds 2 ounces in 15 days. See, also, reports in this volume, passim.]

ties in cultivation in this section are numerous; the most esteemed, and those to which I give preference, are the early purple straw, the white purple straw, (called by some the "Woodfin," by others the blue stem,) and the Lolla, a beautiful white and very safe wheat, if sown early on high, dry land; but in nowise safe sown on flat land. The average product is about 10 bushels per acre. Time of seeding, 20th of September to 1st of November; if practicable, I would prefer seeding the entire crop from 5th to 15th of October; harvested from 15th of June to 4th of July, varying as to season. The only preparation in use among us is to soak the seed in a strong brine; seed from one to two bushels per acre, according to the strength of the land, broadcast—the drill not being used. One bushel is considered enough for thin land, and two for rich fallowed land and tobacco-lots. The plan most approved in this section is to fallow clover-land in the summer—in the months of July and August—three-horse ploughs being used; refallow with two-horse ploughs at the time of seeding; sow, and then harrow. This plan I pursue, and regard it as the best, having experimented with all the different modes of getting it in, from the naked coulter to the cultivator, harrow, &c.; though in this view I find that I come in contact with my friend, Mr. Wm. Gilmer, of Albemarle. He, in very strong terms, condemns the refallowing system. No universal system can be adopted; soils varying almost as much as the faces of men, what would be a good plan of cultivation in one kind of soil might be decidedly bad in another. Thus I account for the difference of opinion between Mr. Gilmer and myself. In Albemarle they have a red, light soil, with a strong, rich, clay foundation, which, when well fallowed, does not become hard before seeding. Here we have a gray or black soil, with hornblende rock interspersed, resting upon a good clay foundation, universally regarded as good wheat land; and the refallowing is the favorite and most successful system.

The average yield is, I think, upon the increase; but the crop is certainly more liable to disaster now than in former years. When I speak of the average yield being more than in former years, I mean to except that period when but little wheat was made, and that seeded on rich, fresh land. Lime has not been used except in a very partial manner. I feel satisfied that our lands are peculiarly adapted to its use, and that the quantity of wheat would be greatly increased thereby. Thus far we have been prevented by the expense; many of us are looking forward to a period, not remote, when we hope the cost will be reduced so as to allow its liberal use for agricultural purposes. The James River and Kanawha canal, shortly to be opened to Buchanan, in the lime region, we trust will have this effect.

I practise the five-field system; having every year two fields (two-fifths) in wheat, one field (one-fifth) in corn, and two fields (two-fifths) in clover. I have the same number of tobacco lots, and cultivated in the same way; one fifth in tobacco, two-fifths in wheat, and two-fifths in clover; thus it will be seen that I fallow one clover-field and one clover tobacco-lot each year, and sow in wheat along with the corn and tobacco land. I know of no remedy for the Hessian fly. I am of opinion that this insect, so injurious to the wheat crop, is with us annually, and that the evils resulting from its attack can only be overcome by favorable seasons. If the months of October and April are favorable and growing months—the time at which the injury is inflicted by the insect—the wheat branches and outgrows the injury; on the contrary, when these months are dry and harsh, the injury is inflicted when there is not sufficient warmth and moisture in the land to nourish the plant. A certain preventive of the white weevil is to have your wheat well cured before it is shocked in the field, and threshed out early, in good, dry order; and, my word for it, you will never see in your barns black weevil.

The crop, the present year, was very much injured by the rust; consequently the price varies, according to quality, from 60 to 95 cents, at our nearest market.

Corn.—The most esteemed varieties are the gourd-seed, large white, and large yellow, or Nansemond, of which the latter for stock is decidedly preferable. I do not think much importance ought to be attached to the variety, as any kind may be so improved as to increase both quantity and quality by selecting the best ears from the most prolific stalks. My practice for years past has been to select my seed in the field, by taking the best ear from the stalk bearing the greatest number. Owing to the great diversity of soil, the average product varies very much on James River bottoms—from 40 to 50 bushels; best high land, about 30 bushels; and 5 bushels on the ridges; reducing the average to something like 15 or 20 bushels. Cost of production about 30 cents. The common method of cultivation is to plough deep in the fall and early part of the winter. In the spring, before planting, let the land be well pulverized by harrowing. Lay off and plant in drills 4 to 5 feet apart; stalks, from 8 inches to 2 feet in the row, according to the quality of the land. When the corn is up about 6 inches, use the plough or cultivator, according to the condition of the land, thinning, at the same time, and brushing with the hoes. Afterwards, use nothing but the cultivators, and a small quantity of earth put to the corn with the hulling hoe. By this plan, you keep your land level, which I regard as the best system of corn culture.

The best method of feeding is to grind and mix with cut, rough food for horses. Nothing of the fodder kind should be fed in the rack. For swine and horned cattle, I would recommend both grinding and cooking.

Oats.—Average product of this grain, 15 bushels per acre to 1 or 2 of seed. This crop is a great exhauster; so much so, that I doubt the propriety of raising it to any extent.

Peas are not cultivated as a renovator. I have made some use of them this year for this purpose; but, as yet, am not entirely satisfied that I can do so profitably. I purpose making further experiments, this last having been made in an unfavorable season.

Clover is extensively used for hay and grazing; and, as a renovator, it yields from one-half to two tons per acre, requiring one gallon of seed.

Neat Cattle, Sheep, and Wool, except to a limited extent, are only raised for home consumption and use.

Hogs.—I have tried the no-bone, Bedford, Surrey, China, Berkshire, and Irish grazier, and find that any one, without *frequent crossing*, will rapidly depreciate. 100 pounds of corn will produce 40 pounds of pork. The plans of curing are very numerous, each having their advocates; but the plan I suggest is one that I have practised for many years, and have never failed in having *good sweet bacon.*

After killing, allow the *animal heat to escape.* Cut out, and, when perfectly cool, to each ham and shoulder put one-half teaspoonful of saltpetre, and sufficient salt, well rubbed in. Pack down, after remaining, joles and sides, 3 to 4 weeks; hams and shoulders, 4 to 5 weeks; take out and rub with dry hickory ashes. Then hang and smoke gently, with oak or hickory chips, in dry weather only. About the 1st of June, take down and pack in dry ashes, or pulverized charcoal.

Tobacco.—Average yield per acre, about 800 pounds. Cost of production, about $4 per hundred, or $60 per hogshead.

Mode of cultivation and curing.—I would state as follows: Permit your tobacco to get thoroughly ripe before it is cut; scaffold it in the field until it yellows or spots freely; then house, with gentle fires under it, until it yellows throughout; then gradually increase the fires, drying the leaf slowly about half-way; this will take some three or four days, sometimes longer if the weather is cool. The heat that I prefer for the first three days should be about equal to a hot day in August in the sun; the fourth day, about 110 degress; after this, when it comes in what would be termed soft order, fire again so as to dry the entire stem; and firing is necessary afterwards, unless in very damp weather. In December take down, in soft stripping order, passing it through about three hands, each of whom should whip it against their thighs, to get off the dust and dirt before reaching the bulker. Your tobacco is now ready for stripping. When you commence, each day's stripping, being first carefully assorted and sized, should be passed, two bundles at a time, through several hands, straightening it when passing to the bulker, who lays it straight in bulk, upon which a good portion of weight should be placed; afterwards, in *soft days*, pass it again through as many hands, one bundle at a time, each bundle straightened as before, and rebulk, weighting very heavy, (with rock;) let it remain in this situation until the last of March, then rehang without opening the bundles, except just below the tie, having your sticks, for this purpose, small, and made smooth with a draw-knife. The stripped tobacco, being now hung up to dry out, should be closely watched. If the weather is moist, take down on the sticks; for if permitted to remain and get in *high order*, all your labor in straightening is lost. The first warm season after it has dried out, take it down when the leaf is in pliant order, and the stem, by pressing, breaks freely; passing again through several hands, rebulk and weight heavily; in a short time prize, laying it straight in the hogshead.

Manures.—I do not know that I can give the best system for making manures; my plan is to feed corn-stalks, scatter leaves and other vegetable matter in the farm-pen, so as to increase the bulk to as great an extent as possible. In the spring haul out upon tobacco land, and top-dress young clover. I feel confident there is great deficiency in management in this particular. The *exposure* of manures is certainly very injurious; they should certainly, if possible, be kept under cover until ready for use. I have made some experiments with guano. In November, 1849, I used one ton on wheat on thin land; last summer the same quantity on oats, corn, and tobacco. That on wheat increased the product from 6 to 12 bushels per acre, and fully repaid the outlay; not so with that on oats, corn, and tobacco; the benefit was very slight. I have made a further experiment this fall, using 2 tons to 20 acres, (200 pounds to the acre.) My experiments have satisfied me that it may be used profitably on wheat upon thin land, if the price could be reduced to about $40 per ton; but I regard it as unsafe for a summer crop. It is in

dry weather decidedly injurious; should the summer be moist, I have no doubt it would be beneficial; but our summers being frequently quite dry, I regard it as too hazardous. My mode of using it was to sow it down and turn under with a three-horse plough.

Very respectfully,

TH. M. BONDURANT.

WIRT COURT-HOUSE, VIRGINIA,
January 27, 1852.

SIR: In answer to your Circular, I would say that our farmers still follow the old method of farming.

Wheat is sowed on fallow ground, and after corn crops. The latter is put in with the old shovel plough, and the former generally with the harrow. The varieties raised are the red chaff, the white wheat, and the Mediterranean. The Mediterranean is considered to be the surest crop; but the yield is not so great as, and the flour is inferior to, white wheat and red chaff. Guano is not used, nor any other manures, save, now and then, a few wagon loads of barn-yard manure to the acre; so that it is hard to tell what our lands would do if properly manured and fertilized. Under the present mode of cultivation, the average yield per acre, of clean wheat, is about 8 bushels; although some land will bring from 20 to 30 bushels per acre; and I believe that the greater portion of our tillable land would, if properly fertilized and cultivated, bring, upon an average, 20 bushels per acre. The rust damages the wheat in this section of the country more or less every year. In 1850 it caused almost an entire failure of the wheat crops in all northwestern Virginia. Early wheat suffers less from rust than late wheat. To avoid the rust, farmers should sow their wheat in the early part of September, when the season is favorable. Of the varieties of wheat mentioned, the Mediterranean is less liable to take the rust. Whether this is owing to any peculiarity in the growth of the wheat, its nature, or whether it be from its earlier growth and maturity, is not yet decided; but it is generally believed to be owing to its earlier maturity.

Corn and Oats grow well here; but little more is made than satisfies home consumption. We cannot compete with other portions of the State in raising corn. Ohio, Indiana, and Illinois can produce it, in many instances, for 10 cents per bushel. We can scarcely produce it for 30 cents per bushel; yet, in market, we get no more per bushel for our corn than they do for theirs.

Fruits of nearly all varieties grow well in our soil and climate. Apples, peaches, and plums are the principal fruits grown here; but none are cultivated for distant markets, as we are not situated near any public thoroughfare that can be relied upon to convey our fruit to market at the precise time we might wish it. Although we have no reliable markets for our fruits, yet the sweet apple might be very profitably cultivated for stock, especially hogs. It is believed that one acre of well-grown sweet apple trees would produce apples that would fatten more hogs than the product of five acres of the average corn crops; and the expense of the former would be nothing in comparison to the latter mode of fattening.

Sheep.—This county is well adapted to the raising of sheep. The expense of their growing is but a trifle, in comparison to that of any other stock. They thrive well on our hills; and it is generally conceded that the wool will pay all yearly expenses in their raising, thus giving all the increase of the flock as a net profit. One hundred good ewes, if properly managed, will yield yearly, at least, the same amount of lambs. The bucks ought not to be permitted to run with the flock before the last of October or first of November; then the lambs would come about the first of April, when there would be plenty of grass for the ewes to subsist upon without much feeding, and little or no loss of lambs from cold weather and other casualties connected therewith. I am satisfied that, if our farmers and sheep-growers would adopt the above plan, they would save annually two-thirds of the lambs that perish from cold and exposure consequent upon coming in mid-winter. Wool brings here from 25 to 35 cents per pound. The average amount of the fleece is about 2½ pounds. Sheep bring from $1 to $1 50 per head, when sold to the drovers; if slaughtered here, they bring from $2 to $3 per head.

Tobacco.—The staple product of the county is destined to be tobacco. The plant thrives well here, and our soil seems to be peculiarly adapted to its culture. In the past year it has been tried in all parts of the county with very favorable results. I think that the average yield per acre may be set down at 1,000 pounds. Some of the best fresh land will yield from 1,500 to 2,000 pounds per acre. The average price per 100 pounds is $5—it often brings $70 per hogshead; so that an acre of ground will give $50, on an average, and often $75 to a $100. There is nothing that our farmers can cultivate that will yield the same amount of money per acre. Wheat will produce, on an average, $8; corn not more than $10; and oats not over $6 per acre; yet it takes very little more labor to cultivate an acre of tobacco than an acre of corn, and the value of the former is so much greater than the latter, that I think all our farmers who hold tobacco lands stand much in their own light if they do not pay more attention to the culture of tobacco. There is scarcely a farmer in the county that cannot raise from two to six acres of tobacco and not miss his time from his other crops. In order to insure good crops, it is very necessary to set the plants out as early in the season as possible. The mode of curing here is by sun-drying. Care should be taken, in housing, not to hang too close, as several of our farmers here had their crops severely damaged by the tobacco heating from being hung too close.

Our farmers heretofore have paid but little attention to agricultural pursuits, as it is not profitable to produce more than they can consume. Their attention has mostly been turned toward the lumber business, of which a great amount has been done in this county. But timber is failing, and the people will have to turn their attention to agricultural pursuits. I should like to see many of your Reports circulated in this county. If the Department have any valuable or new variety of tobacco seed, or grass seed, I would thankfully receive it and distribute it to such of our farmers as would give it a fair trial. The Brazilian, Persian, pear tree, and Cuban tobacco would be thankfully received, as I believe we have none of these varieties.

I am, very respectfully, yours, &c.,

J. W. HOFF, M. D.

Hon. Thomas Ewbank,
Commissioner of Patents

Near Jerusalem P. O., Southampton Co., Va.,
December 29, 1851.

Sir: The Circular sent out from your Office in quest of agricultural information has been forwarded to me by General Millson, the representative in Congress from this district, probably with the expectation that I could answer some few of the inquiries therein contained.

Could I but contribute the smallest mite in furtherance of the valuable object of your Reports, it should not be withheld. But, although the day of improvement has dawned upon us, yet for a goodly time to come we must borrow light from others, scarcely hoping to reflect a ray in return.

So far as your inquiries relate to the productions of this county, they have, for the most part, been heretofore answered, and of course a repetition is not desired.

Guano.—In reply to your special inquiry as to the use of guano, and the increase of production resulting therefrom, I can only give an account of the two experiments in connexion with the last crop of wheat. They were both satisfactory, according with many already published to the world. Mr. Alfred Ricks, one of our most particular and attentive farmers, made an application of 200 pounds of guano per acre to 7 acres of land; 4 of which were good corn land, producing 25 bushels to the acre; the remaining 3 so nearly sterile that they could not produce more than 5 bushels of corn to the acre; the whole, being a light soil, approximating to sandy, was unsuited to wheat culture; and a strip 26 feet in width was left, for comparison, in the centre of the good land, without any guano, and the product was scarcely sufficient to pay for harvesting.

The aggregate production of the seven acres was 76 bushels, weighing 64¼ pounds to the bushel at the mill. There was but a shade of difference in the wheat on the poorest and best land, and the guano should be credited with nearly the whole crop. As far as seen, the best land produced so poorly that it was scarcely worth housing, and the poorest certainly would not have produced wheat at all. A still more successful experiment was made by Dr. Carr Bowers, who has a great deal of system in all he does, and is probably making greater effort to improve his land than any other person in the county: 220 pounds of guano per acre were applied to 4½ acres, accurately surveyed; the land being previously fallowed, the wheat and guano were harrowed in together, and gave a product of 113½ bushels, or 25¼ per acre. In consequence of the wheat being badly lodged, there was much waste. It is believed that, could the crop have been neatly saved, it would have been little short of 30 bushels to the acre. I will here remark that this plat of land was naturally much better capacitated for the production of wheat than that on which Mr. Ricks experimented, being a gray soil, with considerable mixture of clay; and, without the dressing of guano, would have produced 10 bushels to the acre. I omitted to say that Mr. Ricks first sowed his guano, and turned it in 6 or 7 inches deep, and harrowed in the wheat.

The several experiments made in this vicinity, in connexion with the corn or maize crop, have been attended with varied results. One of our successful farmers informed me that, from the application of about half a ton to a part of his last crop, there was not the slightest apparent benefit. The application was made, as usual in this section, in the hill, covering it with a portion of earth to prevent it from coming in immediate contact with the grain. The expediency of its purchase, and application to summer crops in this thirsty climate, is questioned by many.

In the present state of opinion, much more could probably be done by fixing attention on means of resuscitation—within reach of nearly every tiller of the earth—such as the offal from the crops made, the collection of leaves from the forest, including the mould from lands reserved for timber, combined with the rich deposit to be found in many of our swamps and ravines. These means alone, if properly applied, would, in ten years, double the poorest of the whole cultivated area of this part of the State. But nothing of importance, by way of improvement, can be accomplished without reform in two particulars—a cessation from the cultivation of lands that evidently do not pay for tillage, and an abandonment of the cotton crop, which should be left to the far South and Southwest. Without looking to the future, I hold it to be perfectly demonstrable that, even as to present profit, corn is a better crop for us.

It is generally conceded that land with us, which will bring 600 pounds of seed cotton, or 150 pounds of picked, will produce twenty-five bushels of corn to the acre, and that the labor required to cultivate 1 acre in cotton will cultivate 1½ acre in corn. The fodder, shucks, &c., will pay for harvesting the corn, whereas it will cost at least 15 per cent. of the cotton crop to secure it after it is made. *Corn*, for the last ten years, has with us been worth 50 cents per bushel. During the same period, cotton has not been worth $10 per hundred; but place it at that figure, and we have $18 50 for corn, against $15 for cotton; minus 15 per cent. for securing the latter. The most usual objection to the corn crop is difficulty of transportation. This applies with little force to a large part of Southampton. The city of Norfolk is our principal market, and we have two navigable rivers in the county, and a railroad sweeping twenty miles of its southern borders. Were it otherwise, we have an alternative.

Pork.—Corn is easily coverted into pork. In the Report of 1849–'50, it is stated that Mr. Ellsworth succeeded in making 1 pound of pork to 3½ pounds of corn; but that most farmers estimate it to take 5 to make 1. I will be still more liberal than that, and even then show that corn and pork are better than cotton. With us it is usually supposed that 10 bushels of corn will raise and fatten 100 pounds of pork, and I will add 10 per cent. for casualties. Our white corn will average 53 pounds to the bushel; it will, therefore, be 583 pounds of corn, or eleven bushels, to each hundred pounds of pork.

Where cotton is estimated at 10 cents per pound, pork should be placed at 5 cents per pound; and, according to the foregoing estimate of the product of labor, we have 340 pounds of pork at 5 cents per pound, against 150 pounds of cotton at 10 cents, without making any deduction for picking out the cotton. Be this as it may, I know of little improvement where the marketable crop has been cotton, it requiring every effort to keep up the cotton land, while the rest of the farm is undergoing annual deterioration.

Most respectfully, yours,

J. D. MASSENBURG.

Hon. Thomas Ewbank,
Commissioner of Patents

Hickory Creek, Louisa County, Va.,
January 1, 1852.

Sir: I observe in my letter, published in the Patent Office Report for 1850–'51, that a mistake occurred, which I do not think I made. The words, "*and curing what I have left*," should be omitted, for I cure the whole plant with the priming leaves on it, and strip them off as lugs when I strip the plant, which is a very easy process. It would require much time and labor to cure the priming leaves separately.

The cultivation of tobacco, and its preparation for market, require many tedious processes, and none should be added that can possibly be avoided. I will observe, further, that my remarks applied to manufacturing, and not to stripping or stemming tobacco.

Indian Corn.—The most important crop of the United States is unquestionably maize, or Indian corn. The southern and western farmers rely upon it as the main staff or support of their families. It is the most certain and abundant of the cereals, and its place cannot be supplied by any other. He who can improve the varieties, or in any way increase the product, will do infinitely more than he who makes two blades of grass grow where only one grew before. Within my recollection, great improvements have been made in the culture of Indian corn, chiefly by deep ploughing and thick planting. Thirty or forty years ago, the ordinary plan adopted here was to plough the land very shallow; then to lay it off at right angles, up hill and down, in straight rows, five feet apart, when it was intended to leave two stalks in a hill, and four feet distance, on poor land, to leave one stalk. The land, after planting, was ploughed each way four, five, or six times, before it was laid by, and 15 or 20 bushels per acre was considered a good crop. This mode of tillage impoverished the land, which was generally washed into gullies by the rains, and then turned out to grow up in old-field pines and broom-sedge. On the ridges and hills of corn-rows made forty years ago can now be seen piny thickets, in which the trees are now large enough to make good rails or poles for a log-house. Yet this land is not exhausted, but improved, by the pine, and, when cleared up, will produce better, or as good crops, as it did in its virgin state.

My plan of cultivating corn, though perhaps not as good as many other farmers', is better, I am sure, than that of some. I think I can produce as good crops with as little labor as most others. Men are slow to learn; they require line upon line, and precept upon precept, before they become willing to quit the old and beaten track their fathers followed. Many valuable practical essays have been published and widely circulated on the culture of corn, which have made little or no impression on the great mass of farmers. I will detail my plan, which takes but little labor, and generally produces a good crop. If it benefit one farmer, or improve his practice, I shall consider myself amply paid:

I fallow the land as deep as I can, beginning in the foulest land as soon as I can, after seeding wheat is over, and so continue, in the good weather through the winter, leaving the cleanest land for the last. Just before the planting season, (April,) I get as much manure as I can of all kinds, and spread or sprinkle it over the poorer parts of the field; then harrow well, and lay off the rows for planting, four and a half feet apart, horizontally on hill lands; then drop three grains of corn, from 2 to 2½ feet apart, (using plaster on the land,) and cover it with the hoe. A good corn-planter is more expeditious, but not better, as some think. After the corn comes up, I drop half a spoonful of plaster on each hill. I then run the cultivator over the crop, followed by hoe hands to replant, and weed only the foul spots. After this is done, I run the plough next to the corn, two furrows in each row, throwing the earth to the corn, which is now large enough to be thinned and weeded. I leave two stalks in a hill, except on very poor land, where I leave only one. Although I plant only 3 grains in a hill, I get as good a stand as my neighbors, who put in from 6 to 12 grains. If birds, insects, &c., attack a hill of a dozen stalks, they generally destroy all. I graze the land intended for corn during the previous fall to destroy the worms, and generally succeed. After the corn is thinned and hoed, and as soon as the weeds and grass begin to show themselves, I plough out the row; and this I find, in some years, to be sufficient cultivation. At other times, the grass grows faster and I find it necessary to run the cultivator through, which is an ample "lying by." Now, this is a small amount of labor, but it has succeeded well for a number of years past, producing a heavy crop for the quality of the land. I have a very coarse kind of corn, which I have named giant corn. It is a good variety for rich lands, but can be made as well as any kind on poor land. The original variety was introduced here by the late Governor Barbour. The ear is very long. I have seen them very freqently from 12 to 14 inches; and one of my neighbors told me he had raised an ear 18 inches long. The grain is white flint, heavy, and makes superior bread. I have mixed it with the gourd-seed variety, making a shorter but larger ear. I have sent you some for distribution. I sowed the wheat you sent to me on its reception, (1st December;) too late, I fear, to succeed this year. I should be pleased to get a package of spring seeds.

Bacon hams.—For many years I have been a curer of bacon hams for market. Much has been said and written on the best method of curing hams; and yet I have never seen a strictly prime ham cured anywhere else than in Virginia, between tide water and the Blue Ridge mountain.

The far-famed Smithfield ham is greatly inferior to the hams of many curers in this section. I have tried many and various plans—nearly all that I have ever seen recommended. I have tried the various brines, sugar, molasses, peppers, &c.; but have satisfied myself that the plan I have settled upon makes as good or better bacon than any of them. I take the hams of young, thrifty, and fat hogs—weighing from 100 to 175 pounds each—after they are properly cut out in a rounded form; and I sprinkle the under surface of each with a spoonful of powdered saltpetre; then I cover it thickly with a mixture—of Liverpool salt two-thirds, and ground alum salt one-third, and pack them in boxes, with the leg inclining downwards to let the salt penetrate through it. I object to brines, as giving the ham an earthy or bad flavor.

After they have laid in salt 4 or 5 weeks, I hang them up in a smoke-house, sometimes ashing them previously with hickory ashes, and commence smoking them every day with the ordinary chips of oak, hickory, &c., from the wood pile; taking care to so smother the fire as to make a great smoke with little heat. This is continued from 4 to 6 weeks, or until the bacon gets very dry and well cured, and of a dark color externally.

About the 1st of March, or before the fly comes to deposite its eggs, I take the hams down, and cover each one on the flesh or inside part thickly with dry ashes. I prefer weak ashes, because they remain drier, and do not give the bacon a soapy flavor, which strong ashes will do. I then take the hams separately, and place them on shelves, arranged like the shelves of a store-house, taking care not to let one lie on another. My object is to keep them as dry as possible. The thick coat of ashes accomplishes not only that, but prevents mice, rats, and all insects from attacking the meat. It prevents, too, the absorption of moisture, or evaporation, and preserves the hams free from rancidity or any material change from keeping. Hams of this kind—of one, two, or three years old—can scarcely be distinguished from each other.

Some persons pack hams in salt, which gives them an earthy flavor, and some in ashes, which gives them a soapy taste. My hams have sustained the highest character in the Richmond market for many years past; and I have obtained the highest prices for them; and, for my own table, they are at least equal to the *inemptas dapes* of any Roman citizen.

The whole secret of making good hams consists in salting well, (using saltpetre,) smoking and drying well, and then keeping the hams dry and free from the depredations of rats, mice, and insects. My bacon never becomes rancid, which I attribute to good salting, good smoking, and dry keeping.

I am, very respectfully, yours, &c.,

WM. A. GILLESPIE.

Hon. Thomas Ewbank,
Commissioner of Patents.

Nottaway County, Virginia,
November 24, 1851.

Sir: Your Circular, propounding various interrogatories connected with the agricultural interest, was received some time since, and laid aside, without any expectation of a reply—not from any want of solicitude for the success and encouragement of your Report, but from a belief that its pages might be more profitably filled by others.

I am reminded, however, by the reception of your last Report, and the large amount of most valuable information it contains, that it is the duty of every citizen, when called on, to contribute his exertions, though feeble, to the promotion of such a desirable object. The legislation of this country is so rarely employed in the advancement of the agricultural interest, (the most important of all,) that whatever is done should be nourished and cherished with the most lively concern.

I regard the Department under your supervision as one of the most important in the Government. It has been said that he who makes two blades of grass to grow where but one grew before confers more benefit on mankind than the whole race of politicians put together; but, by establishing and encouraging your Department, the politicians themselves are tributary to this most important result.

You remark that "the questions are intended rather as hints or suggestions, than to be literally followed in shaping replies; and, by extending, as they do, over the agricultural products of the whole country, no one person can be expected to reply to all." I am relieved, then, from the necessity of observing any particular system or regulation in what I may write.

I may remark, in general terms, that corn, wheat, and tobacco may be regarded as the *staple crops* of this region of country. Nor can I say that, until lately, any particular interest was evinced in any improvements of cultivation, &c. We have lately formed one of the most interesting agricultural clubs in the State—meeting every month, at the house of some member, to discuss agricultural subjects. One of my enterprising neighbors has three silver cups as premiums for the largest number of subscribers procured for agricultural journals. I mention these incidents as indications of an interest and a tide of improvement which, taken at its flood, may lead on to fortune. This zeal and enterprise, I think, may be regarded, in part, as the offspring of certain facilities of transportation, &c., afforded by the internal improvements of the country; and which will, no doubt, effect some changes in the kind of crops cultivated. This interest, to which I have referred, has caused a great many experiments in different varieties of grain, &c.

Wheat.—I last year tried various kinds of wheat, and remarked, to an extensive wheat-dealer, that I had settled on the Poland and purple straw. My selection commanded his decided approbation. I think they may be now regarded as in the highest favor in this section. Still objections are urged with propriety against both. The Poland is later than desirable, and consequently more liable to rust. The purple straw is considered more obnoxious to smut; which, in some neighborhoods, has been very fatal this year, particularly to this variety. Having a manufacturing mill, I can speak with some degree of confidence and information on this point. I cannot tell why this description of wheat should be more liable to smut. Its distinguishing characteristic is, that it is made earlier than other kinds. The use of brine and lime in preparation of the seed wheat is considered a preventive. The Poland has this year, I think, exceeded in product and quality all other varieties. Its growth being taller, it is considered better adapted to poor land; and the use of guano corrects its tendency to be late.

It is very difficult to give an accurate response to the inquiry concerning the average product. My Poland (some call it Woodfin and blue stem) has this year yielded about fifteen for one sown, or about twenty bushels to the acre, being here sown on better land than usual. I should regard ten for one as over the average in this section. Guano and other fertilizers are so generally used now, and so much more attention bestowed on improvement of land, that the product has been greatly increased within the last few years. I have not used *guano* extensively, but sufficiently so to express the confident conviction that it would quadruple the product on poor land. The proportion of increase is not so great on rich land. The plan generally adopted in this section is to turn it under with a two-horse plough. Intelligent practical farmers are now preparing to harrow it in with the wheat. I consider it such a powerful stimulant that it will act well when applied in most any way, except top-dressing. It is too volatile for that. If the government would now turn its attention to a reduction in the price of this article, I should consider it, in connexion with its encouragement to your Department, as

an ample atonement for the neglect which has heretofore characterized its operations. I made an experiment which satisfied me that its effects are visible (when turned under) for four years. If you are required to make any report to Congress, I should recommend this as the chief material for it; and if you can be instrumental in effecting this reduction of price, you would deserve a monument from the farmer second only to Washington's. In connexion with the wheat crop, and your inquiry concerning improvements in machinery, I will remark that I have for two years used one of Hussey's reapers with much satisfaction and advantage. I think the saving in labor and grain will return its cost for every thousand bushels reaped. I think for a whole crop it is decidedly superior to any I have seen or heard of. Others may beat it in a trial of one hour. This machine is not liable to get out of order. It will cut about twenty acres per day, without leaving a single head standing. I could say more on this subject but for the space it would occupy.

I think the use of *steam*, particularly in threshing, grinding, &c., is likely to constitute a new and important era in agricultural operations and its incidents. I look forward to the time when steam engines will be so simple and cheap as to be considered important and almost indispensable operatives on every large farm. I have been using one as an important and valuable adjunct to water power. It is, perhaps, enough now to say, that steam and water work together in perfect harmony. I have a grist-mill, flour-mill, saw-mill, and many other machines, all of which can be propelled by water power alone, or steam power alone, or combined in equal quantities, or by using more of one and less of the other. It would be useless to describe the particular *modus operandi*, as no two situations would allow the same fixtures. Suffice it to say, that nothing more is required than a band wheel on any part of the machinery allowing it, to which the band from the engine wheel may be applied; the size of these wheels to be regulated by the motion required. It is for each individual to calculate whether the nature of his operations justifies the expense of the preparation. I would not consider that a grist-mill alone would justify it, unless on the principle that the owner could afford to use the engine at a loss a small portion of the year, to enhance his custom greatly during the remainder. But it is not often that such a power is confined to a single operation; for after procuring it these addenda cost comparatively very little. Nothing but an extra band and threshing box is necessary to thresh wheat; nothing but a band and bark-mill is necessary to grind bark for a tannery; and an engine to heat the water to extract the substance of the bark, grind it, &c., is almost indispensable in every large tannery; so that, without coming in conflict with the prudent and proper injunction not to have too many irons in the fire, it may still be judicious and proper, when you have a certain power, to make it work for you as many different ways as possible, particularly where the same supervision will answer for all. Indeed, it may be important to combine several in order to justify the expense of procuring the power. I have bestowed more time on this branch of the subject, because I know of nothing more essential to the development of the resources of the country. Many a bold stream is allowed to carry its tribute to the ocean unemployed, merely because of itself it is regarded insufficient to accomplish the desired objects—a deficiency conveniently supplied by the combination discussed. I have already suggested that the government, acting in its appropriate sphere, could do nothing more in aid of the neglected interest of agriculture than the encouragement of your department, and the reduction in the price of guano. If anything could be done effecting the cheap introduction of steam into our agricultural operations, such as grinding corn, threshing wheat, sawing plank, &c., I should regard the measure of agricultural importunity and aspiration as completely filled. There is a comfortable degree of humanity in conducting arduous and laborious avocations without the exhaustion of animal muscle.

I have occupied so much space on other topics, that, if I refer at all to the other subjects of your inquiries, it must be summarily.

Corn Crop.—In reference to the corn crop, I think the saving of the largest double ears important, whatever may be the kind. There is no favorite species that I am aware of in this region; the product is very variable. We regard 10 bushels to the acre, without improvement, as a fair product.

Tobacco.—In reference to tobacco, I believe that he who could cause *one* plant to grow where two now grow, would confer almost as much service as he who could double the blades of grass. I mean, by this, that the vast amount of labor employed in its cultivation can be more profitably employed on other operations, and that a country is more benefited by the productive articles essential to the sustenance of animal life than those tributary to its destruction.

Stock.—In reference to your inquiries about stock, I would recommend for improvement, Cotswold sheep, Chester hogs, and a cross of Durham cattle, having tried all these kinds, and some others. There are many other "topics of universal interest to the agriculturist" suggested by your Circular. I fear, however, that the length of my response has already caused you to regret the application made to me.

Oats.—Oats cannot now be regarded as one of our market staples, though the cultivation is extensive for domestic use. The most valuable variety I have tried is the Prince Edward Island.

Rye.—The *multicole rye* has been recently introduced into this section of the country—I think, with satisfactory results. That description formerly cultivated frequently failed to produce grain. I have cultivated the different varieties in parallel rows, and found the product of the multicole more than double. It is later than other kinds, and has more time to form the grain; there is no other perceptible difference. I think it should be the policy of our country to encourage as much as possible those crops which require little or no cultivation between seed time and harvest, the effect being to save labor, improve land, promote the growth of grasses, the abundance of stock, &c. I have been influenced in the response I have made to your inquiries by a disposition to evince my appreciation of the Department under your supervision, regarding it as the harbinger of a brighter era and interest in the agricultural enterprises of the country.

Most respectfully,

EDWIN G. BOOTH.

NORTH CAROLINA.

LINCOLNTON, LINCOLN COUNTY, NORTH CAROLINA,
January 10, 1852.

SIR: I received one of your Patent Office Reports some days ago with great pleasure, as it contains some excellent information. I will give a few remarks on the culture of our crops:

Wheat.—Wheat is becoming the most profitable, but is mostly too carelessly put in. After the corn is gathered in October, the wheat is sown broadcast on the stock-ground. The average yield is from 4 to 10 bushels to the acre, and it is a good season in which we get that much. If we would sow more clover and grasses, use more fertilizing manures, plough from eight to twelve inches in July and August, and spread from twenty-five to thirty loads of fertilizing manure to the acre, we could raise from 50 to 75 bushels of corn to the acre; but alas! every farmer tries to see how much land he can tend; and behold, when autumn comes, it brings him but a small yield. Were he to spend one-third of his labor in making manure, and till less land, he would make double the grain; and plough eight or ten inches deep instead of running over so much land, and only ploughing two or three inches; then, when a good shower of rain comes on, it washes all his little loose earth away, and leaves his hill-sides bare. By breaking up his land with a good subsoil plough, (one of Nourse's eagle ploughs,) from ten to fifteen inches deep, it would absorb all the rain, and stand the drought much better. We raise no stock of any kind except for home consumption, and not half enough of that; for we have now worn out our lands so much, that we do not grow food enough to maintain them. I would rejoice to see the time when all the farmers of old Lincoln shall see the benefit of manure, and hope the day is not far distant when this shall be with them a leading interest.

I will thankfully receive any good variety of corn from the Office, should there be any, as I wish to make some experiments on some new kinds of corn, if it is but three or four grains; also shall be very thankful to receive any Reports from the Office.

Yours, respectfully,

G. S. SULLIVAN.

WELCH'S MILLS P. O., CABARRAS CO., N. C.,
December 31, 1851.

SIR: I received your Patent Office Report for 1850; also, your kind favor of Troy wheat came to hand on the 12th instant, which I seeded next day on good ground, but, I fear, too late for a fair trial; but I hope I shall be able to send you a report of it in my next.

Wheat.—The crop this year was fine with those who sowed the May wheat. No rust or fly troubles this kind of wheat—nothing but the late frost in spring; that sometimes cuts its down. We have to sow in November, and sometimes as late as December. I sowed $7\frac{1}{2}$ bushels, and had 125. Time of harvest, 28th, 29th, and 30th of May; weight of wheat, 65 pounds; flour, good. Burr-mills now in use, that make as good flour as any in the Union; price, $1 per bushel; average yield, 10 bushels per acre. Our people are so engaged with raisng cotton, that there is no improvement making in the wheat crops. They are so taken up in gathering cotton, that they do not sow wheat at the proper time to make a good crop.

Corn.—A very light crop has been raised this year. The drought has been so fatal to the corn crop, that there will be a general scarcity, and the price is at present 75 and 80 cents per bushel. I would say it is very far below an average crop—say about 15 bushels per acre, and a failure in every direction—as much so as in 1845. We are thankful for what little we have.

Cotton.—This crop this year has been about 600 pounds per acre. Cotton has been at a low price this winter—say from $7 to $8—a price that farmers can scarcely live at; but it is the great crop of this region. Upon it the planters depend for their money. Indeed, many of our farmers aim at nothing else to make money until they run out their ground, and are obliged to throw it out. But there is great improvement making in raising cotton; it is the only article to bring the cash. The staple was very good this year, and commanded as high a price as the South Carolina cotton. The cotton crop this year was backward by the spring being cold. In May and June it grew off finely; in July there came a drought, that checked the growth of the stalk, and finally stopped the growth of the cotton; short crops.

Oats, for the past year, were very light, owing to the drought; not half a crop that makes seed. Oats are scarce and dear.

Barley is but little cultivated in this region of country, although it turns out well, and would be well worth attending to. It makes excellent feed for horses; but the good land is all planted in cotton, and the barley left out.

Rye receives but little attention; very little raised in this section of country; left out to plant cotton.

Clover and Grasses.—Little has been made in the last two seasons; the drought having been so severe.

Negroes hire this year at $100 and $130 to work on the North Carolina and Central railroad, from Charlotte to Goldsborough.

Your humble servant,

JOSHUA HARRIS.

Hon. Thomas Ewbank,
Commissioner of Patents.

SOUTH CAROLINA.

Matanza, Pee Dee, *January* 7, 1852.

Sir: The season for rice in 1851 was good, with the exception of the high winds in July and August.

Herewith I transmit a statement of meteorological observations for the year, as kept by our excellent neighbor and friend, the reverend rector of the parish in which my former residence is found—showing that 46.53

inches was the quantity of rain during the year; that during the crop season there were seventy days in which it rained more or less, namely, in the month of April nine (9) days, in May five (5) days, in June fourteen (14) days, in July seventeen (17) days, in August twelve (12) days, in September seven (7) days, and in October six (6) days—measuring, in the aggregate, thirty three and one-third inches, (33⅓.) It is true that in the long rivers (the Pee Dee and the Santee) there was a freshet in the month of March; but this only injured those planters who were not duly advanced in the preparation of the soil; otherwise it it was rather an advantage. As an evidence, it left a deposite uniformly distributed, which is one of the best dressings the land can have.

The tides fell out well in June. After "long water" the fields were clean, and the promise of a full crop was very fair in this part of the country. Late in July, however, when the most forward rice was in bloom, we were visited by a gale which destroyed all the blossoms then out.

The morning after, up to 8 o'clock, in some fields of my own (Waterford) there were no blossoms to be seen. By 11 o'clock the plants were covered with new blossoms, as if nothing had happened; but there were parts of the ear the pistils to which were dried up, and could no more be fructified by the pollen from the new blossoms. In every such instance the chaff is all that remains of the grain. In this way the product has been materially diminished of fields which, to the general observer, still looked promising. On the 24th of August another gale visited the coast from southeast, still more severe. The rice crop was then more generally in bloom; of course the damage was more general and severe, and the plant was affected in the same way as described above for the month of July. In addition, where there was very late rice, which happened to be then just in "tight barrel," by the violence of the wind, the barrel was prematurely burst, the incomplete ear exposed, and in many instances the topmost grains were blasted. Owing to these causes, the crop in this district will barely be an average one. The harvest weather, happily, was fine, and the rice has been well cured. South of the Santees it is understood that the crop on several rivers has been diminished by the effects of salt water. On the whole, I cannot estimate the crop last harvested, and now going to market, to be as full as the one preceding it. In January last I ventured to estimate the crop of 1850–'51 as likely to prove ten per cent. short of that of the previous year.

The following is a statement of that crop, as derived from a commercial friend in the city of Charleston, to wit:

	Barrels.
Total receipts of rice for the year ending September 1, 1851	138,523
Less stock on September 1, 1850	1,555
Net receipts	136,968
Of this there were exported—	
To Great Britain	14,115
To France	5,129
To North Europe	22,136

	Barrels.
To South Europe	697
To West Indies	18,967
Foreign	61,044
Coastwise	64,075
Total export	125,119
City consumption	11,620
Destroyed by fire	310
Stock on hand September 1, 1851	1,474
	138,523

Of this were exported in the rough—

	Bushels.	Allow 21 bush. to bbl.
To Great Britain	223,017	
To France	21,247	
To North Europe	138,133	
Total foreign	382,397	or 18,209 barrels.
Total coastwise	61,351	or 2,921 "
Total rough rice	443,748	or 21,130 "

The long-grain rice, when prime and well prepared, is still preferred by very choice purchasers. Up to the present time, several sales have been completed of this variety, at \$3 87½ per hundred weight, and two small ones at \$4 and \$4 25, respectively, when the market for prime of the small grain usually cultivated ranged from \$3 to \$3 50 per hundred weight.

Very respectfully,

ROBERT F. W. ALLSTON.

GEORGIA.

Clarkesville, Habersham County, Ga.,
December 17, 1851.

Sir: Your Circular of interrogatories was handed to me to answer by the postmaster of this place.

I have called to my assistance Dr. George D. Phillips, who has long been a visitant of this county, and whose general experience and knowledge of several subjects of inquiry better qualify him to answer them than myself; and I give his answers entire in relation to corn, oats, barley, &c.; dairy husbandry; neat cattle; horses and mules; sheep and wool; hogs; rice; tobacco, hemp, and root crops; which are, without doubt, as near correct as it is possible to make them under present circumstances.

Wheat.—No guano has been used for any purpose in this county. The yield per acre is probably about ten bushels; time of sowing, from the 15th September to the 1st December; time of harvesting, from the 15th June to 15th July; seed generally soaked in sulphate of copper to prevent smut; which process appears to prevent it almost uniformly. Our farmers usually sow about one bushel to the acre. Wheat is usually sown amongst the standing corn, or on land which has produced a crop of corn, and ploughed in with an ordinary southern plough. The best remedy for the Hessian fly that we are acquainted with is either to kill all the grass on the land before sowing or to sow late in the season—say middle to the last of October. Exposing the wheat from time to time in the open air and sunshine eradicates the weevil. The culture of wheat is conducted very carelessly and in a very slovenly manner. Should our farmers prepare their ground with as much care as is done in the States of New York and Pennsylvania, the yield would, without doubt, be as great as it is in those States.

The greater portion of the crop is consumed within the county, and is worth about \$1 per bushel.

Corn.—The manures used for the corn-crop are made in the stable, cow-yards, and hog-pens, by littering them freely with forest leaves, straw, &c. These are applied to the soil broadcast, or spread in the spring, previous to ploughing, and turned under by a one-horse turning-plough; two would do better. The land is then laid off by ridging, with three furrows; crossed at right angles by one furrow, and planted. This is the common way of preparation and planting in upper Georgia, both on the uplands and bottoms; but our best and most successful planters plant mainly in the drill, and plough but one way; having protected their lands from washing by water furrows, or hill-side ditches.

On all lands we plough deep, particularly at the first and second ploughings. The old method of hilling corn is generally abandoned. We consider the best way in which corn can be fed to animals is in the form of meal, and the finer the better; and that it is more easily digested and nutritive, when cooked, for hogs and cattle, we fully believe.

We have no doubt but the manure resulting from ten bushels of corn, fed to hogs, if applied to an acre of land not too much worn, would increase the product one-fifth.

Oats, Barley, Rye, Peas, and Beans.—We have cultivated, to some extent, for many years, oats, barley, rye, peas, and beans; and consider them as *exhausters*, in the order in which the first three stand, but do not regard peas and beans as exhausters, provided the vines are not removed from the land; if ploughed in, more is returned to the soil than is abstracted from it.

The average yield of oats and barley is about 12 bushels per acre; rye, 8 bushels; peas, from 15 to 18 bushels; beans, say 12 bushels. Much depends upon the season as to the last two crops, an early frost cutting them off short. Very few have cultivated peas as a renovating crop in this county; those that have done so find it equal to a crop of green clover when turned under.

Clover and Grasses.—Clover has been somewhat cultivated, for a few years past, and will, doubtless, be more extensively used in a few years; if properly cultivated, will yield about 4 tons per acre, and gives three mowings in a season. No fertilizers are used for meadows, except lime; and that to a small extent. Herdsgrass seed (red-top of the North) is preferred in laying down meadows. Two bushels per acre is about the usual quantity of seed sown. The cost of growing and curing hay is, probably, about $4 per ton.

Dairy Husbandry.—So little attention is paid to dairy husbandry in northeastern Georgia, that our information is meagre. Only one individual, within our knowledge, has engaged in cheese-making; and, though he had extensive pasturage for cattle, and milked about 100 cows, he abandoned it at the end of the second year. He is a northern man, had some experience in the business, made fine cheese, which met with ready market; and, if it had been more profitable than other pursuits, would doubtless have continued it. Every farmer keeps as many cattle as he can carry through the winter, and makes his own supply of butter, at a trifling cost, and sells any surplus at 10 cents per pound.

Neat Cattle.—The cost of raising cattle with us is trifling. In summer they feed on our native grasses, and in winter on corn husks, straw, pea vines, and hay. At 3 years old they cost us in value of labor in feeding, &c., $3 50 per head, and are worth about $7. A good cow is worth $12 in the spring, and $10 in the fall.

What would be the increase in weight from feeding 100 pounds of corn, would depend on many circumstances—the tendency to take on fat, the condition of the animal, &c.; but that it would not ordinarily fall short of 15 pounds if ground into meal, we fully believe. We have neither the pure blood nor crosses of the Devon or Hereford cattle; but our native breeds are as thrifty, and take on fat as readily as the Durhams. We break steers by securing them to a post or tree, where they are fed and watered until they can be handled safely, and then put them under the yoke with one older and well broken; work a pair alternately this way for a few days, when they will be sufficiently broken to work together or separately.

Horses and Mules.—We find horse and mule-raising profitable; particularly the latter, as the cost of raising a mule until he is fit for use and market, (say 3 years old,) does not exceed $30. That of the horse colt, at the same age, is not less than $50. Our brood mares do the work of the farm until they are near foaling, when they are more cared for, and taken from work. Two or three weeks after foaling, they are put to work again and highly fed; when at work, the colt follows or runs about the field, doing but little damage. The greatest difficulty in breaking a mule is to get him harnessed, and in place in the wagon. They never refuse to pull, and any simple contrivance, by which they are prevented from throwing down their head, will prevent their kicking. A few days' steady work will break either horse or mule when he cannot throw his head down.

Sheep and Wool.—We neither raise wool nor mutton sufficient for our own use, although we are in the finest sheep-raising region of the south; where, for 9 months in the year, they keep fat on the native wild grasses. The life of the animal has no protection from man or dogs, and the latter eat more mutton than the former.

Wool from our native breeds could be raised for 8 cents per pound, and we know no reason why there should be a difference in the cost of raising ordinary and fine wool. Those who attend to their flocks properly, raise 18 out of every 20 lambs.

Hogs.—Our best breeds of hogs are thought to be a cross of the grazier and Woburn; but some prefer the smaller hogs, crossing the grazier and Chinese Guinea. The cheapest way to produce pork, is to keep the pig fat, the shoat fat, and the hog fat, and kill at 14 or 18 months old. Have lots of barley for young hogs to feed on in winter, clover lots, with the gleanings of wheat fields in summer, and peas, pumpkins, and apples in autumn. But to fit the hog for bacon, there can be no substitute for corn.

Rice.—That rice can be successfully cultivated on upland we know, as several of my friends have raised it, at the rate of 40 bushels to the acre. Two varieties have been tried, with equal success.

Tobacco.—But little tobacco is raised in upper Georgia, where the climate and soil point it out as a market crop. Eight hundred pounds per acre is regarded as the average crop; and the best rotation crop to be wheat. The cost of production cannot vary much from $3 per hogshead.

Hemp.—We raise no hemp, and but little attention is paid to the root crops.

Potatoes.—Both Irish and sweet potatoes are cultivated for home consumption. The average yield is ordinarily about 350 to 400 bushels per acre. The cost of production does not exceed 10 cents per bushel. Very little preference is given to varieties. Planting in hills is preferable to ridges, and is usually pursued, as it exposes the roots to the more direct action of the solar heat. Long manures, such as straw and leaves, are preferred for Irish potatoes; and that from the cow-yards for the sweet. The potato rot has scarcely made its appearance with us. Some four or five years since a little of it was to be seen. Of late, however, it has entirely disappeared, and our crops are as sound and healthy as they were before the appearance at the North of the disease.

Fruits.—The interest manifested of late in the cultivation of fruit is decidedly on the increase in this county, which is peculiarly adapted, both in soil and climate, to its successful culture. There is now a greater variety of apples and pears cultivated in this county than in all the rest of the State together. Not less than 150 or 200 varieties of apples, both northern and southern, are cultivated, with every promise of success. Nearly the same number of pears are, also, either bearing or in progress of growth, which promise well. Southern-raised trees succeed much better, and come into bearing sooner, and are more durable, than those imported from northern nurseries, which receive a very material check from the length of time it takes them to reach us, as well as that they receive before they become acclimated.

The apple crop can, most undoubtedly, be made one of the most profitable, if not more profitable than any other crop that can be grown here. The best keeping varieties we have of the northern are, the Esopus Spitzenberg, Newtown pippin, and northern spy; of southern, the berry, wonder, buff, and English crabs, as they are here called. The best remedy for the blight we find to be root-pruning, as the disease is caused by a too luxuriant growth of wood, which is left in an immature state when winter sets in.

Peaches grow here almost indigenously. No care is bestowed upon them, as the trees spring up everywhere, and produce enormous crops, without pains. We grow them here weighing over one pound each, and of as fine flavor as are to be found anywhere.

We cannot succeed in raising the smooth-skinned fruits—such as nectarines, plums, and apricots—from the ravages of that insect pest, the curculio.

The splitting of the trunks of the finer cherry trees, when two or three years old, from the bud, is a malady for which we have not yet found a remedy, and which pretty effectually prevents their extensive cultivation.

Grapes do admirably with us, both native and foreign [illegible]. Occasionally the rot attacks them, when suffered to grow too [illegible], and bear too great a crop. They require constant pruning [illegible] the growth of the crop, and high manuring with vegetable [illegible] ashes. Swamp soil, with ashes, is one of a most desirable character.

No wine is made.

I have never seen a case of *yellows* amongst our peach trees.

Manures.—Very little attention is paid to making and preserving manures. The best plan, beyond question, for preserving and making manures effective is to keep them from the weather; and, when applied to the land, to be immediately ploughed in.

Lime is beginning to be used as a fertilizer, with very evident advantage, and in quantity of from 25 to 100 bushels to the acre, according to the character of the land on which it is put—that containing the greater amount of vegetable matter receiving the greater amount of lime.

Not an ounce of guano has found its way to this county that we are aware of.

J. VAN BUREN.

Hon. THOMAS EWBANK,
Commissioner of Patents.

HAMILTON, HARRIS COUNTY, GEORGIA, 1851.

SIR: I send you what little information I have in agriculture upon such articles as are generally raised in this section.

Wheat.—Guano is not used in this county in the production of wheat. Cotton seed is the principal manure used here for raising wheat. One hundred bushels per acre of cotton seed will generally make the yield double. Land that will bring five bushels per acre without cotton seed, will generally yield ten bushels by applying the cotton seed in the above proportion. The best time for sowing wheat in this section is about the 20th of October, if the ground is not wet. Wheat does best sown when the ground is dry. Wheat soaked 24 hours before sowing, in bluestone, will prevent the smut. The average price of wheat in our market is $1 per bushel; cotton seed from 2½ to 3 cents per bushel.

Corn.—Guano is not used in the production of crops of any kind in this section. Cotton seed, stable manure, and cow-pen and hog-pen manure, are used here for producing corn. The best plan of manuring corn, is to put the manure around the corn immediately after it comes up; then it will be where the spur roots will strike out into the manure in earing-time. The average price of corn this year has been about 85 cents per bushel. To feed hogs with, corn does best cooked; for horses, ground and raw.

Oats.—Oats generally yield from 10 to 12 bushels per acre. They exhaust the land as badly, or worse, than a crop of corn; price, 50 cents per bushel; one bushel of seed per acre.

Rye.—The general yield of rye is from 8 to 10 bushels per acre; does not exhaust the land as badly as oats; price $1 per bushel; 1 bushel of seed per acre.

Peas.—The average crop of peas is about 5 bushels per acre; half bushel of seed per acre; market price $1 per bushel. Peas are not cul[illegible] crop, though they are an advantage to the land to [illegible] stock.

Dairy.—A good cow will yield 75 pounds of butter per year; price, 15 cents per pound; cost of feeding, $5 per year. To save cream, milk ought to be put up into wide shallow pans, well scalded before the milk is put in to be churned in a stone jar. To put up butter for market, the water must all be worked out; then salted down about six days; then taken up and all the water worked out again; then salt it down with fine salt, and it will keep.

Hogs.—The best breeds for the climate are the Woburn and Grazier. To save good bacon, let your pork lie after it is cut up until it is quite cold to the bone; then put plenty of salt, and about half a pound of saltpetre, to 1,000 pounds; let it lie in pickle five weeks; then take it up, wash it clean of salt; then ash it all over, and hang it up and smoke it; take it down again the first of March and ash it again, and it will keep good all summer.

Irish Potatoes.—The best plan for producing Irish potatoes, is to have the land well broken and bedded. Open the bed with a shovel plough; then drop the potato; then fill up the trench with well-rotted stable manure; then draw up a little dirt on the manure; then cover the whole surface over about ten inches deep with straw—and they will yield about 125 bushels per acre, without any further cultivation. The yellow potato is the best; the cost is so small that it is not worth counting; the average price is about $2 per bushel.

Sweet Potatoes.—The yam potato is the best of the sweet kind. The land should not be very highly manured for potatoes, or they will go to vine too much. Good new sandy land will yield 200 bushels per acre, worth 25 cents per bushel; cost of raising too small to count.

A. F. JOHNSTON, *P. M.*

NEAR BLAKELEY, EARLY COUNTY, GEORGIA,
December 10, 1851.

SIR: In reply to certain inquiries contained in your Circular for 1851, I now offer such information as experience and observation have placed at my command. Promising that all statements made in this communication are derived from the agricultural operations of southwestern Georgia, I offer none but such as I deem undeniably true. My own plantation lies about the middle of the 32d degree of north latitude, but the same practices and similar results obtain throughout this southern section of the State.

Indian Corn is made usually in abundance for domestic consumption; little or none for exportation. The production of this grain ranges, according to soil, seasons, and skill in cultivation, from 10 to 40 bushels per acre; and the price, when saleable at all, varies from 50 cents one to dollar; the latter price never obtains unless cotton sells high and, unfavorable seasons have curtailed the grain crop.

Cotton, the well-known staple of the country, is grown by almost every tiller of the soil, and is relied on as the chief source of income. Two descriptions of cotton are known to commercial men and to manufacturers, "the long and short staple," the latter being that which is grown on the highlands, the former on the sea islands of Georgia, South Carolina, and other maritime localities. The long staple plants grow, indeed, on highlands as much as 100 miles above the water, but the short staple is found to yield a better profit to the upland planter. The production of clean cotton-wool per acre depends greatly on soil and seasons; and the average in a term of seven years, throughout the highland districts, cannot justly be set down as more than 250 pounds. Soils of a rich sandy quality, under propitious seasons, yield double this quantity or more of clean merchantable cotton, whilst many poorer fields fall short of this average by 50 or 100 pounds. It is not an easy calculation to determine the *cost* of producing a hundred-weight of cotton-wool; but as the inquiry has been specially made, I have taken pains, aided by several of my neighbors, to attain the nearest approximation, and have come to the conclusion that the cost of production and conveyance to the nearest market does not fall short much, if anything, of six dollars and six cents a bale. This calculation proves what all cotton planters know, that disastrous seasons or low prices leave them with very scanty profits. A continuance of low prices will unquestionably drive cotton planters to the use of machinery, by which they can convert the raw material into yarn or cloth, (what should long since have been done,) by which their labor can be fairly remunerated.

Wheat, Rye, and Barley might be profitably grown in any part of this country; but they are crops of not even secondary consideration, and are consequently put on poor fields with but little care or skill.

Wheat is, of late, engaging more attention than formerly. On a meadow soil, sown early in the fall, it escapes *rust* and produces from 6 to 12 bushels per acre. The day is probably not distant when planters will generally find it better to produce flour for domestic use than to import it from New Orleans or New York.

Peas and Potatoes of every variety are successfully grown in this country, chiefly for the purpose of fattening hogs and other plantation stock. They are, indeed, especially the latter, used as esculents for the master as well as his slaves; and both, to a considerable extent, are left in the fields to be eaten by hogs, cattle, and horses; the potatoes to be rooted up and devoured by hogs, and the peas to be consumed during the fall and winter months by every sort of farm animal. I do not know a farmer who has ever measured his ground and crop of either potatoes or peas, for the purpose of ascertaining the exact production per acre; but the current estimate of my own neighborhood is 10 to 20 bushels of peas, and from 100 to 200 bushels of potatoes. Both certainly grow well in this section of Georgia, and, as provision crops, rank next to Indian corn.

Rice and Sugar-cane.—These belong to the class of small crops, and are rarely grown for sale. An acre of wet or dry land will produce from 30 to 70 bushels of rough rice, double as much as any small family would need for domestic use; and two or three acres of high dry land, fertilized by proper manures, planted in canes, will yield as much saccharine

matter, in the form of either sugar or sirup, as the master's family and 50 negroes will make use of in 12 months. Both the crops are very common in southwest Georgia, but seldom produced in quantities beyond the requirements of the plantations where grown.

Horses, Cattle, Hogs, and Sheep.—All these animals are cheaply raised, and, if of improved breeds, would probably compete with any in the United States. The care and skill in feeding and general management are by no means such as prevail in Pennsylvania, and such as would prevail here, but for the all-absorbing cotton crop. We raise some good horses for the saddle and harness, and generally hogs enough to allow rations to the laborers at the rate of 3½ pounds of good bacon or pork per week to each field-hand through the year. It must be admitted, however, to the discredit of our husbandmen, that more than half of our horses and mules are bought from the western drover, and, when the price of cotton is high, a considerable part of the bacon and pork consumed in the country.

Cattle and sheep are left to shift for themselves in the woods, except two or three months of winter, when they receive a daily allowance of corn shocks or other coarse fodder.

In the summer they become fat on the native grasses of the forest, and milch cows, after June, when our wheat, oats, and other winter crops are harvested, yield an abundance of milk and butter from the crop or crab-grass pastures of these fields. Poor lands in this latitude produce this fine grass in great abundance after the wheat or oat crop has been removed.

During the winter months milch cows are fed on pumpkins, sweet potatoes, cornmeal, cut-straw, &c., generally in an uncooked state. In this part of the country neither hogs, cattle, nor other farm animals, have their food prepared by boiling or steam: at any rate, the practice is very rare, but will, doubtless, become more common when we shall have made better progress in arts of domestic economy.

Very respectfully, yours, most obediently,

J. CRAWFORD.

FLORIDA.

Clifton, Madison County, Florida,
December 3, 1851.

Sir: I shall reply to the inquiries of your Agricultural Circular in the order in which they stand.

Wheat.—There is so little attention paid to this crop, as scarcely to be called a crop with us. Very little sown; and that little most wretchedly scratched in at one ploughing—if ploughing it may be called.

Corn.—Guano is not used in our county as a manure for any crop. The best mode of planting is by throwing out into beds, as for cotton. Land ploughed deep and close; plant in water-furrow—a protection from drought; and plough the first time deep and close, with narrow, long plough; second time, less deep, with larger plough; third time, shallow, and lay by with sweep. Product, 20 to 30 bushels per acre.

Oats, Barley, Rye, Peas, Beans.—Oats, barley, and peas will yield nearly the same; rye less than either. Beans are never cultivated as a field-crop with us. Barley requires rich land to succeed in our climate. As a renovating crop, the pea is esteemed. Oats are regarded as doubtful, if not injurious.

Clover and Grasses.—These are blank subjects with us. There is some hay made from the native grasses in the fields after the staple crop is made, which comprises all to be said on this head.

Dairy Husbandry.—Blank again.

Neat Cattle.—We have none but native stocks; and the cost of rearing amounts to the labor of marking and branding the calf. If it lives, well; if not, well. On the frontiers, where the range is good, this is a most lucrative business, and a capital in stock-cattle will pay 25 per cent.

Horses and Mules.—The raising of colts is not regarded as profitable, owing to losses from staggers. Mules are, I think, as profitable as cotton-growing, the cost at three years old not exceeding $25. The mares will pay their expenses by ploughing the crop season, and giving them the fall to bring their colts. I break all my colts and mules to the wagon, working them enough to make them manageable elsewhere, and work lightly for the first year.

Sheep and Wool.—The growing of wool could not be otherwise than profitable, requiring no feed for the sheep, winter or summer, and only to be protected from dogs, wolves, &c.

Hogs.—There are various opinions as to the best breeds, these opinions depending on the way stock is raised. For the range or shift-for-yourself system, the long-nosed Pike stands A No. 1. For a system of partial feeding, the Corbet, grass, and a cross with the China hog, is preferred.

Cotton.—The average yield per acre, for all lands and years, I would not put higher than 800 pounds. The cost of production, ready in market, I think not less than say 4¼ cents per pound. I know no preventive for rust, army, and boll-worm; and I think the only remedy is planting less deep, and thorough tilth, and ample manuring. I have no experience in subsoiling for cotton, but have every confidence in it. Cotton seed is beginning to be much appreciated as a manure for all crops—like the negro's 'possum, good for everything. Cotton lands can only be improved by rest and manure.

Sugar-cane is with us only a patch-crop for home use, and does not succeed well, from the rattoon, more than one year.

Rice is grown successfully upon all lands in our climate, particularly fresh. Product, from 30 to 60 bushels rough rice per acre.

Tobacco.—None grown, except for home use. The Spanish or Cuba tobacco is profitable when carefully handled.

Hemp.—None grown.

Root Crops.—Only grown as family comforts.

Potatoes are grown (the sweet) by every one. Negro-killer, or Alabama, and Hayti, the most productive. The best system of planting, is deep and thorough tilth, the lands drawn into beds, and the least work possible to keep the grass under afterwards.

Fruit Culture.—Almost wholly neglected. The orange is now receiving some attention. Some grapes, for table use. Almost all kinds of fruit would, no doubt, succeed, with proper attention.

Manures.—Owing to the freshness and natural fertility of our soils, with the mildness of the climate, and the great ease with which the comforts of life are obtained, we have hitherto almost entirely neglected manuring, except with cotton seed.

Respectfully,

RICHARD J. MAYS.

Hon. THOMAS EWBANK,
Commissioner of Patents.

MANITOU RIVER, TAMPA BAY, SOUTH FLORIDA,
December 18, 1851.

SIR: I have received your "Agricultural Circular," and, as requested, will answer some of the questions asked, giving such information as I possess; and being a sugar planter, I shall confine myself chiefly to a description of that staple—its history and culture in this State. The cane cultivated in this State has been brought originally from Georgia, having extended gradually south, from the Carolinas, keeping pace with the advancing civilization, and becoming more developed, as it approached the tropics. With us it is more perfect than in any other territory of the Union, annually arriving at maturity, tasselling, and bearing seeds: these seeds are exceedingly minute, and it is generally supposed that they are inadequate to the reproduction of the cane. I think, that in consequence of the annual maturity of our cane, its vitality is progressive, furnishing a perfect and healthy plant; such is not the case in Louisiana. Their imperfect plants, propagated year after year from the refuse of their unripe cane, may reasonably be expected to lose their force and decay. The culture of the sugar cane, on the large scale, is comparatively of recent date in Florida; our experience and knowledge of its culture are consequently imperfect. In South Florida, we find that our canes will rattoon well for five years; but I believe that the conviction is general, that we should not rattoon longer than three years; which, with the first or plant crop, makes a term of four years between each planting. The establishment of sugar plantations in South Florida is so recent, that no planter has succeeded in getting in a full crop. Consequently, no well digested system of rotation has been adopted. The system which I am adopting is, to divide my plantation into five equal portions, four-fifths of which will be planted in cane—the fifth to lie fallow. During the seasons of leisure, this portion will be prepared in the best possible manner for planting in the ensuing spring. My lands are based on marl, having a rich subsoil, but a light silicious surface soil. The fallow land will be ploughed very deep, with four-horse ploughs, throwing it up into lands of seven feet, with deep water-furrows; into these furrows all the trash of the land, and the rotted begassa of a preceding crop, together with any other manure which may have been prepared, will be collected. The land will be again ploughed with four-horse ploughs, bedding on the deposited manure; when this fifth is planted in cane, the oldest of the remaining sections will be ploughed out, and subjected to the same operation. By this system, our plantations will yield from 2,000 to 3,000 pounds of sugar to the acre. Nothing is more injurious to a rattoon crop than the method often pursued of burning off the refuse trash, &c., unless it be the introduction of cattle.

Very few planters return their begassa to the land on which it grew. In Louisiana vast chimneys are constructed, at great expense, for the purpose of burning it; when this is not done, it is generally hauled to the river, and dumped in. These planters do not reflect that they are removing from their lands those essential salts, without which it is impossible to produce a good cane, and of which there is only a limited quantity in any soil. The begassa from every acre of tolerably good cane contains, of

	Pounds.
Silica	138.01
Phosphoric acid	11.28
Sulphuric acid	19.98
Lime	27.48
Magnesia	10.98
Potash	76.50
Chloride of potassium	9.81
Sodium	6.06
Total	300.00

In every good cane, this amount is doubled. Those who pursue this insane mode, may probably find in it a sufficient cause for the loss of that vital force of which they complain. I think, that on a fully developed plantation the cost of production of sugar, in South Florida, will be from 1 to 1½ cent per pound, dependent upon the variation of seasons.

Rice can be grown very profitably, on the small scale, on our high lands in all parts of the State; 60 and 70 bushels being not unfrequently gathered from acres carefully prepared. The yellow or golden rice is, I believe, best adapted to either wet or dry culture. My own experience is limited to the culture of high-land rice on my new grounds, as a preparatory crop to cane. This, on the large scale, is not profitable. There are large bodies of land along our Gulf coast, admirably adapted to the cultivation of this staple. It occurs to me that the area of rice culture could be very much extended by the introduction of the wheel commonly used for drainage, reversing its operation, and throwing the water on the lands too much elevated to use the natural flow of the stream. Some of the machines are in operation in Louisiana, which throw several millions of gallons per hour. Many old fields, abandoned in consequence of the difficulty of procuring a proper head of water, might thus be reclaimed.

The *fruit culture* of my immediate district is confined to the production of oranges, lemons, limes, guavas, bananas, pine-apples, cocoanuts, &c., &c. Of these our plantations are small, and young; but they have given ample earnest of profitable results. On the hummock lands we can realize from 300 to 400 barrels of oranges, lemons, and olives to the acre. Our pine lands will, with proper attention, give 200 barrels per acre. I have a few olives, from which I expect fruit next year. I have many varieties of wild grapes; some of them very superior, hanging in large and heavy clusters, both purple and white, resembling in appearance some of our finest cultivated grapes.

The Bermuda arrow-root flourishes throughout South Florida, producing even on the pine lands from 200 to 300 bushels to the acre; the quantity being largely increased when planted on rich lands. The yield of merchantable arrow-root flour, obtained by very imperfect mills, is from 6 to 8 pounds to the bushel; worth from 25 to 30 cents per pound. Along our Atlantic coast, south of 27°, the cumpti or Indian arrow-root grows spontaneously, giving results nearly equal to that of Bermuda, with the advantage that it requires no cultivation—the sole labor consisting in bringing it from the forest land and conveying it to the mill; the simple stirring occasioned by the digging being sufficient to secure a better crop than the one just removed. The Sisal hemp grows readily and luxuriantly, even upon our thin pine lands, and will eventually become a valuable staple; but, in the multitude of others, it is at present overlooked. So, also, the palma christi, which becomes a tree, and is perennial.

Our country is well adapted to the raising of *horses and mules;* our climate affording perennial pastures, and rendering unnecessary expensive provision of forage and stabling; as many of these animals as might be required for the use of the country could be raised to the age of three years without requiring the expenditure of as many dollars. The healthfulness of these animals, in our section of the country, is notorious. Colts should be broken before they are weaned. Being early accustomed to the bridle and gear, the transition from freedom to labor is imperceptible.

Very respectfully, your obedient servant,

ROBERT GAMBLE, Jr.

Hon. Thomas Ewbank,
Commissioner U. S. Patent Office.

ALABAMA.

Bolivar, Jackson County, Ala.,
October 29, 1851.

Sir: Your "Agricultural Circular," United States Patent Office, of August, 1851, has been by me duly received; and I now readily proceed to give you such information and suggestions as I have on hand.

Corn.—This crop is grown in this part of the State in great abundance generally. The drought has injured the last two crops considerably, both in quantity and quality. Neither guano nor any kind of manure is used here, to any extent, in the production of this crop. However, the time has come when our farmers that cultivate up or barren lands will have to resort to this process, or emigrate, as has heretofore been the practice. The application of fertilizers even now pays well. The average product per acre is from 35 to 37 bushels, at a cost of about 25 cents per bushel.

The best system of culture is not generally practised here, our lands being rich, and the product of little value over home consumption. Now we have the dawn of better times, a market being opened for our surplus.

I will state an experiment I made this season in the cultivation, or rather in planting, of this (to us) indispensable crop.

After breaking up my river-bottom land in the spring, and laying it off as usual in rows of four feet, fearing another dry summer I ran another extra furrow in the bottom of the first with a cary, and followed with what we call a bull-tongue, *all as deep as we could*, then crossed back the same way; and with that small addition of two deep furrows I have no doubt but that I made at least 10 bushels more corn per acre, and with less rain than I ever saw a crop made with. In feeding this crop to stock we have not experimented very much, and use but little economy; yet I have no doubt but grinding or crushing, and cooking, would pay well. To the last inquiry under this head, (corn,) I do not believe that the trouble of gathering the manure from a hog-lot, or pen, would pay in any country, if fed only on shelled corn.

Wheat.—Guano is not used. The average product per acre is about 15 bushels; the time of seeding, October and November; of harvesting, June and July.

No particular system of putting in is followed here. The better the ground is prepared, the greater the yield; and the farmer gets well paid for all his trouble in ploughing and pulverizing for this crop. It is generally on the increase in this county; and ere long we shall produce enough for home consumption. At present we only lack mills of good quality. We can grow the grain at 50 cents per bushel, or less. Corn, cotton, or oats, grow well after wheat; but corn is generally preferred in this section. Manures are beginning to be used here in the growth of this grain, and all pay well.

Oats.—This is a valuable crop in this section of the country. I know of no crop that is more reliable than oats, and they pay more for labor done, or capital invested, than any crop here. There is but little choice in the different seeds used; all do well. Average yield per acre about 40 bushels; quantity of seed 2 bushels per acre. This crop does not exhaust the land, nor much renovate it if cut and carried off the land; but if pastured by hogs (which is a good plan) then the land is improved.

Barley.—This grain is not grown here; nor rye, in any great quantities. Rye does not exhaust the land even if cut, for a great quantity of straw is left with the stubble. It affords a good winter and spring pasture for young colts, mules, calves, and sheep.

Good crops of peas and beans are grown here in and among corn, as this is the only way we cultivate them. They are a valuable crop—peas especially.

One of my neighbors, Wm. S. Allen, has made an experiment this season on the pea crop. He planted 10 or 12 in or by every hill of corn, on 60 or 70 acres of land, and can now gather more bushels of peas than corn. They have not injured his corn one bushel, nor hindered the cultivation of it in any way; will now renovate and improve his land, and fatten his hogs. What he gathers are worth 75 cents per bushel. Every farmer who raises corn ought to plant peas.

Beans are lately grown here for market. I planted this season 15 acres with corn; but the drought cut them short, and we shall make only about one-fourth of a crop. We plant a little bean, perfectly white and round, called here the soup or rice bean. They are a reliable crop; not hard as peas to harvest, for we pull off vine and all, haul in, thrash them, and feed the pods and vines to cattle. Price this year 75 cents

per bushel; last year $1. The bean I mentioned does not injure the crop; only a little in the way in stripping off fodder.

Clover and Grass are not grown to any considerable extent; yet we have as good grass-lands as any found in this latitude. I sowed the different kinds of grass seeds you sent me last spring, just as the drought set in; all died but a little of the Lucerne, on account of which I am very sorry, but hope to succeed better the next time.

Neat Cattle.—We have no system of raising stock here, of any sort; and never count the cost, as the cattle live half the time on Uncle Sam's pasture.

The dairy is not attended to, except as a family convenience. Butter is worth 10 cents per pound to produce in winter. Cheese is only made for home use, and is of an inferior quality.

The best method to break a steer to the yoke, with which I am acquainted, is, to take him up at three years old; chain him to a tree or post, with a heavy chain; let him remain there until his head gets sore, for he will jerk a little at first; then put him in by the gentlest steer as a yoke-fellow; hitch them to a cart, and drive on. On the next day, put in his mate, if you think best, by another sober ox; keeping a gentle yoke always in for fear of fright or danger. After working for a few days, pair off, &c.

Horses and Mules.—The raising of mules, in this county, is very profitable. The expense, until three years old, does not exceed $35, at which time the animal is generally worth $75; and never less than $50. The best way to break a colt or mule is, to handle it while young; handle its feet and legs; rub and keep it all the time docile; when you want to use them in gear, put it on gently; treat them kindly and mild; the plough, or the dump-cart, are both good places for breaking them; avoid all whipping, hallooing, and jerking, as all such treatment is unnecessary and cruel.

Sheep are only raised in this county for the little wool we use in clothing, &c.

Hogs are grown in abundance for market. Pork is now almost entirely the product of corn and oats. One barrel of corn will weigh about 250 pounds; and generally three barrels of corn, or ten bushels, will grow 200 pounds of pork, the mast helping out a little. The best breeds for this county are the common stock, with about one-fourth Berkshire. I do not know that I am acquainted with the best method of putting up pork, or curing the same; however, I will give you my plan as practised for 24 years. I endeavor to fatten by the first day of January, at the latest: and ten days sooner, if I can. After killing and cleaning, I cut up, or open, and sprinkle a few handfuls of salt on each piece, letting it remain spread out until all the animal heat and blood have passed off; then salt down with plenty of salt, more by sight than by weight. If the weather is freezing cold, it does well to salt warm; and then take it up and resalt in the night-time, if the weather should turn warm. After the meat has thus been well salted, and penetrated by the salt in every part—after it begins to feel sleek or slippery, I hang and commence smoking with green wood, or bark; any sound green wood will do that is not resinous; ash is preferable; oak or hickory next; tanner's bark is good, and chips do well. Windy weather is good for meat drying. During 24 years I have not lost 50 pounds of meat by not salting and curing well. We have killed even in March, and saved all. But attention is necessary in the management of curing. I have tried putting down bacon in corn, ashes, bran, &c., to keep out the skippers. I see canvass and sweet hay, applied around the hams, lately recommended as being excellent to keep and preserve them, and have no doubt that it is worth trying; fill all round the ham with sweet hay, and tie up tight; hang high and dry, and keep out the light.

Cotton.—Cotton is grown here, to some extent. The average yield per acre is about 200 pounds of clean cotton. Cotton does not pay under 5½, and is worth all of 6 cents to make it, in this latitude. Any crop grows well after cotton; for if the ground be entirely level, cotton does not soon exhaust the land; and, if rolling, it will soon wash off, or the soil will run to the bottom of the hills.

The rust may sometimes be stopped by ploughing or harrowing. It is generally occasioned by dry weather, and the plant getting in an unhealthy condition; after which the small insects attack it and give it that russet color. The boll-worm has not troubled this section very much. I do not think that cotton-lands should be ploughed very deep, especially rolling lands; for, in my opinion, it would not increase the crop, and the soil would wash off sooner; subsoiling might do on prairie land or river bottom.

Cotton-seed as a fertilizer.—I have known it used, both in the growing of corn and Irish potatoes; nor is there anything better than this as a fertilizer, except the cotton itself. As before observed, if the land is not level, it will run off; and must be sown in wheat, oats, or planted in corn, or it will wear out; and must rest from cotton, at least. The South have always pursued a ruinous policy—so far as exhausting their lands is concerned—by running them consecutively in cotton, even for 10 or 15 years. They are beginning to see their error, and will, I hope, reform; but the damage is now irreparable, or nearly so. Lands that once produced a bale to the acre, will now scarcely produce 400 pounds of seed-cotton.

Sugar-cane.—This crop is not grown in this latitude.

Rice.—Only in small quantities.

Tobacco.—Only in small quantities, although this is a good tobacco-growing county, and every farmer might, with little cost, produce his own tobacco; and I have wondered why they do not do it—economy suggests the propriety of doing it.

Hemp is now on the decline; but little now cultivated.

Turnips grow well; but will only pay to cultivate in small fields, from a half to two acres.

Potatoes.—This crop grows well here, and in seasonable years all kinds do well; no new varieties.

Manures.—I have not had experience enough to suggest anything under this head, that would be of any advantage to the agricultural community.

Meteorology.—About the first of August, range of the thermometer in the shade about 99°. I have no means at hand for giving you the mean temperature of each month; nor the quantity of rain that fell in any, or all the months. I would simply say, that scarcely none has fallen here since the 4th of last May.

Yours, respectfully,

JAMES WILLIAMS.

CHUNNENUGGEE, ALABAMA,
December 18, 1851.

SIR: Your Circular of August last was forwarded to me by my friend, the Hon. Henry W. Hilliard. Before proceeding to answer the various inquiries relative to the agricultural productions and general husbandry of this region of country, it may not be amiss to allude to its topography and characteristics; confining my remarks to the county in which I live, knowing that you have other correspondents in different sections of the State, from whom you will learn the general results of the operations of the planters of Alabama.

The county of Macon embraces a variety of soil, though the most of its territory is a flat, level country; yet, through some strange freak of nature, a remarkable ridge was thrown up, running transversely oblique through the southeastern portion of the county, which seems to be the line of demarcation between the calcareous and sandy regions, dividing also the waters—those on the north running into the Tallapoosa river, and thence to Mobile bay; while those on the south form the head of Conecuh river, the principal tributary of Pensacola bay. Thus, after describing an immense circle, they mingle in the Gulf of Mexico.

The beautiful summit from which I write overlooks all the vast region extending to the high hills of Tallapoosa, a distance of 40 or 50 miles. Here, too, a few years ago, upon this identical spot, stood the grand council-house of the sovereigns of the land, who roamed at will over these wild romantic regions. They have passed away, leaving no vestige, no mementoes of their national existence, verifying the truth of Sacred Writ, which says, "The fashion of the world passeth away." Many interesting events connected with that strange race of people and the localities of Chunnenuggee, might be narrated; but I leave that to the future historian, whose duty it will be to commemorate the existence of a nation once formidable in warlike deeds, and will now respond to some of your inquiries.

This being a famous cotton-growing region, the cotton mania prevails to a great extent, absorbing all other considerations; hence, our system of agriculture is a most impolitic and absurd one. With a soil and climate most congenial to the growth of all the substantials, and even luxuries, of life, yet we are the most dependent people in the Union, relying mainly, as we do, upon our neighbors of the West for nearly all our supplies. By the adoption of a judicious system of agriculture, properly diversifying labor, the Southern people would soon be the most prosperous and wealthy people in the nation, for the bounties of nature were never more lavishly bestowed. Ours is a "blest heritage," indeed. The happiest results may be accomplished by reversing our present system. If, instead of planting two-thirds of our best land in cotton, as is now the universal custom, we were to appropriate two-thirds of it to growing grain, letting cotton be a secondary consideration, we would then have full barns, a plenty of fine fat stock, and be able "to live at home," perfectly independent. Under this system the cotton crop would be curtailed at least one-third, bringing it under 2,000,000 of bales, which would guaranty remunerating prices, and prevent those ruinous fluctuations in the value of our great staple.

Wheat.—There have been no experiments made with guano in growing wheat here. Until recently but little attention has been paid to the wheat crop. The scarcity of mills and the rage for making cotton, tended to prevent it. But the result of the operations of those who farm as well as plant, fully demonstrates the practicability of raising an abundant supply; yea, more than the domestic wants of the country require. By sowing the early kinds, the crop may be regarded as tolerably certain, and the yield from 15 to 25 bushels per acre. The kind of wheat exhibited at the great Macon fair, weighed 65 pounds to the bushel; and other specimens were but little inferior.

Corn.—I have no knowledge of any guano being used in raising corn. The principal manures used on our thin lands are cotton seeds, stable and barn-yard manures, all of which answer a fine purpose. On our lime lands corn grows most luxuriantly, and the sloughs yield from 40 to 60 bushels to the acre, with good cultivation.

Oats, Barley, Rye, Peas, and Beans.—The oat crop is becoming one of much importance, especially in the prairies or lime region. Here they grow luxuriantly, and yield most abundantly. They afford a most wholesome food for stock, particularly for work-horses and mules. When cut up or mixed with a little choppings or meal, they supersede, to a great extent, the use of corn. Barley is not cultivated to any extent; it makes valuable lots for brood-mares, &c. Rye is not raised for market here; it is regarded as valuable for green pasturage, and sustains our stock well during winter. Our lands usually yield from 15 to 20 bushels per acre; and it might be considered a valuable crop, for it uniformly sells for one dollar per bushel. Beans are only cultivated for culinary purposes, and grow finely in this climate.

The pea crop on our fresh plantations is one of great value, as our entire stock are frequently fattened by the run of our pea-fields. After gathering corn, many object to raising peas, alleging that their stock is destroyed by them. The results of my operations have been so different, that I am a great advocate for the pea crop, not only on account of stock, but as a fertilizer of the soil.

Clover and Grasses.—Very little attention has been paid to foreign or exotic grasses. I know of but one individual who has experimented with the red clover in this county; he seems to be pleased with his success, and thinks, upon our bottom or slough lands the red clover may be grown successfully. My own impression is, however, that the native or spontaneous grasses of the South are most reliable, and by proper attention might be made a source of national wealth.

Major S. Powell, of this vicinity, has recently made some valuable experiments, showing the vast product of our land, in spontaneous grasses; the most valuable of which is the crab-grass, which grows upon our corn land after the crop is laid by. He measured several acres in different portions of his field: from the first acre, on the high land, he saved 2,575 pounds of nicely cured crab-grass hay; from the second acre, which was in the bottom or slough, the yield was much greater, being 3,987 pounds. From his experiments, he feels well assured that from a ton to a ton and a half of hay could have been saved from each acre of his corn land. The crow's-foot and other wild grasses grow much more luxuriantly, and millions of pounds might be saved from our bottoms, which are annually wasted and lost through our negligence. Major Powell is of opinion that his hay is more nutritious and valuable than northern hay, and answers better for mules and horses than fodder.

Dairy Husbandry.—But little regard is paid to this branch. In a country where there are so few farmers, but little attention is paid to stock of any kind. None make butter or cheese for market.

Neat Cattle.—As but few persons pay attention to feeding these, it is difficult to say what the cost of raising would be. A good milch cow, of common stock, is worth from $15 to $20. Blooded stock, Durham or Devon, sell much higher.

Horses and Mules.—I find raising mules profitable, as there is but little expense attending it. They are usually put to work at two years old, and are less liable to disease than colts or horses. As I uniformly break a team every spring, raised on my plantation, I am inclined to think that the planters would find it to their interest to pay more attention to this branch of farm economy.

Sheep and Wool.—As our climate is mild, I know no reason why wool-growing should not be profitable. Our sheep require but little feeding, and little attention has been paid to this branch of husbandry.

Hogs are reared successfully, and as cheap as in any part of the United States. So much attention, however, is paid to cotton culture, that hog-raising is also neglected.

Cotton.—That region of country extending west of the base of the Chunnenuggee ridge, embracing the prairies or lime lands, yields upon an average 1,000 pounds of upland cotton per acre; while the eastern and sandy region yields from 600 to 800 pounds of seed cotton.

Sugar-cane grows well here, but is not cultivated with a view to make sugar.

Rice can be grown successfully, and many planters make enough for their own use.

Tobacco and Hemp are not cultivated.

Potatoes.—The Irish potato is grown only for culinary purposes. The sweet potato is a more valuable crop, but is not raised for market.

Fruit culture receives very little attention.

Yours, respectfully,

N. B. POWELL.

The Commissioner of Patents.

MISSISSIPPI.

Edwards, Mississippi, *September* 2, 1851.

Sir: The Circular from your Department, of August, reached me three days since. I make the attempt to answer your queries in part, even in the midst of pressing engagements. I do this that I may, as a citizen of Mississippi, render my mite towards making your Report more general; deeming it a duty to endeavor to obey all the calls of my country, as well as that those afflicted, like myself, with the "*cacoethes scribendi,*" may still have a target to fire at; as it seems I furnish a better mark than any other of your numerous contributors. Why it is, the deponent saith not; though willing to "lay the flattering unction to my soul," that "birds will peck the best fruit."

I can say, with a "conscience void of offence," that I have labored, by close attention in watching results, to enable myself to give "truth, the whole truth, and nothing but the truth." If I arrive at conclusions differing from my friends, it is not that I design to propagate error, or that I do not desire, above all things, the happiness of my race, but that I have no better sense.

Many opinions advanced by me have been combated in private and in public; yet, at this time, I know of not one which has not received support from warmer hearts, and abler pens, and wiser heads, than I dare to assume to myself.

Among these has been oats culture, and the use thereof. The object of your labors in this department being to give information, I trust I may be allowed to give my views again. I do not think green oats, as a pasture, are at all advantageous to horses. I believe they will pay well when used as a pasture for hogs or cattle; for the young especially, and for brood ones whilst rearing pigs. I find that horses and mules suffer more in hot weather—pant and sweat more—when fed on oats cut up, heads and straw together, than when fed on corn and fodder; (we term blades of corn maize, fodder.) I plant oats yearly, and prefer an oat-field in June or July to any other feed for hogs; and when thus fed off to hogs, the land produces cotton the succeeding year better than after any other crop that we use as a crop. This is the amount of my oats heterodoxy, I believe.

I am also heterodox on *feeding peas to hogs*, and I can only refer to my published opinions; adding, I am as firmly convinced that the pea I use will destroy a stock of hogs, by turning them to the quantity I usually have, even with salt, ashes, &c., as I am convinced of any other fact in agriculture. I do not assert that it is green or dry peas, frost-bitten or not; but I suggest, if it be not the decay in the pea producing a poison, as does unsound corn, ergot, and unsound potatoes, &c. I have sown this year over 50 bushels of peas, and can show 100 acres that are now almost one mass of pea-vines; yet I never let anything but my meat-hogs therein, save an occasional run of my horse stock.

My next heterodoxy is upon the *culture of corn*. I hold, the planters of the South do not leave corn enough on the ground. Of course I do not mean that corn is never too thick. Upon land properly drained, I prefer level culture; but if low ground, the land should be ridged; then, I doubt if so thick a stand should be left. I dare to demand of any one visiter to this place, if he has not seen, for the past 12 years, at least a fair crop for the land, and that there is seldom ridge enough to show where corn was grown; and even this dry year I will average my crop at 40 bushels, taking out a few acres of a poor washed ridge, and some fresh land where I failed in getting a full stand. I have 110 acres as a crop, and I expect 4,000 bushels; 10 acres, not included, being used as hog feed.

I now proceed somewhat in order to answer your queries.

Corn.—No guano used that I know of: I cannot tell the average product, as the year has been generally very unfavorable. I did not have rain enough to wet the earth 2 inches from 7th April to July 4th.

The mode of culture I prefer, and therefore deem "best," is to break up land deep—6 inches—and thorough, in large beds, say of 32 feet; run off rows with a shovel plough, 4 feet distant; this is invariable with me, giving fewer or more stalks in the row, according to poverty or richness of land. Drill corn at rate of about half a bushel per acre; cover with an iron-tooth harrow. When corn is fully up, run round with a narrow shovel-plough, (the bull-tongue, also called scooter plough,) clean with the hoe very nicely, leaving no grass or weeds; thin out either at this working, or wait for a wet spell of weather. In a few days, run round again with a 6-inch shovel-plough. I prefer these ploughings to be deep and near to corn. The latter ploughing should mould the plant well. If, by this time, grass has begun to appear in the middles, I would use an iron-tooth harrow to tear up clods and destroy all grass, if it required running the harrow twice. In the course of some two weeks after last ploughing, if time permitted, I would hoe the corn, levelling the ridge, cutting up grass, and cleaning around stumps and trees; and two weeks, or near it, after second ploughing, I would run another furrow with the largest shovel, or use the sweep, which breaks out the row, if not broken out. I would do so early enough to keep the rows clean. When my corn is in bunch, I sow peas, and either use the harrow, or sweep, or shovel-plough, to cover, which cleans the row and lies by the corn; though, if not hoed previously, I now give a hoeing, so as to leave the corn-field clean for peas and corn.

Peas.—We do not plant the pea known in England and the Eastern States: the pea is different; the vine is different, growth and all; it more resembles the pole-bean in growth, but abundantly more vine, growing and fruiting best in the fall. I have seen writers, of the South, too, giving an analysis of the pea, when that analysis is of the English pea, so known by South country folks. (I allude to this that there might be a better understanding.) I prefer grinding corn for horses, mules, and oxen; and I think that when corn bids fair to sell at 75 cents a planter can afford to pay toll.

To feed hogs, I prefer making corn into meal, and then into mush, yet giving them at the same time dry corn in a separate trough. Having tested these matters, for my own satisfaction, long since, I cannot conveniently refer to my figures.

My hog-pen manure, as all other kinds, is applied to cotton, and without note as to increase, my object in manuring being not alone the present increase. I therefore use manure more freely than would give correct data.

I use the cow-pea of the long variety upon all corn land, principally as a renovator; using 10 to 15 quarts per acre; being scattered as regularly as possible over the entire surface, before the last ploughing. This has been a practice of some 15 to 18 years' standing; and so thoroughly am I convinced of the value of this pea as a renovator, that I intend to average hereafter one bushel per acre, even if I have to plant and cultivate peas merely for seed. I am not satisfied that I sow now enough.

I find that where the shade is most dense, and earliest, the land has improved most. I have corn now on land cleared and cultivated in corn in 1830, which will *this year* give me 40 bushels per acre, to which there never has been applied any manure; no other aid used, save a rotation of two years in cotton, and one in corn and peas. The land being good, I did not deem it needful to make any greater change this year in corn; and to give a better growth of vine, &c., to turn under, I shall next year continue in corn, and thus bring it under my usual rotation—two years in corn and peas, and one in cotton, for all ordinary land.

I hope this corn and pea story will not be tedious. I thus dwell on it because I am thought as discarding the pea; whereas, I know of not a solitary planter anywhere who bestows more labor to secure a growth of the pea-vine. I have 20 acres planted in peas, 8 feet apart, which have been ploughed three times and hoed twice; but I do it as a renovating crop. Fifty head of hogs will feed my family abundantly; I have almost two acres per head.

Horses and Mules.—I regard the growing of these animals to be more profitable than making cotton to buy them with. I have now several head, and after paying for the insurance—no other way will I breed—I do not know the expense. My colts are reared in woods, pasture and field, scarcely ever fed, and at an expense so small that I am not able to say.

I prefer to work brood mares moderately; do not want them fat, unless upon pasture feed; prefer to keep them in good condition upon as little corn as possible. To colts I never feed corn until they work. Break geldings at five months; mares at four. They do not grow to size of the Kentucky stock, but will do as much work, live longer, and cheaper. I have a mare by *Monsieur Tonson*, out of a Richenel's mare, that is now a good work animal; foaled in 1835, and worked yearly since broken.

I halter up mules with a three-quarter rope, Kentucky make, having the rope 30 to 50 feet long; lead the mule about, never suffering it to break loose. After working with it half an hour to an hour, before getting tired or sullen, let it loose, with halter on it, in the lot. It is occasionally led about until it will lead, and has learned not to resist, for several days, when it is put in the wagon, or gin, and worked moderately. I prefer to buy mules in October, even at $10 more, so as to break slowly in the winter.

Hogs.—The best hogs I have ever tried are the Berkshires—the ridicule of all men to the contrary notwithstanding. I believe oats, Bermuda, open pasture, abundance of water, never letting hogs out of pasture, will be found cheaper in the country at large than any other plan. The boar should not run with the stock; the sows should not be kept fat; and young hogs for the knife should never be stinted, or permitted to get poor. If corn and hogs are stinted when young, they never make a full crop by any after-labor. These are my honest sentiments, though others equally honest may, and have a right to, dissent.

Cotton.—I have written more than I ought; I have no right to so much space, nor to the attention of your readers. I will close with this subject.

My average crop last year was 1,100 and some pounds; this year I think it possible that I will do better, although the year is so generally against hill-land. It is too difficult to arrive at a just conclusion as to cost of production. I have never seen a calculation that pleased me, and I cannot offer one. I have used no preventives against the enemies of the cotton crop, save the hoe and the plough. I believe my usual depth of ploughing to be 6 inches. I ridge up all land with two-horse ploughs, endeavoring to do effectual work; my rows are 4 to 5 feet distant. This year I ran, after the laying off furrow, 7 furrows to break out entire, in a 4½-foot row; thus cutting less than 8 inches to each furrow-slice. I prefer to give one or two extra furrows in the spring, and have all land broken up 6 inches, rather than hurry over and slight my work. I have subsoiled to a small extent, but I regard it as labor unwisely spent, unless the land has been drained; with our heavy, washing rains, the clay is washed down to bottom of furrow, and thus, when dried off, the bottom is harder than before ploughing.

Allow me to say something of the last year's crop. I believe that the commission merchants have done the planting interest harm, or I am mistaken in facts. I think, so far as my acquaintance extends, that one-half of the bales sent off were lighter by 20 pounds th an usual, owing to the difficulty of pressing—the air being so dry; an d Ibelieve there were more motes and worthless stuff called cotton sent forward than ever before. I know that there was nearly one-tenth sent from this place of such cotton as I never gathered before, and I have heard of others doing the same thing. Bolls were opened, and the pods taken out, which had been injured by the frost so much that I only expected it to be bought for making paper.

Now let us estimate: Admit one million of bales went forward lighter by say 15 pounds—thus there would be 37,000 bales less actually; admit only a twenty-fifth went forward of the motes and frost-bitten bolls, we would have 100,000 other bales: take this from the actual receipts, and it will nearly make up for the deficit in American consumption, or it will give less available cotton in Europe than is shown by those interested in the cry of a large crop.

The present crop will not be materially less than the crop of 1850, although the hill-crop per acre is decidedly less; yet the planters acting so suicidal as they do, having planted more extensively, and the swamp lands doing so much better than usual, with increased culture, we need not count upon less than the crop of 1850.

My own crop, though as good as that of 1850, probably, yet is under my average of 12 years. I therefore place my figures at 2,300,000 bales.

I hope, honored sir, that these hasty remarks *may* aid somewhat in the objects contemplated by your labors for the benefit of agriculture.

With respect,

M. W. PHILIPS.

Hon. THOMAS EWBANK,
Commissioner of Patents.

Query.—Are not stalks of cotton and corn really *stalks*, and not STOCKS, as many write them?

TEXAS.

BROWNSVILLE, CAMERON COUNTY, TEXAS,
January 29, 1852.

SIR: Your Agricultural Circular has been handed me by our post master, and I hasten to respond to such of the queries as can be answered from this section of country. We are in, or about, 26° north latitude.

Corn is the only agricultural product raised at this time in the valley of the Rio Grande. Average product per acre 60 bushels (when we get a crop at all). Cost of production, not exceeding $12\frac{1}{2}$ cents.

The system of culture here is entirely different from any part of the United States. The plough used is made of the crotch of a mezquit, or other hard wood, with an iron point slipped on and held in its place by claws. The ground is generally ploughed with these ploughs three times, and planted in rows $3\frac{1}{2}$ feet apart. When the corn is 4 to 6 inches high it is ploughed again, and the ground thrown to the plants; when knee-high it is hoed, and again hoed just before tasseling. It is all consumed in preparing food for our own people; and we annually import from New Orleans an immense quantity.

Neat Cattle are raised here in immense quantities. The breed is the native cattle of this country and Mexico. They are herded upon our prairies and mezquit ranges—one "vaquero" being sufficient to attend to 200 or 300 head. He earns \$6 per month, and his ration of corn costs about \$1 more. On this he is bound to support himself and family; and it is generally the case that a man once engaged as a servant remains so all his life.

The cattle breed at between two and three years of age; and, as we have no hay to cut, no soiling, or stall feeding, the cost of rearing until three years old is merely nominal.

Our Mexican neighbors will sell heifers, rising three years old, at \$3 per head. Our steers are broke to the yoke at three or four years old. They are yoked by the horns, (quite a primitive way,) and are rendered tractable by the unceasing use of the goad, (a long stick with an iron spike in the end.) Our beef is allowed by judges to be of the finest flavor—equal to any to be found in the Union.

Horses and Mules.—Our stock-raisers divide their mares into parties of 25 or 30 each, with a stallion, or *proof jack*, as it may be desired to raise horses or mules. They are herded in the same manner as our neat-cattle, and the cost of raising does not materially vary. Mares for breeding purposes are now worth \$6. They could be obtained two years since at \$3 and \$4; but the demand for the interior has reduced the supply here and raised the price. Unbroken colts, (average,) at three years old, can be bought for \$8 to \$10. Mules, at \$30 to \$40 per pair, according to their appearance; and full grown mules, at from \$20 to \$40 for superior ones.

The manner of breaking a young colt for service here is, to throw him by the lasso; and, while down, gird on the heavy "vaquero" saddle; blind his eyes with a band made for the purpose, and let him rise. His being blindfolded prevents any movements on his part, until the rider is seated in the saddle, with his heavy whip and tremendous spurs. The bandage is then removed from his eyes, when he commences plunging and rearing, to detach the unaccustomed burden from his back; the rider plying whip and spurs as fast as his strength will permit. A gentle horse is then ridden in front of him, and he is induced to follow, first slowly, then faster, until finally it becomes a run. He is thus run until pretty well tired, when his head is turned and he is ridden back gently to the place of starting, and is considered broke.

Sheep.—Sheep are raised pretty extensively here. They are considered the most profitable stock that can be kept, as they yield a quicker

return than cattle or horses. The breed, until lately, was the native breed of this country, which, by in-and-in breeding, had deteriorated to its lowest ebb. Some two years since, however, some of our most enterprising citizens procured several fine merino, Bakewell and Saxon rams, and have now a fine prospect in the number of half-breeds, and the enhanced value of the wool.

Judge J. B. Bigelow, of this place, was the first to attempt the improvement of our sheep, and he succeeded so well that several of his friends have now gone into the business, and our section of the country bids fair to produce wool of an excellent quality, and in sufficient quantities to become an object. Major W. W. Chapman, United States army, of this place, has done much to encourage the improvement in sheep, and to develop the agricultural interests of our valley in general, and is entitled to the gratitude of those who are so materially benefited by his counsels.

Our sheep have lambs twice a year. They are herded through the day and folded at night. One man and his dogs are sufficient to take care of 2,000 head, except when the ewes are dropping their young, when additional help will be required for about a month each time. Counting all drawbacks upon sheep and lambs, they increase here 50 per cent. per annum. The common sheep shear about one pound, and are shorn twice a year. The expense is, one shepherd, at \$5 per month; ration, $\$1 = 6 \times 12 =$ - - - - - - \$72 00

One man two months in lambing time, $\$6 \times 2 =$	12 00
Shearing, one cent per head, (2,000 sheep,) twice per an'm	40 00
Building fold	10 00
Original cost of 2,000 sheep	1,000 00
Interest, at 8 per cent.	80 00
Capital employed, and expenses on 2,000 sheep	1,214 00
Cr. by 4,000 pounds wool, at $12\frac{1}{2}$ cents	\$500 00
" 1,000 lambs, at 25 cents	250 00
Product of 2,000 sheep in one year	750 00
Cost of maintaining same	214 00
	536 00

or over 50 per cent. on the investment. Fat sheep are worth from \$1 to \$1 50 for killing. The half-breeds of Judge Bigelow, before referred to, will average \$1 50. Our native breed has a fixed value of 50 cents.

Cotton was formerly cultivated in this valley; but the advent of the American army here in 1846 was the cause of all agricultural operations being suspended, when the farmer took to his sword instead of his ploughshare. Cotton has not been cultivated here since, although several of our land-owners are about doing so this year.

Sugar-cane does well. It is, as yet, only cultivated to sell in the stalk for eating, as our Mexican friends are very fond of it in that state.

Tobacco has not been cultivated here as yet, although I have not the least doubt that when our lands get into more general cultivation tobacco will be a staple product.

Manures.—None used. The only lands being in cultivation are the river-bottoms, which overflow, on an average, once in three years, leaving a rich deposite; and thus we go on—the Mexican farmers not knowing anything about guano, poudrette, or gypsum, as fertilizers of the soil.

1851.	Daily mean of thermometer, detached. Sunrise.	Nine a. m.	Three p. m.	Nine p. m.	Monthly mean.	Rain.	General remarks.
January....	53.45	63.67	66.61	58.45	60.03	.95	Rained 10th, 11th, and 31st.
February...	60.71	67.53	69.96	62.64	65.10	1.04	Rained 2d, 15th, 18th, 19th, 20th, and 25th.
March	59.16	67.67	73.93	66	66.69	.40	Rained 23d and 28th.
April......	69.53	78.66	82.13	70.04	75.43	1.15	Rained 3d, 13th, and 30th.
May......	75	84.54	86.66	77.99	81.20	.90	Rained 25th.
June......	71.53	87.53	90.53	77.53	63.66	2.35	Rained 16th; therm. 102° at 12 m., 25th.
July......	75.83	87.58	88.64	77.67	81.95	3.65	Rained 2d, 3d, 4th, 6th, 7th, and 8th.
August.....	77.48	94.96	91.36	77.54	84.48	1.65	Rained 9th, 10th, 14th, and 20th.
September.	69.04	84.43	82.16	75.33	75.78	5.60	Rained 1st, 2d, 14th, 16th, 17th, and 19th.
October ...	63.38	84	76.67	68.87	66.32	4.10	Rained 3d and 23d; therm. at 100° at 9½ a. m., 10th.
November.	54.33	67	67.04	58.83	61.02	1.00	Rained 5th and 22d; frost 25th.
December.	54.38	61.70	64.19	64.19	57.51	4.70	Rained 6th, 7th, 11th, 13th, 22d, and 23d; frost 18th.
Y'rly mean	65.32	77.44	78.32	68	71.60	27.49	

The above is taken, by permission of Dr. N. S. Jarvis, U. S. A., from the meteorological register kept under his direction at this place, and can be relied upon as correct.

We had 42 days on which rain fell, which, in the aggregate, amounts to but 27½ inches, not being in quantity sufficient to mature corn planted after 1st of February. Our second crop is planted from the 1st to 15th of August, and bids fair to give us a large return for our labor; but the frost of 25th of November did the work for us, not leaving us even the stalks for fodder. Our lands are now in a good state, as they were pretty generally overflowed, and retain the moisture a long time. Many of our farmers have already planted their corn; others are yet at work planting.

These hasty remarks are submitted for what they may be worth, as I doubt not some other person, better qualified, has responded to your Circular from this valley; but if attention should be called to our valley through the means of this, I shall consider myself more than paid for this mite to your valuable Report.

It would be well to state that good land can be obtained in our county, with quiet titles, at from 10 cents to $10 per acre, according to its situation and improvements. All of which is submited by

EDWARD DOUGHERTY,
Secretary Cameron County Agricultural Society.

To the Commissioner of Patents.

San Augustine County, Texas,
December 1, 1851.

Sir: Your Circular of August came duly to hand, and has been noticed. I herewith submit a few thoughts which are mainly from my own experience, having followed the plough thirty years; was brought up on a farm. Athough my success has been equal to any of my neighbors', it is not from book-theory, but from practical experience. I will endeavor to answer correctly the questions propounded; and if they are worthy of embodying in your Report, I shall feel amply rewarded.

Cotton and its Culture in this County.—The Hogan cotton I prefer to any I have tried. It yields the most per acre, to wit: One acre in Hogan yields 1,788 pounds of seed-cotton; Petit Gulf, 1,300 pounds, planted in the same kind of soil, at the same time, and cultivated in the same way. One hundred pounds of Hogan cotton in seed, yields 69 pounds of seed; motes, 1 pound; clean lint, 30 pounds—equalling 100 pounds. One hundred pounds of Petit Gulf cotton in seed, yields 69½ pounds of seed; motes, ½ pound; clean lint, 30 pounds—100 pounds. No difference, as I could perceive, in the quality, or in the labor to gather it. In fair soil a hand can cultivate ten acres in cotton and three in corn, which will support the team and board the hands, with some to spare for stock. The best plan that I have tried to avoid the plagues that so often interrupt cotton, especially when young, is to plough the soil deep with a double team. Where cotton has been before, reverse the rows, or cross. Delay planting, even here, until the 20th of April, when the soil is warm; it is much the safest plan. I have found it grows kindly, and bears equally well, and is much the easiest to cultivate. As to the boll-worms, caterpillars, &c., I think they are produced mainly by the wet weather peculiar to the season during June and July; so I have no remedy against them.

How to treat Plough-teams to keep them healthy.—Feed them with what they will eat clean; increase or diminish, as may require, for all teams differ in the quantity of food they consume. Clean out everything from the trough; salt regularly every Wednesday night and Saturday night, when it can be had; pasture them occasionally while ploughing them. A team should never be interrupted before day, as it tends greatly to injure them.

Treatment of Hands.—Feed and clothe well; speak kind to them; never use any bad language to them; have them retire at regular hours—say 9 or 10 o'clock. Never interrupt them till daylight; then to business promptly. More injury is done to hands by their keeping bad hours than by the labor they perform. The main point to guard is, take care of little things that cannot help themselves. The great road to success is close attention to business—changing or governing our acts as circumstances may require.

Weight of corn raised this year, 1851, (per bushel,) 51 pounds, raised in upland.

Weight of corn raised in 1850, (per bushel,) 52 pounds, raised in upland.

Weight of corn raised this year, 1851, (per bushel,) 65 pounds; Spanish corn—in bottom land.

Red peas, per bushel, 62 pounds.

White peas, per bushel, 66 pounds.

Wheat, per bushel, 58 pounds; some years it weighs 60 or 62 pounds. Rye, per bushel, 56 pounds.

I have no thermometer, nor water-gauge. I give you the number of days it has rained for the last five years, from my journal:

Months.	1846.	1847.	1848.	1849.	1850.	Total.
January	7	8	5	18	15	53
February	10	11	12	7	9	49
March	9	12	14	12	11	58
April	13	12	12	11	11	59
May	9	7	10	19	10	55
June	9	16	15	16	19	75
July	13	17	13	23	16	81
August	19	10	11	19	10	69
September	7	7	5	12	1	32
October	4	2	3	6	5	20
November	7	10	13	13	6	49
December	8	11	10	14	15	58
	115	123	123	170	128	659

Cotton-seed is a good manure, generally. What it will increase in corn, or any other grain, per hundred pounds, I cannot tell. One thing I learned this year: I placed a large handful, with rotten cotton-seed under, in a portion of my corn-hills. The season being so dry, it injured it very materially. It did not produce as much as when there was none on the same kind of soil; and the exact difference I did not ascertain, but think it about one-fourth less where the seed were, than where there were no seed.

The best kind of Sweet Potatoes.—Red Bermudas grow well, and are easiest kept. Round yams next. What the cost of raising, or amount raised per acre, I know not. It differs very materially in different soils, or even in the same soil.

There are many things required to make a good farmer. Some men, who are professed hands with pen and ink, cannot plough a straight furrow, nor gear a horse, nor do they know when it is correctly done for him to work easy. If I know anything about it, it has been by knocking the clods, under which I must soon be laid; which is the end of all flesh.

I am, respectfully, your friend and obedient servant,

HENRY BROOKS.

To the Commissioner of Patents.

Wharton, Wharton County, Texas,
December 5, 1851.

Sir: Your Circular, calling for information, (agricultural,) was handed to me by the postmaster at Wharton who requested me to answer it.

Having been engaged in the county for 13 years in the cultivation of corn, cotton and cane, the statements I shall make will be the results of my own experience, corroborated by the opinions of many, with whom I have consulted. But little information, however, of general interest, can be expected from a new country; and, particularly from one for which nature has done so much, and art so little. That little, I will now give you; premising, however, that the soil of the country is entirely alluvial, of immense fertility, and of unknown depth; that, though there is much prairie land in the county which has been improved by the yearly burning of the grass, yet cultivation, with few exceptions, is confined to the canebrake and timbered lands. These remarks will make it unnecessary for me to notice your queries as to manures.

Corn.—This grain is raised in great abundance; but only for home consumption. Fifty bushels are considered as the average yield per acre. I think this too low, for my crops have ranged from 40 to 90 bushels; and, in two years only, out of 13, has the yield been less than 50 bushels per acre. If cultivated for sale, the cost of production would be about 25 cents per bushel. My mode of cultivating corn is peculiar; and, as I believe it to be the best, I will state it. As my soil is light, and does not break up in clods, I do not break it up before planting. The furrows are opened four feet apart, and about four inches deep. I then drop about two and a half or three feet apart in the furrows. A furrow from each side is then thrown over the corn; and, after all is planted, the middles are broken out, leaving the ground ridged up over the corn, to the depth of six or eight inches. When the corn is about to come up, a one-horse iron-toothed harrow is run over the ridges lengthwise. This throws off much of the dirt, and leaves the ground clean for the corn. When about a hand-high, a turning-plough is run around the corn, with the bar next to it. The furrow is shallow; but, as I use a wide plough, the dirt meets in the middle, and the ground is left clean, except in the drill; the hoe-hands follow the plough, clean the drill, and thin out the corn to two stalks for every two and a half feet. As soon as the weeds make their appearance, one furrow is thrown to the corn from each side; ridging it up only enough to cover up the small weeds and grass. The corn is now knee-high, or higher. Before the weeds in the middle get too large to turn in, I run another furrow around it, at a greater distance from it, but still near enough to lap a little more dirt around it. I then break out the middles, with one or two furrows, and my ploughing is done. The corn, at this time, hides the ploughman, and shades the ground well. If the season should be favorable for weeds, I find it necessary to clean out the middles with sweeps, not running more than an inch deep; or, to pass over it with the hoes, to take out the larger weeds. It will be seen that, with the exception of the two furrows throwing the dirt from the corn, I give but one ploughing, but that in broken doses. The object is to avoid cutting the roots. As the corn gets larger, and the roots spread wider, my furrows are run further from it. I follow the same plan in cultivating the sugar-cane, and for the same reason. I am fully satisfied that this plan will yield more corn per acre than any other that I know of.

Oats and rye do well; but little of either is sown. Yield per acre, not known.

Neat Cattle are raised in great numbers on the prairies. Cost of raising a three-year old, not known; but next to nothing. Stock cattle generally sell for $4 per head, all ages counted. They are neither fed nor salted; and the only attention they need is branding, and occasionally collecting up those that stray off. No improvement in breed.

Horses and Mules, from Mexican mares, are raised by a few; but, though the rearing of them is very profitable, yet enough are not raised in the county to supply its demands. The mares may be bought for from $5 to $10; they are never fed. The cost, therefore, of raising a three-year old mule or horse, would be but little more than the interest on the price of the mare; from $20 to $40 would be the value of the horse or mule at three years old.

Sheep.—There are but few in the county. They do well; but little attention is paid to them.

Hogs are raised abundantly; but little attention is paid to improving the breed.

Cotton.—This is the staple crop of the county. One bale, weighing 500 pounds, is the average per acre. More is raised, but that is the average saved.

The question with the planters here is, not how much per acre, but how much per hand. Ten bales, of 500 pounds each, are occasionally saved to the hand, and it is the general opinion that eight bales per hand is the average crop. I do not think the average is more than seven bales.

Great diversity of opinion exists as to the cost of production per pound—some say four, others six cents per pound. Their opinions may be reconciled by supposing that they base their calculations on different qualities of cotton. If a planter should tell his hands to rush ahead and take no pains in picking, he will get much more cotton saved, but will have an article that will rank as inferior, or ordinary. This will not cost him more than four cents. Should he require them to be more particular, he will save less, but the quality will be better—say middling, or good middling, which will cost him about five cents. Should he be very particular, he will save still less, but will have fair, or fully fair cotton, which will cost him six cents, or more. The quality raised here ranks, generally, as middling, and I think costs about five cents. The cost is difficult to estimate. A good manager can make it cheaper than an indifferent one, and a small planter cheaper than a large one; and there are other contingencies. Neither the rust nor the boll-worm has injured us enough to be noticed. The army-worm is our only dread, and against it we have no preventive. The best plan is to plant as early as possible, so that many bolls may be matured before they come. We have a periodical rain that sets in about the 15th or 20th of June, and generally lasts two weeks—raining nearly every day. The worms never come till after those rains; and never, unless the rains continue much longer than usual. Half a crop, or more, of bolls will be matured by that time, if planted early.

Sugar-cane.—There are but four plantations of cane in this county. One of them was commenced by Mr. Mercer, near Egypt, before the Texas revolution, and has been profitable. The others are about three years old. I have neither known nor heard of premature decay of the cane. The canes are planted in rows, eight feet apart, and a good stand of rattoons will come up yearly, for five or six years. Our experience will not justify us, as yet, in making any suggestions as to the culture of cane or manufacture of sugar. Cost of production about three cents per pound. I think experience teaches that the cultivation of cane, as a sole staple crop, cannot be relied on, with certainty, in this county. We never fail to have frost by the 12th of November. It has once occurred as early as 25th October. This frost always kills the cotton, and too frequently the cane; and it generally becomes warm soon after. The cane will be spoiled, unless speedily worked up.

I think the most profitable plan would be to plant half a crop each, of cotton and cane; the cotton to be planted early, and of an early variety. It could be all saved carefully, and would therefore be a fine quality, before the cane crop would need working up; for, as there would be but half a crop of cane to take off, this operation could be delayed with great gain, both in quantity and quality of sugar, for the cane sweetens rapidly in the latter part of the season.

The cultivation of the crop would be light; and I think the yield of five bales of fine cotton, and 5,000 pounds of sugar, might be calculated on, with almost certainty, to the hand. Average yield of sugar, about fifteen hundred pounds per acre.

Rice.—We have no lands suitable for the swamp rice. A small patch was sown last season of upland rice; it was very flourishing, and the grain filled well, but it was destroyed by the birds.

Tobacco grows luxuriantly, but is not cultivated for sale.

Potatoes, both Irish and sweet, are raised in the greatest abundance. It is said that the yield per acre is from two to five hundred bushels. As they are never measured, this is but *guessing*. Cost of production about one cent per bushel.

Fruit.—With but few important exceptions, the peach is the only fruit cultivated. They are grown abundantly, and are of superior flavor. The best preventive of disease in the trees, is to plant them in a situation exposed to the north, and to cultivate the orchard.

Meteorology.—As no observations have been regularly recorded in the county, the questions under this head can only be answered generally.

From the 15th of July to the last of August is our warmest season, during which Fahrenheit's thermometer ranges at 3 p. m. from 88 to 94°; I have occasionally seen it as high as 96. Frost occurs about the 12th of November, after which there is much pleasant and even warm weather; and in some seasons there has been no more frost during the winter. Most commonly we have a succession of changes, from cold to pleasant, and back to cold, the time taken up in making the revolution being from one to three weeks. There are seldom more than two or three days of cold weather together, during which the thermometer, early in the morning, will frequently fall below 32°; I once saw it at 20°. Spring opens about 1st of March, or earlier. Latest frost known was on the 7th April. Our only cold wind is from northwest. Our winds are variable in winter and spring. From 9th of May to last of August we have a regular wind from southeast—a deflection of the trade winds.

We have frequent rains in winter and early spring: a periodical rain of about two weeks at the summer solstice. Fall is generally dry, though we have much windy weather; yet I have known but one dangerous wind.

Very respectfully, yours,

M. L. WEEMS, *M. D.*

Hon. THOMAS EWBANK,
Commissioner of Patents.

SEGUIN, GAUDALUPE COUNTY, TEXAS,
November 15, 1851.

SIR: Your Circular, dated August, is before me; and I will, in as brief a manner as possible, give you such information as I can from my own knowledge communicate.

Wheat.—On wheat we use no manure of any kind. Average crop, 20 bushels per acre. Time of seeding, 1st of January. Time of harvesting, 1st of June. We use one bushel of seed per acre; plough once from 4 to 6 inches deep. The yield is increasing. We are not troubled with flies or weevil. Price, $1 50 to $2 per bushel.

Corn.—No manure used. Average crop from 40 to 50 bushels per acre. Cost of producing per bushel, 12 to 15 cents. The best mode of producing is to plough deep in winter, and plant about the middle of February. We hoe our corn once, and plough twice. By the time this is done, corn is too large to work. Experience has taught us that to plant late, or cultivate too long, will not produce a good crop.

Oats yield from 35 to 50 bushels per acre. *Rye* about the same. *Peas and beans*—but few raised; few plant only for table use.

Clover and Grasses.—We have none except the grasses which grow spontaneously upon the wood-lands and prairies. We often cut here from mezquit prairies, but I do not know the precise yield per acre. It is immense.

Dairy Husbandry.—There is no regular system among us; consequently I cannot tell the yield of cheese or butter per cow. We churn in the good old way. Put butter down by washing well, then salting sufficiently in casks, without exposure to the air after salting down. Average price of butter 20 cents per pound; cheese, from 8 to 15 cents per pound.

Neat Cattle.—The cost of rearing till three years old, $1 per head. This is for the attention to them, as we do not feed at any season, and but few salt. Price at three years old, $10. The value of good dairy cows in the spring is from $10 to $12; in the fall, from $12 to $20. We have but little trouble in breaking our steers to work. Our usual mode is to neck them together a few days, then put on the yoke, and put them in the swing of the team. In 19 cases out of 20 they work at once.

Horses and Mules.—They are very profitable. The expense of rearing until three years old, exclusive of cost of season to horse or jack, about the same as that of a steer—say $1. Brood mares do best to be turned upon the prairies, driven up and salted once a week. We take up our young horses or mules and teach them to lead by the rope or halter, then saddle and ride them. This I consider the best mode of breaking. Many, however, catch them up from the prairie and ride at once, which generally results in the abuse of the animal.

Sheep and Wool.—They are profitable. The cost of growing does not exceed $2\frac{1}{2}$ cents per pound. We only use hay during the cold weather in winter, which usually lasts from two to seven days; then turn them out upon pastures or prairies. Large sheep are more profitable for wool or mutton. It costs nothing more to raise fine than coarse wool. Average number of lambs, one to each ewe. My own sheep, however, have averaged something over this since I have adopted a method of taking the bucks from the ewes, so as to let them have lambs but once a year, and all at the same time. I prefer my lambs to come from the 1st of January to the 1st of March. The lambs grow with astonishing rapidity, the ewes having young at 12 months of age.

Hogs—Irish Grazier.—The method adopted in procuring bacon is to take care of the pigs until they are three or four months old, then let them shift for themselves until two years old, when, generally, they will fatten on mast of pecans or acorns. The usual mode of putting up bacon is to take the bone out, and salt down in bulk from 15 to 30 days; then wash, hang up, and smoke well. Those who take great pains save the ham without taking out the bone.

Cotton.—The average yield is one bale (400 pounds ginned cotton) per acre, and cost of production more than cotton is now worth. We have no rust, and have never had the army or boll-worm in this county. Our land is so rich that it will not require rest for many years. We use no manure or fertilizer of any kind.

Sugar-cane is only planted in this county by way of variety, or for experiment. So far it has done well when planted on low bottom-lands.

Rice.—I am of opinion that rice will not do on upland. At present I know of none being raised in the county.

Tobacco is only grown by a few individuals for their own use. It grows luxuriantly, and is said to yield well.

Hemp.—We have none.

Root Crops.—We only raise beets, carrots, and turnips, for table use. Potatoes (Irish) yield from 100 to 300 bushels per acre; the cost of raising, very trifling. We plant by breaking up land deep; then open a deep furrow; put down the potatoes about 8 inches distance; throw over them a small quantity of hay, or trash of any kind; cover by throwing two heavy furrows on the potatoes. If they come up too early, we keep them from frost by covering them lightly with loose dirt drawn up with the hoe.

Sweet Potatoes.—We bed out seed in February or March. As soon as the slips are sufficiently large, make up hills or ridges and transplant. Average yield, from 250 to 500 bushels per acre. We do not cultivate either only to keep down grass and weeds.

Fruit.—I greatly fear this is not a good fruit country. I have been about 13 years in the county, and find there are many difficulties in the way of an orchard of any kind.

Grapes do well here; but it is with much difficulty the large red ant can be kept from destroying them.

Manures.—We save none.

Respectfully, T. H. DUGGAN.

Hon. THOMAS EWBANK.

COLUMBUS, COLORADO COUNTY, TEXAS,
October 24, 1851.

SIR: The postmaster of this place having received your Circular, asking for information on the different subjects of agriculture, and thinking that I, being "assistant marshal" for this county, would be better able to give the information sought than he himself would be, handed the Circular over to me, and requested me to answer the different questions therein contained. Some of the information I can give correctly; some will be guess-work; however, I will keep strictly within bounds.

Wheat.—None raised; and I would say, to begin with, guano is not known here, nor any other manure used.

Corn.—I have known 75 bushels raised to the acre; but 50 bushels would be a safe average.

Oats, Barley, Rye, Peas, and Beans.—The three former have never been raised to any extent. Peas and beans, however, I should suppose, grow as well here as at any place on the globe. The amount per acre I cannot give, as there are no pains taken in the cultivation. I, myself, have raised, this year, three crops of peas from the same seed, on the same ground.

Clover and Grasses.—Not raised here, as we have an inexhaustible pasture without that trouble.

Dairy Husbandry.—No attention given to it beyond home consumption.

Neat Cattle.—We have an abundance, and the cost of raising is nothing. Such a thing as feeding cattle is not known here. Our beef is always fat stock cattle, worth \$4 per head. Beeves worth \$10, all, or nearly so, Mexican stock.

Horses and Mules.—Cost the same as cattle, and no more, to raise them, and they sell for about three times as much. The stock run at large in the prairies.

Sheep and Wool.—It is generally thought that wool-growing would be profitable. There are a good many persons just entering on the business, with some energy. What wool has been sold was of the coarse kind, and averaged 35 cents per pound.

Hogs.—The same as cattle; cost nothing to raise except some trouble, and there is no pork or bacon put up but for home use.

Cotton.—An average yield of cotton is about 3,500 pounds to the acre. The cost of cultivation per acre I am not able to give you correctly. We have not found out yet any successful remedy against worms; and as for improving the land, I may observe that we have not found it necessary as yet.

Sugar cane.—The average production is two hogsheads to the acre, but the net cost I am not able to give you; and we know nothing of the seed here—whether it would be better than rattoon or not.

Rice is not grown.

Tobacco is cultivated, but at how much per acre I am not able to say.

Hemp is not grown.

Turnips, Carrots, and Beets all grow finely, and turn out well.

Potatoes.—Irish and sweet, equal to any southern State.

Fruits are poor, with the exception of figs.

Manure, as already stated, under the head of "wheat," is not used at all.

Meteorology.—No correct observations have ever been kept. The thermometer (highest) has been, in August, 97°.

Before I conclude, I beg to observe, that I have raised water-melons this year from the seed; out of these melons I have now a second crop, as abundant in quantity as fine and flavory in quality and taste.

Hoping the above information may be satisfactory, I remain, sir, yours, respectfully,

ARCHIBALD McNEILL.

Hon. THOS. EWBANK,
Commissioner of Patents.

TENNESSEE.

ECLIPSE, MACON COUNTY, TENNESSEE,
September 15, 1851.

SIR: In compliance with your request I will proceed to give you a few brief statements on the agriculture of this vicinity to the best of my knowledge. Although I am not engaged in the farming business, I can probably satisfy you.

Wheat.—Guano is used as a manure on wheat crops with tolerable success. The average crop is from 8 to 12 bushels per acre. Time of sowing from 1st September till 15th October; of harvesting, May and July. There is no peculiar way of preparing seed, only to select it clear from wheat-cockle and rape; from 1 to 1½ bushel per acre. Break up, harrow, plough, or brush in from 2 to 4 inches. Ploughing rather on the increase—broadcast. There is no particular remedy for Hessian flies. Some prefer early, and some late, as a preventive. Others sow slacked lime broadcast while the dew is on; after threshing, put up in the chaff as preventive against weevil. Worth from 60 to 75 cents per bushel.

Corn.—Guano is used very much in this crop; sometimes scattered broadcast, and sometimes a common shovel on the hill. There is no estimate made per 100 pounds. Average about 35 bushels per acre; worth from 20 to 30 cents. Break up in the fall; cross-plough in the spring, then harrow; check off from 3 to 4 feet, according to the strength of the soil; drop from 4 to 5 grains in the hill. By this method you will be sure to have a good stand, viz:

> One for the blackbird, one for the crow,
> One for the cut-worm, and two left to grow.

It is my opinion it is much the best ground or chopped, but it is universally fed whole and raw. Your last question has never come under the consideration of our farmers, that I have heard.

Oats, Barley, Rye, Peas, and Beans.—Oats is an abundant crop; yields from 20 to 25 bushels per acre, and a dozen binds per bushel, sowing from 1 to 1½ bushel per acre. Rye and barley scarcely raised at all; not enough to make any comparison. Peas and beans only for table use.

Grass is scarcely used at all for hay. The blades of corn are used as a winter feed. Clover is sometimes sown for summer pasture, with indifferent success.

The Dairy is not used to supply any market. All made is in families; no peculiar way of treating milk; only a common log spring house below or above the spring. The common old model churn is used; big at the bottom and little at the top.

Cattle.—Three years old, cost $2 to $3; worth $4 to $6. Good dairy cows, worth $10 to $12. Not ascertained—no experiment tried that I know of. Take while small, put a common yoke on their necks, with bows, and lash their tails together to keep them from turning their necks in the yoke.

Horses and Mules.—Their growth is considered profitable by the farmers. Rearing mules till three years old, from $20 to $30; worth from $40 to $65, and on the decline. Colts, from $30 to $40, till three years old; worth from $40 to $100, and on the decline. Brood mares, breed to good jacks and horses. Give plenty of dry food and good pasture and keep them out of the wet a few weeks before foaling. Breaking: just bridle them, bounce on their backs and stick there, and there is no more trouble with them.

Sheep and Wool.—Nothing more than for family use. No experiment. Large sheep, both for mutton and fleece, are preferred; no full-blooded merinos raised. Wool is worth from 25 to 30 cents. About two-thirds to the number of ewes.

Hogs.—The common old Grazier, mixed with Hindoo breed. Good clover or grass in summer, and corn-fed in the fall, two or three weeks, (last grass not extensively raised;) from 8 to 10 bushels. Kill in November or December; when cold, salt down in hogsheads or large troughs; hang up early in the spring; smoke with good sound wood until dried, then pack down again in corn, wheat bran, or ashes, and you will have good meat.

Cotton is scarcely raised at all, only by very small patches; not enough to give any information—therefore it will pass unnoticed; also sugar-cane and rice not cultivated at all.

Tobacco.—About 600 pounds per acre; cost of raising, about $1 75 per 100 pounds; worth, for the last year, from $4 to $7, but on the decline. No improved plan known; no peculiar rotation to maintain the fertility of the land. Guano is used with good results on old land; it makes our best and heaviest tobacco.

Hemp not cultivated at all. Turnips, carrots, beets, &c., not cultivated, except as a garden vegetable for the table. Neither increase nor decrease perceivable; no improvement in the way of preparing the land known; not used among stock; no estimate made.

Potatoes are cultivated about the same as the above-named roots, except sweet potatoes. Make round hills, plant, scrape down, and hill up. Nothing more done until digging time, in September and October.

Fruit.—Neither increase nor decrease perceivable; not enough cultivated to make it profitable to the farmers, only for family uses. No exportation made; no applicable remedy discovered for the diseases of fruit-trees. No grafting of consequence; no interest taken in the grape culture or forest culture.

Manure.—No particular way, only to let it lie in where stock is stabled or penned for the winter. Plaster not used; no lime of consequence. Guano is used with good success; no particular quantity; thrown on as the strength of the ground may require.

So I believe I have given you all the information I can think of at present, but will take pleasure in communicating to you at any time, on any subject; as I would like to become a little acquainted at any rate. Or I am at your service for anything you want at any time that is within my power.

Your obedient servant,

J. H. EUBANK.

VERNON, TENN., *Nov.* 27, 1851.

DEAR SIR: Your Agricultural Circular of August, 1851, is before me. I have delayed answering the many inquiries, hoping that I would be the better able to do so after gathering up as much information as possible upon a subject that is so important. I proceed at once to give you my information, imperfect as it is.

Wheat has never been raised, only for home consumption. Surest crop is raised from the May wheat; there are many other varieties tried, but none so sure as the early May wheat; it produces from 10 to 15 bushels per acre; by its early maturity, never takes the rust. The Mediterranean has been sown in various parts of the State for several years, but never in Hickman until this year; it did well this season, being very nearly as early as the May wheat, and grows better on thin land.

There are but few of the farmers who take any interest in putting it in well; those who do are well paid for the extra labor. When we have a crop of good wheat, not injured by late frosts, it weighs about 68 to 70 pounds per bushel; but the last two crops have been poor ones.

Indian Corn is the principal crop with most of the farmers, and, where the soil is good, they raise from 50 to 60 bushels per acre; 35 bushels would not be far from an average over the county. I have done as much in the way of experimenting upon this article as any one in Hickman. Having, from childhood, been brought up to work thin land, of course it has been to my interest to cultivate it to the best advantage. The mode of culture several years back was, and is with a good many yet, to plough the land about 2½ to 4 inches deep; and, from observation, I find that in land that is the least rolling, the soil has disappeared. Land that is for corn, if stubble, should be broken up in October. Let it lie until the last of March, or first of April; break it up again; and then I use a log harrow, about 7 feet long, with iron teeth inserted in the log 6 inches apart—this being the best harrow I ever saw used. I will give you a better description of it: The tongue, for oxen, is inserted through the centre of the log with a large mortice to strengthen it; the teeth should project back enough to let the weight of the log drag on the ground, and, the teeth being placed at the proper slope, they completely pulverize the land, and leave it perfectly smooth and finely harrowed up. The log should be of weight sufficient to mash the clods and level the ground. After harrowing land for corn, I check it at 4½ feet, and drop

3 or 4 grains in each hill. About four days after planting, if the season is fine, cross over it with a side-harrow. I plough and harrow four times with one good hoeing. If I use manure for the crop, put one shovel in a hill; it is some labor, but pays better than any I can give. The benefits of manure have been but little known in this county until within a few years; but it shows so plain upon the farms of those who judiciously apply it, that there will be but little thrown away or wasted, and every effort will be made to increase the quantity. The long, briar-top, or gourd-seed corn is the most prolific, shelling out more from a cob than any other variety.

Oats are abundantly raised. Sow, from the 20th of February to the last of April, from $3\frac{1}{2}$ bushels to $1\frac{1}{2}$ bushel per acre, on corn or cotton-land; and, with an ordinary season, you can make about 600 binds per acre. The small black oat is the kind used.

Peas are raised to some extent, and could be profitably raised with less labor than any other crop. I have raised 5 crops. My mode of planting is: After ploughing my corn three times, to cross the ploughing in the centre of the row *forthwith* with a small coulter; drop between the hills from 4 to 8 peas in a hill, and cover with the foot; in ten days, or as soon as the corn wants ploughing, run the bar of the plough to the peas, and the mould-board to the corn; when ploughed again the other way, the peas will be of sufficient size for the mould-board; hoe out after the five ploughings; and, my word for it, in fair land, and a moderate season, you will not regret it. I have frequently sown them broadcast the last ploughing; but it is not so sure, as they are too late for a sure crop. The pea known as the cow-pea is the best, as they will lie on the ground and keep sound all the winter. I find that horses, mules, cattle, and hogs are very fond of them, and improve rapidly when well fed or pastured on them. The vine is a great addition to land; also, the Goober pea is extensively raised here, and, so far, has proved to be the most profitable crop that can be raised. The first ever raised for market was sold in Nashville in the fall of 1845. Since that time there have been upwards of 20,000 or 25,000 bushels raised within 10 or 15 miles of this place each year, and sell for from 65 cents to $1 per 22 pounds. The vine is equal to clover-hay for stock, if well saved.

Clover has done but little good in Hickman for the last two years.

Neat Cattle.—Those who take care of the young, with good shelter in the winter, can raise them, until 3 years old, for $6 each; and they are raised upon such food as would be thrown away if not fed to cattle. Worth, at that age, from $8 to $10.

Horses and Mules are raised here to some extent—particularly mules; and those that have made a business of it appear well pleased with the profits arising from the sales at 2 and 3 years old. The cost of rearing one until 3 years old does not exceed $35 or $40. Worth, at that age, from $10 to $100. I could write a page in giving my views upon the management of mares and colts; but, as every one has a way of his own, I think it useless.

Hogs.—The best breed of hogs is the Berkshire, crossed with the native stock, and well fed all the time, or grazed on clover, oats, &c.; which, with plenty of salt in the spring, is a very good substitute for yearling hogs. Pigs should be better fed. The best mode of curing bacon is to kill your pork as soon as the season will allow; put on plenty

of salt; let it remain about 5 weeks; have a good, tight house, and be sure to have it high, with a cold spell to hang in, and you will never fail to have good bacon. The best mode of putting up hams—and I have tried many ways—is to put them up early in ashes—a layer of hams and ashes—and stalks across, to keep them from touching.

Cotton is a poor article for Tennessee, and particularly this season. Average yield, about 600 pounds per acre, and is selling for $1 40 in the seed. I would say to Tennessee, Let the southern people raise it: there is not an acre of land but what can pay better in almost anything that is grown than cotton. Try it.

We have some *tobacco*-raisers in this county, and they made it profitable last season; and, with proper culture, it is a profitable crop. Fresh, new land, or old, manured, does equally as well, and makes a heavier article; but it is a crop that requires an experience, to make it pay, that few are in possession of. The least neglect, and a total failure is the result.

If what I have written, after correcting the many mistakes, will be acceptable, you are at liberty to publish. The enclosed are correct answers to a part of your questions, according to the best of my judgment.

Very respectfully, yours, &c.,

WILLIAM B. EASBY.

LINE POST OFFICE, OBION COUNTY, TENN.,
October 29, 1851.

SIR: A copy of your printed Circular came duly to hand; and, within a few days past, I have had the pleasure of receiving a copy of your Annual Report to Congress, accompanied by a few packages of seed-wheat, &c.; for all which acts of kindness, intended both for public good and individual interest, be so kind as to accept my sincere thanks.

As to the many kinds of information sought by your general Circular, I with much pleasure communicate a few important facts in relation to the culture of grasses and small grain, hoping they may obtain general circulation through the medium of your [illegible] Report to Congress, if you should deem them worthy of a place in [illegible] important and useful a book.

In seeding new lands with *grasses* of all kinds, it is important that the soil should be prepared, without turning under the virgin, or top soil, so that the seed may be deposited in it, instead of the unsubdued sub-soil. This preparation may be, by the use of a subsoil plough and harrow, or with the harrow alone, by which a better stand will be insured, and a far better yield. I esteem it of great importance to harrow all kinds of grasses and small grain in the early spring, whilst the soil is yet moist—say in the latter part of March, or very first of April. The advantages that will result from adopting this mode of culture are these: the light and air will be freely admitted to the roots, which are necessary to luxuriant growth; and most foreign growth will be destroyed—thus insuring the largest product of which the soil may be capable of producing; and lastly, the spring harrowing will break up the turf-bound condition of most meadows, and perpetuate them through many years until the soil is exhausted of that constituent quality which produces it, and I believe through all time, if duly manured, without reseeding. From my experience, I am convinced that spring-harrowing is as necessary to the best production of grasses and small grain as ploughing is to the greatest production of corn. It must be apparent to all, that the loading or weighting of the harrow must be in proportion to the closeness and hardness of the soil, and that in light soils the harrow itself must be light, without any additional weight.

Yours, most respectfully,

P. V. MARR.

Hon. Thomas Ewbank,
Commissioner of Patents.

KENTUCKY.

Great Crossings, Kentucky,
January 21, 1852.

Sir: A press of business is not a lawful excuse for a man to plead why he has not furnished something for your Annual Report, if he professes any interest in your operations. I, therefore, at this *late day*, can only plead *guilty* of gross neglect of a plain duty.

Wheat.—Owing to the peculiar winter, a considerable portion of wheat froze out, and was consequently too thin; that which matured was generally full and plump, and, where this freezing did not occur, made a fair yield.

Corn, in this part of the county, was unusually fine; and, although we have more stock than common in the county, (mules especially,) we will have a surplus. Some of our corn has been sold to go to New Orleans—from 17 to 25 cents a bushel having been paid.

Oats are finer than I ever knew them in this county; they not only grew taller, but thicker and heavier.

Barley.—My first crop is now green. Owing to the unusually dry fall, small grain of all kinds were sown late; consequently, my barley and wheat are not promising.

Rye has almost ceased to be cultivated.

No effort in my neighborhood has been made to cultivate *root crops* as a substitute for corn-fodder. I intended to make a trial this season with sugar beet or ruta-baga, but was discouraged by a gentleman who had tried them and failed. He recommended the common turnip as the best substitute. I accordingly sowed more seed than usual with me, with a view to use them; but, owing to the dry weather during the months of August and September, they did not succeed well. I will try them again the coming season.

I expected to give you in this the result of some experiments in reference to the relative value of raw and cooked food for hogs, and of ground and unground food for mules; but my public duties so frequently call me from home, that I cannot give that close personal attention to an experiment that its importance demands. Suffice it to say, that, after nearly two years have elapsed since I commenced the use of ground food, I am

fully satisfied that there is economy in its use. Every intelligent agriculturist must deplore the present state of things that exists in the western country in reference to agriculture. The general indifference in regard to improvement of implements, as well as the soil itself, greatly discourages the efforts of the few.

The deep-rooted prejudice against *book farming*, the difficulty of getting up a *combined* effort for improvement, and the determination on the part of some to do as their fathers did, joined to that *slothful adage*, "let well enough alone"—all render it a difficult matter to enlist the energies of agriculturists in any effort to improve. Such is the power of habit, or the influence of prejudice, that, if an effort be made to introduce improved implements of husbandry, the person making the effort is regarded as an innovator. Custom is law. "My father raised as good hogs and had as good bacon as anybody," says one, "and he always turned his hogs in the corn-field, and they staid there until he was ready to kill; and, therefore, I'll fatten my hogs in the corn-field." Another uses the same remark, and concludes by saying, his father always fattened his hogs in a close pen, and he will do the same. As to the best method, such farmers are deaf. Whether it is cheaper to fatten the one way or the other, or to abandon both and adopt a different system, is a matter that such men never pry into. It is so in reference to feeding cattle. It is not a question whether a certain quantity of corn will yield more to the grower in beef, by cutting it up and feeding in the shock or grinding it in a trough; but somebody has done well at feeding cattle with cut-up corn, and, therefore, it is a good business. Success in business is the criterion, and the consequence is, our farmers are constantly changing their mode of operation.

As farmers, we must for the present, and for some time to come, remain a stock-growing people. And how shall we remedy the defects of habit of which I have spoken? First, we must diffuse information; agricultural papers must be read, and your valuable Annual Report widely circulated. It has always exercised a most happy influence on agricultural operations; and its influence must not only continue for good, but increased good.

I suggest, as a means of improvement, county or district clubs of farmers, formed where they may impart to each other the results of experiments tried; of modes of culture adopted; compare the results of each other's system of feeding, with a view to the adoption of the best; and, in every way best suited in their judgment, to promote the interests of agriculture. Prejudices, under such a system, would give way; bad habits would be corrected; a healthy spirit of improvement would be cherished; and, in the opinion of the writer, the farming interest would be permanently benefited. Let the farmers composing such clubs meet once a month, (or not so frequent, or more frequent,) at some central point agreed on. Some of them might prepare essays to be read to the club; others gather statistical information; and all, in some way, endeavor to promote the interest of farmers. I throw out these hints; if you think them worth printing, use them; if not, throw the paper under the table.

With my most ardent wishes for your success in this undertaking, and a sincere desire for your personal welfare, I subscribe myself, respectfully, yours,

Y. R. PITTS.

To the Commissioner of Patents.

NEAR COLBYVILLE, CLARK COUNTY, KENTUCKY,
December, 1851.

SIR: In answer to your inquiries about *wheat*, I would state that I do not know that guano has ever been used in this county. I suppose the average product is about 10 bushels to the acre. Sometimes we have 25 or 30 bushels per acre, and then again the crop is almost a failure. The chief cause of the failure is the Hessian fly, or the rust. If sown too early, it will likely be injured by the fly; and if too late, by the rust. It is therefore important that it should be sown too late for the fly, and soon enough to prevent its injury by the rust. But it is impossible always to do this, unless we could tell what the weather would be after the sowing; for, if it keeps warm, although late, it will be liable to be injured by the fly. Our usual time of sowing is from the 15th of September to the last of October. The time of harvesting depends somewhat upon the kind; the early ripening kinds, being less liable to the rust, are generally harvested in June; the later kinds, in July. The average price was about 50 cents a bushel.

Corn.—The average product is between 50 and 60 bushels per acre. The cost of production, or the selling price, is generally about 20 cents. I have known men hired to do all the work of raising a crop of corn for $2 per acre. The corn land is generally ploughed as deep as it can be conveniently; after which it is laid off from 3 to 4 feet, and planted in hills. Some prefer drilling. Soon after the corn comes up, a large harrow or roller is run over it—a person following with a small rake to take off any clods that may be left on the corn; and shortly afterwards, a small plough is run as close as possible to the corn, throwing the dirt from it. As soon as the corn will bear it, the plough is again run near it, throwing the loose dirt against it, and in the hill. About this time, the corn is thinned, leaving 3 or 4 stalks in a hill, and pulling out any large weeds that may be there. After this, it is ploughed both ways, if planted in hills, still throwing the soil towards the corn, and splitting the middle of the rows; when, if the weeds have been well subdued, and the corn has grown 4 or 5 feet high, it is "laid by."

I have no experience in saving manure from a particular measure of grain; but believe that 100 barrels of corn, fed to hogs, upon 10 acres of "tired" ground, will add 50 barrels to the next year's crop. By tired is meant land that has frequently borne the same grain in successive years until the product is materially diminished.

My usual rotation is, corn, two years; wheat, rye, or oats, and clover seed; two years in clover pasture; and corn again as before.

Oats.—I consider oats the next most profitable grain to corn; upon my land the average product is about the same number of bushels per acre. I usually use from 2 to 3 bushels of seed per acre.

Grasses.—Timothy is almost universally preferred for meadows, clover for rotation, and blue-grass for pasture.

Neat Cattle.—The price of cattle varies very much as to quality; and in different years, the same kind of cattle vary much in price. Generally the cost to the purchaser is about 50 cents per month. Thus, a two-year-old steer will be worth $12, and a three-year old $18. But some are much higher, and others lower. I have no experience with Devon cattle, but much with Durhams and natives (scrubs, we call them) and some with Herefords.

I will relate two experiments that I made many years ago. I purchased 20 native calves of one of my neighbors, mostly heifers; these I spayed; and 20 heifers that were of a mixture of the Durham, Hereford, and Patton stock. They were all spayed at once, and pastured and fed together. They were sold when about 30 months old. The natives averaged about 350 pounds each, and were mostly weighed. The Durhams were sold for 750 pounds each. The butcher afterwards told me they exceeded our estimate.

I purchased 20 *four-year-old* steers of the native stock. I had raised 15, and purchased 5 mixed Durhams that were *two years old*. These cattle were all grazed together during spring and summer, and in the fall and winter they were separated and fed out of the same field, with the same allowance of corn, during the week; and every Sunday they were all turned into a lot, into which the allowance for both had been hauled the day before. At Christmas, I killed, for a beef, one out of the Durhams; so that after that time the Durhams had one-twentieth more than the natives. I sold the Durhams in April for $31 96 each; and sold the natives in May for $20 91 each. The natives were not weighed; but I sold them for the best price I had ever been offered. I never could get any offer for them until the Durhams went away. We killed an average of the Durhams, and they weighed 799 pounds. I have just sold 18 four-year old Durham steers, averaging 1,202 pounds for $66 21 each.

At the time I made the above experiment, I had no experience in feeding cattle, but asked a neighbor who had been engaged in the business which lot he thought I should make the most upon, and he said, upon the natives, as they were two years older than the Durhams. The natives fattened, but did not grow; the Durhams fattened, and grew, too, and were fatter, when sold, than the natives. Of the Durhams, there were no full-bloods, but were all mixtures; but they had enough of the Durham and Hereford blood to give them fattening qualities. Had they been thorough-bred Durhams, the result would have been greatly more in their favor.

I have usually employed one of the following plans in *breaking steers*; I first get a strong rope around their horns, and tie them by the side of the stable or barn, so that they cannot hurt themselves by getting the rope around them. They are fed there, and, after a day or two, are led off to water. As soon as they can be led, they are put in the yoke; if very strong, a yoke is used with three bows. A pair of strong oxen are brought—one on each side, and all three fastened in the yoke, and turned loose. A boy is told to drive them about in an open pasture during the day. The next day a common yoke is put on; one of the broken oxen is put with him, and they are set to work behind a pair that are well broken. If the steer is not very strong, he is taken, as soon as he has been learned to lead, and put with a well-broken ox to work. The two should be about the same strength. After having worked each of the new pair in this way for some time, they are then put together.

Wool.—Wool-growing is said to be profitable by those who are extensively engaged in it. I have found it very unprofitable. I have kept from 100 to 200 merino sheep, that averaged about 4 pounds of wool each in the fleece, which I have sold for from 16 to 20 cents per pound. This would give from 64 to 80 cents the sheep. In consequence of the low price of wool, I have reduced my flock to 50, and am using a Cotswold buck to give me larger lambs for mutton. The coarse and fine wool sells at the same price; the coarse wool is in rather more demand, as it does not lose as much in washing, and is more easily manufactured into coarse jeans than the fine.

Hogs.—There has been considerable controversy about the relative value of the different breeds of hogs; and there have been a number of experiments made to test their fattening qualities. These experiments have been made principally between the Woburns and Berkshires; and have uniformly resulted in favor of the Woburns. The Irish grazier hogs, imported by James Letton, have added greatly to the value of our hogs. The cross of the Woburn and the Irish upon the Berkshires has greatly improved the latter. There have been various other breeds that have had their advocates. The Neapolitan improves the meat and fattening qualities of all the breeds with which I have seen them crossed; but they impart a wildness, which more than counterbalances any good qualities that may be communicated by them. The cross would be valuable to persons who keep their pigs in sties or small enclosures. I do not know that our method of raising pork is the cheapest; but it is a cheap method, which I will detail. We try to have one set of pigs early in the spring, and another in the fall. The sows are fed in the spring upon corn, whilst suckling their pigs; about one ear of corn for each pig she may have, each day. As soon as the clover is sufficiently grown, they are turned into the clover-field, where they still have a little corn. After the pigs get large enough to begin to eat corn, some is put into a small pen, into which only the pigs can get, that they may have a little corn every day, in addition to the clover. Here they stay until the rye is ripe, or the wheat has been cut; they are then removed to the rye field; or, after the wheat has been removed, to the wheat-stubble, to glean the fields. By this time the oats are ripe enough to turn upon. After they have finished the oats, they are again put into the clover field; and the apple orchard, if near the clover-field, is of considerable advantage. If there are no apples, a little corn will keep them from falling back until they are put into the corn-field (or have the corn gathered for them) for fattening. The larger of the spring pigs are killed, by many persons, in the following fall, for family use. The balance, and the fall pigs, are wintered after cattle; that is, the cattle that are intended for fattening are put into a field that is in grass, and have corn hauled out to them and thrown upon the grass. After the cattle have done eating, the hogs (that had been previously turned out) are turned into the field after them. Three hogs can thus be wintered after one steer. They gather much that would be lost. March pigs, raised in the above way, killed in November, will average about 200 pounds dressed. The larger hogs are frequently sold. Our corn is generally cut up and shocked in the field, 16 hills square, or 256 hills to the shock; and one shock of good corn is enough for 10 steers a day; and 30 hogs will be well wintered after them.

Hemp.—The culture of hemp is on the increase in this neighborhood. There is no new process, except that cutting has almost entirely superseded the old method of pulling, and the roller is much more used in putting in the crop than formerly. The hemp crop ranges from 500 to 1,000 pounds per acre. I suppose the average is about 750 pounds. I make the average cost of producing an acre of hemp about $31.

Fruit.—The culture of fruit is receiving much more attention than formerly; but it is confined in this region mostly to the production of enough for family use. I think, even upon our land, that is worth $75 per acre, that the culture for stock would be profitable. My hogs derive much benefit from going into an orchard of fall and winter fruit, of 100 trees, whenever they bear fruit. I believe my hogs get more benefit than the interest upon the price of the land; and I get the greater portion, and all the best, to put away for family use. I know of no preventive of the blight. But the best remedy that I have tried for it on pear trees is to cut off the limb, and burn it.

We usually plough but once for wheat; and then, if the wheat is ploughed in, only about three inches deep. The plough is usually followed by the roller or harrow, and the seeding is done. From a bushel to a bushel and a half of seed is used. There is generally no preparation of seed. I have never seen the smut until this year. One of my neighbors had a field that was not worth cutting, and I have heard of another crop that was considerably injured by it. Wheat is not near so sure a crop as it was thirty or forty years ago; nor is the yield near as great.

Yours, respectfully,

SAM'L D. MARTIN.

Hon. THOMAS EWBANK,
Commissioner of Patents.

OHIO.

COLLAMER P. O., CUYAHOGA COUNTY, OHIO,
January 1, 1852.

SIR: In attempting briefly to reply to some of the inquiries and suggestions in your Circular of August last, permit me to premise that, as a *practical farmer*, my agricultural labors have been confined to so few acres of ground that it would seem almost like presumption to aspire to this appellation; but, with this premonition, I will attempt to give you the result of my experience and observation in relation to a few of the leading articles referred to in your communication.

On Fruit Culture.—The cultivation of fruit is receiving, in this vicinity, (near Cleveland,) increased attention. The adaptation of our warm, sandy soil, and our lake-regulated climate, for this branch of agriculture, on the south shore of Lake Erie, throughout a considerable portion of its whole extent, is beginning to be understood and appreciated, and large orchards of apples and peaches are now yearly planted out, and the owners are beginning to realize handsome profits from their investments, and to be convinced that a much more extensive cultivation of orchards of *good fruit* will yield a fair remuneration and profit to the cultivator.

On feeding Apples to Hogs.—I have had but little personal experience on this subject; but, from the little I have had, I have been induced, within a few years past, to select scions from the best sweet apples I could find, and to graft them into many of the bearing trees of my orchard, for the purpose of feeding; but they have not yet produced sufficiently to enable me to carry out the experiment. A few years ago when my trees yielded abundantly, I built a fence, in my orchard, around two of the trees, of common, ordinary, sour fruit, and shut up a hog, as the apples began to fall in the enclosure. There I suffered him to remain, with a slight protection from the storms, until near Christmas. On slaughtering him at that time, I found him as good, for aught I could see, as one fed in an adjoining enclosure, with the slop of the house and what corn he would eat.

A few years ago I was at Hudson, in Portage county, when a gentleman connected with the Western Reserve College there, and an extensive and practical farmer, was showing me his orchard, of some two or three acres of apple trees, situated near his house, in which he was in the habit of turning his hogs to pik up the falling fruit. During the discussion of the subject, which the fine specimen he exhibited had elicited, he assured me he had frequently fattened his hogs in that orchard from the falling fruit, and had, in that way, made more pork than he could possibly have made from the same quantity of ground planted with Indian corn. Thus, not only saving all the expense of ploughing the ground, planting, and tending the crop, but also reserving a large portion of the fruit for family use; and, in the early part of the season, making use of the grass among the trees, in pasturing his horse, before the fruit began to fall.

On Grape-growing.—In this department of agriculture, but little, very little, has been done in northern Ohio. The subject is but little understood, and the cultivation of the grape has been almost entirely neglected. Go through the Western Reserve, with its millions of acres, comprising the whole northeastern section of our State, and I very much question if, among all our worthy and industrious farmers who occupy it, you find one in twenty who has a grape vine in his garden or on his farm, unless a native of spontaneous production; and if, perchance, you do find, here and there, one solitary individual, in what condition will you find it? Why, if fortunately, or by mistake, planted in a situation favorable to its existence, it is tangled and matted together with the accumulated tendrils and laterals of a dozen years' growth, and, in appearance, much resembling a huge brush-heap overrun with brambles; and but that kind Nature, with a more liberal hand than its unfortunate proprietor, (as if to intimate to man the propriety and necessity of regular and liberal pruning,) had assumed the neglected duties of the vinter's art, and repeatedly curtailed its rampant growth, by killing off and reducing its labyrinthine excess of innumerable and crowded branches, and thus affording room for new bearing shoots, it would long since have ceased to produce a single cluster of fruit.

In the gardens of our citizens at Cleveland, and in and about our larger towns and villages, more attention is paid to the cultivation of the grape; but in all this section of country, I know of but two collections of vines that are entitled to the name of vineyard—one is at or near the mouth of Vermillion river, on the bank of Lake Erie, containing some 2½ acres; the other is in this immediate neighborhood, some 5 miles from Cleveland, and containing about 3 acres: the first of these mostly of the Isabella and Catawba varieties.

Wine.—On the manufacture of wine, what shall I say? That, behind the age as we are in the culture of the grape, compared to our Cincinnati and southern friends, yet the manufacture of wine falls far in the

rear even of our grape cultivation; and I might, perhaps, have left the space assigned to this subject a blank, but for a consideration of the importance the subject is assuming in southern Ohio, and my conviction of the suitableness of our location and climate for the successful growth of the grape, and our ability to compete successfully with our Cincinnati friends. Our light soil requires none of the heavy outlay for trenching which I have seen practised in the heavier soils on the Ohio river; and the extensive process of terracing their steep, stony side-hills is obviated by our smooth, level plains. Our few vines, as far as I have observed them for the past 3 years, have yielded as abundantly as theirs; and we are not, I think, so subject to "the rot," of which they complain.

The influence of our lake is highly beneficial; retarding vegetation some 2 or 3 weeks, we often escape the late vernal frosts so fatal to the fruit prospects of our neighbors. The difference which this would have occasioned in the length of our season is abundantly made up by the mild influence exerted in the fall, and by the large body of water composing our lake, warmed up by the summer sun, dispelling the autumnal frosts in its vicinity, which, for several weeks previously, have cut down the vegetation only a few miles south of us in the interior.

In deciding the relative advantages of northern and southern Ohio for the cultivation of the vine, an important question will be, What is the comparative value of the grape of these different localities on light or humid soils? I do not know that this question has been decided by subjecting the must of each to the test of the saccharometer. I could not find the instrument in Cleveland last fall; so I ventured to adopt the substitute suggested by Mr. Longworth, of Cincinnati, (a fresh-laid hen's egg;) but my experiment was not altogether satisfactory, being rather too much like guess-work, and strongly reminding me of the expedient resorted to down south by a man who, to weigh his hog, for the want of scales and weights, made use of an adjusted plank, on which he balanced the hog with a pile of stones, and then he guessed at the weight of the stones.

The saccharometer may test the saccharine properties of the grape; but that is but one of the properties it should possess. I find, from my varied but imperfect experiments, that the amount of aroma, giving fragrance and flavor to the wines, varies very essentially in the different varieties with which I have experimented, and that, though one may be deficient in one principle, it may add much to the flavor and value of wine made from a richer and sweeter variety; the value of this property can only be proved by the practical use of the variety possessing it.

Wine-making is yet in its infancy in the United States, and this, with other matters connected with the subject, has yet to be examined into and tested by the future experience of vine-growers and wine manufacturers.

Very respectfully,

H. H. COIT.

CLEVELAND, OHIO, *September* 30, 1851.

SIR: The peach tree has been gradually losing its health and vigor during the last 50 years. In sections of country where it was formerly healthy, it is now only raised with extra care. This diseased condition began to show itself coincidently with the appearance of the *Ægeria exitiosa*, or *Borer;* and has progressed as that depredator has increased in numbers, leaving no room to doubt that the one has, in a great measure, been produced by the other. A successful remedy has long been a great desideratum in the peach-producing sections of the Union. During a late tour in New England, I had the satisfaction to find that such a remedy had been discovered by E. M. Pomeroy, esq., of Wallingford, Ct., After examining the whole subject, I came to the following conclusions, to wit:

1st. That Mr. Pomeroy's remedy is effectual in preventing the deposition of the eggs into the crown of the roots by the perfect insect.

2d. That it is equally certain to destroy the young larvæ already lodged in the bark of the tree, near the roots—the only point they ever attack. It accomplishes this by cutting off the means of respiration.

3d. That, after it has been thoroughly employed on a diseased tree for a year, the tree is sure to recover its health and vigor.

4th. That the cost of material and the amount of labor required in the application are so limited that neither item will ever enter into the calculations of one in possession of a valuable peach orchard.

5th. That the discovery of the use of this remedy will be of incalculable pecuniary benefit to those parts of the United States in which the peach is a staple crop—as in New Jersey, Ohio, New York, and Maryland.

I beg leave to refer you to an article on *"the Premature Decay of the Peach tree,"* which will probably appear in the December number of the Horticulturist, by Mr. Downing. Mr. Pomeroy will probably lay the subject of his remedy more in detail before you.

I am, sir, very respectfully, yours,

JARED P. KIRTLAND.

MOORE'S SALTWORKS, JEFFERSON COUNTY, OHIO,
December 10, 1850.

SIR: It is with pleasure that I now proceed to make a report of matters relating to the agricultural interests of this vicinity.

I have had the object of your Circular under consideration for some time, and have availed myself, as far as practicable, of every opportunity, both by personal observation and the opinions of intelligent individuals, to arrive at some degree of precision on the various subjects proposed. I fully believe the agricultural portion of the community, taken in mass, are inferior to none in all those moral qualities that characterize the noble of the earth; but I must confess that, in analytical disquisitions, or subtle and detailed calculations of profit and loss, even in our farming operations, we, as a class, are sadly deficient.

I rejoice in the existence of the Office of which you are Commissioner, and fondly hope the salutary and beneficial influences arising therefrom will be speedily and widely extended. I consider the agriculturists of the nation the only absolute producers of wealth—all others are consumers; and, if this be true, it would seem to follow that to advance and stimulate agriculture should be one of the first and highest efforts of our national legislature. Your Office, it is true, sends forth annually a flood of light, which, to the agriculturists of the nation, is valuable beyond estimate; but the means at your disposal are, by no means, commensurate with our wants. Hundreds of agriculturists, I doubt not, are entirely ignorant that any such Report is made; and, of those who do know it, few, comparatively, can obtain it. I speak advisedly, and from experience, on this subject. I have annually sought this Report for the last fifteen years through my immediate representatives, and have, during that time, received two copies, and many others have been equally unsuccessful. I say, then, let the agriculturists of the nation speak out, not only through their public monthly journals, but, with your permission, through your Report, and tell our public servants what we desire. Pardon my long introduction.

Wheat.—The principal variety cultivated here is the blue-stem. Other varieties have been introduced from time to time; none, however, thus far, have taken precedence over it. Fallow ground is deemed most certain to insure a good crop; many, however, succeed well by sowing on a clover-lay, with one ploughing; and this method is gaining favor. The time of sowing is from the middle of September to the middle of October. Fifteen bushels may be set down as the full average per acre. In the eastern and southern parts of this county the lands are more fertile, and, I presume, the yield is greater. For the last three years the fly has given us but little annoyance. In seasons in which the fly abounds it is deemed a great misfortune to be in close proximity with neighbors who follow the old skinning system in farm management. When the fly abounds, or is apprehended, it is advisable to sow no ground which is not in a high state of fertility; and this is to be cultivated in the best possible manner. Good farmers and their fields are more than a match for the fly; while they who are more slovenly and less energetic are compelled to mourn over what they consider their misfortune, but never once dream that they have invited and encouraged the ingress of these marauding hosts.

Corn.—The kind most highly esteemed here is a large, yellow, fourteen-rowed variety. The probable average of the neighborhood is 40 bushels per acre. On our bottom lands, 50 to 75 is common. Our best farmers prefer a clover-lay or old meadow; and on this, unfermented manure, made the preceding winter, is applied, and turned under with the plough. The ground is then well pulverized with the harrow, and marked out and planted. For the further cultivation, the harrow and cultivator are the proper implements. In sod ground, intended for corn, in which the cut-worm is apprehended, winter ploughing may be advisable; and this practice is doubtless attended with other advantages—the soil being thus exposed to the pulverizing tendency of the winter frosts. Under this system the manure is retained and applied to the wheat crop. My own practice corresponds with the first method; and, to avoid the cut-worm, I delay turning over the sod to the very eve of planting. By this time the grass has started, which, being inverted, attracts the worm, and furnishes it with subsistence until the corn is out of its reach, or death renders it no longer formidable. By this method I can use my long, coarse, unfermented manure to what I consider much better advantage. Corn is a gross feeder. There is but little danger of over-feeding or over-stimulating this plant. It revels in the ammonia emitted from the decomposing substances underneath it; and, after maturity, it leaves the manure in good condition for the succeeding crop. By this method I avail myself of the benefit of the manure one crop in advance of those who pursue a different course. I am not aware that any close, careful, and accurate experiments have been made in this vicinity, testing the difference between feeding corn whole or ground. I do not, however, entertain a doubt that the preference is decidedly in favor of grinding; and if cooked, so much the better.

Oats.—Oats very frequently follow corn as the succeeding crop, and, if it stands erect until it matures, a large crop is generally obtained. It is sown as early in the spring as weather and a proper tillage of the land will admit. Quantity sown per acre, 2 bushels; average yield, 40 bushels.

Rye.—Rye is not extensively cultivated; but to those engaged in sheep husbandry its importance, I apprehend, is not duly appreciated. It should be sown last of August or first of September; one bushel, or, if seed be abundant, one bushel and a fourth, may be sown to the acre. Early the ensuing spring the weak of the flocks may there obtain an abundance of succulent food at the very time it is so greatly needed, and cannot be obtained anywhere else. This timely precaution by sheep owners generally, would annually save thousands of those valuable animals a lodgment in the bone-yard.

If the crop is intended to mature, the sheep should be removed the first of May; but if the crop is not the object, the field is in fine condition for corn, and may be turned over and planted. I consider the pasture ample compensation for the previous labor of seeding. My own practice is to let the crop mature, and, unless the season is extremely dry and unfavorable, the depasturing is no detriment to the crop I believe rye the least exhausting of any of the white crops; and I generally find clover and other grasses to take more certainly, and grow more vigorously, with and after this grain than any other.

Clover and Grasses.—Seeding down lands with clover and other grasses, whether for mowing or pasturage, is now considered indispensable. The average yield of hay is about one ton and a half per acre. Clover and timothy have the preference here, either for mowing or pasturage; one gallon of clover and one of timothy seed I deem sufficient for seeding an acre. I may here remark that timothy succeeds much better when sown early in the fall, and, if sown with fall grain, should have the last drag of the harrow.

Cattle.—The price of cattle when three years old ranges from $12 to $15. I have no hesitation in saying the cost of rearing is several figures above the sale; and were it not for the benefit derived by cattle in breaking down our straw piles, and adding to the manure heap, I presume few would be reared.

Sheep and Wool.—"Is wool growing profitable?" At the average price of wool for the last ten years, I do not consider wool-growing profitable; nevertheless, it is true, that some men, by assiduity and perseverance, have rendered their flocks a source of profit. The cost of producing a pound of wool will materially vary in different locations, always regarding the price of land and other contingent circumstances. The average price of land in this vicinity is about $20 per acre, and

much of this extremely hilly and broken, entirely precluding a regular systematic rotation of crops; and from this cause much of our lands remain permanent pastures, or are broken by the plough at long intervals.

From considerable experience and much reflection, I am fully satisfied a pound of three-quarter-blood wool cannot be produced here under 33⅓ cents; this price merely covering cost, and yielding no actual profit to the producer; and in those neighborhoods or sections of country where land is more valuable, the production of wool advances proportionably with the price of land; and if the producer is compelled to sell at 33⅓ cents, he is, in my estimation, "working for nothing, and finding himself." I consider the major part of the lands of this and the adjoining counties, under judicious management, well adapted to sheep-husbandry, and, under a more favorable state of things, would very soon double or treble the present production. I trust I shall not be considered as entering on either enchanted or forbidden ground in making one or two observations which here force themselves upon me. In the Report of Commerce and Navigation for the last year, I find the wool imported amounts to over 17,869,000 pounds, at an average price of less than seven cents per pound. A considerable amount of these wools come from Buenos Ayres, or the Argentine Republic, and the adjoining States, which is probably the best wool-growing region in the world. The long, rough, coarse Chilian or Valparaiso wools, and all of a similar quality, cannot supplant or materially affect us. But such is not the case in regard to the wools grown east of the Andes. These are emphatically rival wools, and, when burred and cleansed, come to the cards 10 or 12 cents below our domestic wools of similar quality. The present easy terms of admission of these wools invite foreign rivalship and competition, and we are unceremoniously dogged out of our own market, or compelled to receive prices actually below the cost of production. This I believe is wrong.

The sheep of this and the adjoining counties are of the merino family, and for the last few years have been approximating to the Saxon variety. We feed our sheep about four months of the year—a ton of hay, or its equivalent, for ten full-grown sheep, is about a fair allowance. Our flocks do not generally average more than 2½ pounds per head. A ton of hay does not, in my estimation, represent or produce over 6 pounds of wool. The manure, however, is an item which should always be kept in view. Those who reside in the locality of a hay market will find it more profitable to sell their hay and purchase their manure than to transform it into wool. On lands not costing over $20 per acre, hay sold at $5 per ton pays a reasonable profit.

Hogs.—The best breed of hogs in this vicinity is bad enough. The Chinese, which is the only decent animal in the hog line I have ever seen, has been frequently introduced; but those roaming hordes of razor-backed alligators which everywhere abound, soon manage to steal a march, not only on us, but also on their less amorous male competitors, and thus transmit their own depravity in their offspring representatives, involving not only chagrin and vexation to the owner, but a ruination of the breed. One of the greatest obstacles to the improvement of farm stock here arises from those hordes of worthless animals turned out by their owners, often with small profit both to the animal and owner, and always and absolutely a curse to the whole neighborhood. The remedy for this is the enactment of a law prohibiting animals running at large, localizing it to meet the wants and interests of the people. But the legislators of Ohio view this as a delicate subject; peradventure, its support might involve the loss of one or two votes at the next election, and consequently the bill is laid upon the table, there to sleep the sleep of death.

It is my opinion that but little pork is produced here at a less cost than 8 cents per pound, and consequently it is a losing business. The cheapest method of producing pork with which I am acquainted, is to procure the Chinese breed of hogs, and give them a good clover field for summer pasturage. This, in connection with the slops of the kitchen and offal of the dairy, will make quite respectable pork, at a much reduced cost.

Potatoes.—The only variety in this neighborhood which has outlived the potato disease is the red Meshanocks; and these, at different times, have been on the very threshold of final departure. The past spring I selected three spots of land—No. 1, a virgin soil, without manure, a gravelly loam, but quite fertile; No. 2, a strong clay loam, highly manured; No. 3, soil almost literal sand, but fertile. At the time of digging, one-half of those on No. 1 were grievously diseased, and cast out. On No. 2 the disease gave sufficient indications of its presence, but not so malignant. On No. 3 there was no sign of disease. Further experiments are necessary before reliance can be given. I shall continue my experiments next season. My own opinion is, that the disease is entirely of atmospheric origin, which is not yet comprehended or understood, and that certain peculiar characteristics of the soil only have the tendency to develop it.

Fruit.—Cultivation and improvement in varieties of fruit are everywhere progressing. The time will soon arrive when Ohio will be second to none, either in the quantity or quality of its fruit.

In promoting the agriculture of the nation, you are engaged in a great and noble work; your labors are appreciated by our most learned and advanced farmers, as well as by your humble and most obedient servant,

ROBERT GEORGE.

Hon. Thomas Ewbank,
Commissioner of Patents.

St. Clairsville, Ohio,
September, 1851.

Sir: Mr. A. W. Florian Genin, of this county, has been some six or eight years trying to get new varieties of the *pear* by planting the seed of the Seckel pear, and budding, in the first and subsequent seasons, from the sprouts of this seed, into the quince tree. In this way fruit is got from the seed on the fourth or fifth year after planting it. Most of the fruit yet obtained from the process is bad, or indifferent; but this fall one of these buds presented a good fruit, more luscious, if not better, perhaps, than the Seckel itself.

A pawpaw of the best flavor, mixed with the Seckel pear, would give some notion of its taste; it is a little larger than the Seckel itself, and both it and its leaf are more elongated than that of the Seckel.

The same gentleman had, in the spring of 1849, some 600 flourishing *peach trees.* In the summer following he commenced digging them up and burning them as fast as he discovered symptoms of the yellows. There are now but 80 or 90 trees left, and these are the portion least cultivated. He refers me to facts, which show that, in proportion to the *restraint of their growth,* they *have escaped the disease.* A part were manured and ploughed with corn and potatoes; these were first affected. A part were in grass, in rich soil, and leached ashes at times spread some four feet around the body, stifling the grass; these grew a little slower than the trees in the ploughed ground, and were the next diseased. Some were set out in grass ground of poorer soil, and were but once given ashes—about a peck of coal-ashes. These still survive. A few small ones among them were burned with the first parcel for the yellows; but he has no doubt they had the disease when he set them out. Probably *rapidity of growth* predisposes, or rather exposes, both animals and vegetables to disease. Whether the trees that survive will escape in the end, remains to be seen. The last remedy heard of in this region, is the *driving of a nail into the tree,* just above the ground, horizontally, in a north and south direction. The *on dits* are favorable, but need proof. Mr. Genin, whom I have seen since writing the last sentence, tells me he has driven the nail into about three fourths of his eighty trees yet remaining, and thinks some proof of its efficacy has fallen under his notice. Mr. George Anderson, of St. Clairsville, drove nails in May, 1850, into trees affected, and they recovered; also, Mr. Henry Scovern. Both claimed that there were *no worms* at the roots, when their sickly aspect attracted attention.

Meteorology.—Mr. Joseph Harris, a tin and coppersmith, of St. Clairsville, has permitted me to use a record he has kept since September 8, 1849, of the fall of rain and snow, and the degrees of temperature. He reduces the snow to water, and treats two inches of snow as equal to one inch of water, as a general rule.

From this record I find the average temperature at St. Clairsville, at dawn of day, from 1st November, 1849, to 1st November, 1850, to have been 40.39; 1st November, 1850, to 1st November, 1851, 46.21; and at 2 p. m. for the latter year, 60.68—and the depth of rain for same year, 47 inches; and for the last 8 months of the former year, $34\frac{9}{10}$ inches. The lowest temperature of the first year was 4° below zero, on the 5th of February, 1850; and on the second year, 4° below zero, on the 31st of January, 1851. The highest was 82° on the 20th September, 1851; and 74° on the 7th of July, 1850. This lowest and highest refer to early morn. He did not commence recording the temperature at 2 p. m. until July, 1850.

I have compiled the following table from the record:

Table showing the fall of Rain and Snow, at St. Clairsville.

	Rain and snow.	Average at sunrise.	Av'age at 2 p. m.	Highest.	Day of month.	Lowest.	Day of month.	Whole No. of degs. in each month of this year in the order stated.	Whole No. of degs. at sunrise.	Whole No. of degrees at 2 p. m.	Remarks.
1849.	*Inches.*										
November.........	....	42.33	....	62	7	32	21	1,270	1,169	1,632	
December.........	....	27.03	....	51	30	7	25	838	894	1,128	
1850.											
January.........	....	29.61	....	54	25	5	1	918	925	925	
February.........	....	26.80	....	48	9	4	5	755	971	971	
March.........	4 1-4	34.77	....	59	16	6	4	1,078	1,245	1,245	
April.........	4 1-16	35.43	....	57	27	24	14	1,063	1,257	1,257	Peaches blooming on 27th.
May.........	4 1-8	46	....	64	29	36	2	1,436	1,650	1,650	Frost on 21st. Bees made no honey the last fourteen days of May.
June.........	7 1-8	58.60	....	70	29	43	1	1,759	1,791	1,791	Frost on 1st. The last twenty-seven days of June good for bees.
July.........	7-8 & 1-16	46	88.16	74	29	62	7	1,424	1,956	1,956	Wheat cut 11th to 15th: rather more than an average crop. Bees stopped making comb on 17th, but continued to fill it for ten days. 21st they commenced killing drones; 31st still killing.
August.........	4 5-8	35.28	79.96	72	30	56	27	1,092	1,895	1,886	From the 10th bees are living on their winter stock; cold.
September.........	4 3-8	55.60	74	72	26	47	29	1,665	1,752	1,752	
October.........	5 1-16	43.38	56.98	65	17	32	21	1,345	1,362	1,362	
	34 9-16							365)14,742(40 39-65	16,867	21,925	
November.........	3 1-16	38.96	54.40	59	28	30	17				
December.........	7 1-8	28.83	36.36	36	12	16	14				
1851.											
January.........	2 5-8	29.83	40.83	47	4	*4	31	....	....	....	On 30th 1° at sunrise; 9° at 2 p. m.
February.........	5 3-4	34.67	46.17	56	24	7	1				
March.........	2	40.16	54.61	60	31	18	3				
April.........	4 3-16	41.90	63.40	59	1	27	12				
May.........	5 10-16	53.22	71.19	68	28	30	2	....	....	....	Frost on 24th, 2d, and 7th. Ice ¼-inch thick on 2d; thunder on 12th and 18th. 31st cold and rainy.
June.........	3 15-16	59.70	76.83	73	29	48	14	....	....	....	On 20th 90° at 2 p. m.; on 29th 88° at 2 p. m.
July.........	3 3-8	63.09	65.96	80	4	54	5	....	....	....	On 4th 73° at 2 p. m.; on 26th 94° at 2 p. m. 31st July dry. Bees eat last two days seven pounds, commencing on winter stock.
August.........	3	61.12	80.86	70	17	48	28	....	....	....	On 31st 53° at sunrise; 90° at 2 p. m. Dryest weather seen in ten years.
September.........	4 7-16	58.40	69.28	82	30	36	25	....	....	....	Little frost. On 11th 90° at 2 p. m.
October.........	1 7-8	43.96	61.32	55	29	23	27	....	....	....	On 7th 80° at 2 p. m.; on 9th 82° at 2 p. m.; on 20th 72° at 2 p. m.
	47										

* Four degrees below zero at sunrise; seventeen degrees above at 2 p. m.

Mr. Harris has many bees. He numbers and weighs his hives. When his bees swarm into one, he weighs it again, and thus finds the weight of the swarm. He afterwards occasionally weighs the hive, to ascertain whether the stock of honey is increasing or diminishing. He thus finds they are driven, at times, in the summer, to resort to their winter stores, and can spare no honey to the lords of creation, consistently with their own preservation.

His thermometer is in an open shed, without sides, protected by a roof from the sun; the air has free circulation through the shed.

I would suggest that the growths which may be counted in the large trees indicate, for hundreds of years back, the degree of dryness and wetness of seasons. *One* tree, as it might at some period have been in a diseased state, would not be conclusive. I counted one that showed that this region had suffered from drought for several years in succession, some 130 years ago. I did not seek to corroborate it by the testimony of other trees. The years 1816 and 1817 were very wet and cold; count back from the surface to those years, and you will find the growth of those years larger than most others.

Apples.—I have in my orchards above four hundred apple trees, of natural fruit; there are but two of them which I deem worth propagating by grafting; and the best of these two attracted no particular notice for six or eight years after I came into possession of the orchard. Good fruit, like good books, may exist some time before it is appreciated. I call it the ivory-sour, from its whiteness and agreeable acidity; it has a flavor all its own. When it is peeled, and cored with a tube, and the cavity made by cutting out the core is filled with loaf-sugar and then baked, it delights the eye by its whiteness, and the almost transparency of its substance, as well as the taste by its flavor. The first settlers here mostly raised apples from the seed; and thus produced many good varieties that will probably pass away, because not sufficiently brought into notice to be propagated. One that would suggest practicable measures to preserve them would deserve to be made chairman of a city agricultural society. A new apple is viewed in the market with distrust; hence, for exportation, that apple is best which is best known. The Newtown pippin has both fame and superior qualities. The Putman russet, the white red streaked Vandervere, or straight-whip, and Long Island pippin, I value, in the order named, as well-known and that keep well. The Gates, Rambo, bellflower, and Rhode Island greening, have more delicacy of constitution, and some seasons will not keep well; and hence nurserymen hesitate to recommend them as winter-apples; but in years of *large crops* of fruit—of all kinds—indicating the absence of palsying late frosts, excessive cold, or drought—these varieties may be relied upon for keeping until February, March, and May.

Last year I had Rambos and Gates through the whole of May.

Respectfully, yours,

THOS. H. GENIN.

Hon. Thos. Ewbank,
Commissioner of Patents.

Kelley's Island, Near Sandusky City, Ohio,
November, 1851.

Sir: In answer to your Circular relating to agriculture, I would say, the staple crops of this township are wheat, corn, Irish potatoes, and fruits; the principal of which are apples, peaches, pears, quinces, cherries, and grapes.

Wheat.—Wheat is usually raised here by once ploughing, sowing one and a half bushel of seed per acre, and harrowing; little or no manure being used. The soil is a limestone clay; two or three crops are usually raised in succession on the same ground; then planted to corn, or seeded to grass or clover, for two or three years; costing about as follows (raised after corn, the corn being cut and removed from the land):

One day, man and oxen ploughing, (per acre,)	$1 25
One and three-fourth bushel seed	1 56
Half day sowing, harrowing, and drawing, say	56
One and a quarter day harvesting and housing, say	2 00
Threshing	2 50
	$7 87

Usual yield, 25 bushels; costing about 31½ cents per bushel. Many years the cost is not over 24 cents; but 31 cents may be called a fair average.

Corn is usually raised, or planted, after two ploughings; unless it is on sward. Expense, beginning on sward:

One day, man and two yoke of oxen, say	$2 50
One day planting, man, seed	1 00
Two days weeding	1 50
Husking and cribbing, two days	1 50
	$6 50

Yield, 60 bushels per acre; costing about 10½ cents per bushel for the labor; calling the stalks worth as much as the cutting up and shelling the grain for market. To the next crop must be added, man and horse, ploughing, say $1 50; making the cost about 12½ cents per bushel; seldom exceeding that amount.

Potatoes require two days' work, per acre, more than corn, in planting and cultivating:

Six to eight bushels seed, worth in the spring, say	$5 00
Two days' labor, planting; three days harvesting	3 75
Cost of corn	8 50
	$17 25

Costing, housed, 12 cents; price, for the last season, has been 50 cents per bushel. I plant, for winter use, from the 20th of June to the 1st of July. Our frosts hold off to about the 1st of November. When planted so late, I have never had them rot.

I esteem the Mashannock and pink-eye the best summer and fall potato; and a kind of black potato, that I have not seen raised elsewhere, the best for winter and spring; being very prolific; yielding one half more, or double that of the other varieties; and are excellent keepers. The red pink eye and English white are favorites with many; yielding better than the pink-eye and Mashannocks, and keeping better.

I have been using the subsoil plough the last three years, with the most satisfactory results; proving it a much cheaper method of improving worn land than manuring. I will give one experiment, as follows:

Lot 6$\frac{11}{100}$ acres, seven years under annual cultivation, to wheat, corn, or potatoes, without manure; crops growing lighter. For eighth crop, ploughed with *subsoil* plough, one yoke of oxen; after the furrow-plough, planted corn; light from neglect in hoeing; fine crop of weeds. Ninth crop, ploughed same manner the other way of lot, somewhat deeper than before, with both ploughs: crop improved; fed out without being measured; corn cut off 20th September 1850; wheat sowed without ploughing:

One day sowing	$1 00
Two and a half days, man and team, harrowing and drawing	3 13
One day digging around stumps	75
Yield, 241 bushels, costing 2 cents	4 88
Add seed, nine bushels white flint, say	9 00
Costing less than six cents per bushel	$13 88

The cost of sub-soil ploughing, previously, would not exceed 2 days per acre; man and one pair of oxen, $2 50 per acre; being much cheaper than hauling manure equivalent to it from the manure-yard to the land.

This year, after the wheat was off, I again ploughed the same lot with two pair of oxen, No. 5 plough, as deep as it could go, say 12 to 16 inches, making a mellow soil of that depth, and throwing much of the sub-soil on top; again sowed it to wheat about the 1st of October, 1851. The result will be seen next year. Various kinds of wheat have been tried. The Genesee white flint has the most and strongest advocates, both for yield and quality.

Grapes.—Much attention is being paid here to the grape—the fruit never being killed by frost in spring or fall. It ripens perfectly every year. The Catawba and Isabella are the favorite varieties, being hardy, full, and constant bearers, and making wine of superior quality. The vine is traced on trellises (made of red cedar) set from 6 to 8 feet apart. The plants being from 3 to 5 feet in the rows, the expense of setting out and preparing an acre for 3 years, at which time they begin to bear, is from $100 to $150. When in full bearing, say 6th year and after, 200 to 300 bushels is a fair crop; worth $2 per bushel for wine. The annual cost of cultivation being from $50 to $75 per acre, yields a greater profit than anything a farmer can raise.

ADDISON KELLEY.

Hon. Thos. Ewbank,
Commissioner of Patents.

Belleville, Richland County, Ohio,
November 20, 1851.

Sir: In compliance with your request, as contained in your Circular for 1851, I embrace the opportunity of giving you such general information as I am in possession of in relation to the improvement of agriculture and the exportation of products from this county.

The articles of export are wheat, flour, corn, flaxseed, clover-seed, dried fruit, (apples and peaches,) horses, cattle, sheep, hogs, bacon, pork, lard, beef, tallow, butter, and cheese. Potatoes thrive well here, but there is not more cultivated than for home consumption.

Wheat.—This grain is cultivated to considerable extent, and produces well; its average yield with me is between 20 and 26 bushels per acre; and it will give that yield throughout the county, if the land is well cultivated. My time of sowing is from the 8th of September to the 1st of October, and time of harvesting from the 5th to the 20th of July. My manner of culture is to plough down a heavy crop of clover the latter part of July; I then harrow it well. Some use a heavy roller first after ploughing, and before harrowing; let it lie till 6 or 8 days before seeding, then cross-harrow again. At seed time, I sow the wheat and harrow twice, or plough in with a shovel-plough or a cultivator. The wheat drill is coming into general use, and I think it a very elegant manner of putting in our wheat; there is an increase in the quantity of wheat, owing perhaps to a more thorough manner of its cultivation. My manner of rotation is a crop of wheat on a clover sod; the next year a crop of corn; the next a crop of oats, and again set to clover.

I have no remedy for the Hessian fly or weevil, except late sowing to prevent the Hessian fly, and early sowing to prevent rust or weevil. The average price the past season, in Belleville and Mansfield, has been 60 cents; the present price is 50 cents. The best kind of wheat we have is white blue stem and whig wheat: the former a beautiful white berry, and the latter a red berry, with a very thin bran, producing beautiful white flour. Both varieties weigh from 60 to 66 pounds, and are much sought after in the market.

Corn.—No guano is used as a manure in this part of the State. My average crop is about 35 bushels per acre. Last year my crop was 60 bushels per acre; season was very good. This year my crop has made 32 bushels per acre. This season was very poor for the growth of corn. My manner of cultivation is as follows: In May I plough my ground, and harrow it once; I then turn round, furrow it out 3½ feet each way, (always ploughing from 6 to 8 inches deep;) drop from 3 to 5 kernels in a place; cover it well 3 inches deep; plant from the 15th to the 20th of May. At the time of planting, I roll my corn in plaster. This causes the corn to come up and grow very fast, and never to turn yellow. I then go through it twice with a cultivator; I then go through twice with a shovel-plough, the last time going three furrows in a row. I then lay it by till the corn begins to be getting hard. I then top it; set the tops up till it is cured. When the corn is fit, I husk it on the stalk, turning stock in to eat it up clean, and they will fatten on it. Through experience, I find that at least one-third of a saving may be made by having the corn ground and cooked both for beef-cattle and hogs; but the price of pork and beef in this country is so low, that it will not pay for this trouble.

Rye, Barley, Peas, and Beans are but little cultivated in this county for export.

Oats.—Great quantities raised; produces well, and is a profitable crop for feeding horses. I sow 2½ to 3 bushels per acre; product, from 30 to 50 bushels per acre.

Clover and Timothy, and their Seeds.—Clover is sown for pasture and the renovation of the land, and for seed. When intended for seed, the first crop is mown for hay, which crop will average 2½ tons per acre. This crop is cut in the first part of June. The second crop is let grow for the seed, which is cut in September, and produces from 1½ to 2½ bushels to the acre. Clover makes the best pasture for horses of all grasses, but not so good for cattle or sheep. The hay is good for wintering sheep, and horses do very well on it; but cattle have no relish for it. Clover is mostly used in this county for the renovation of land.

Butter and Cheese.—As to cheese, there is but little made; none for export. As to butter, there is considerable made and exported; but the yearly average product of butter per cow is something I have not experimented on. From observation of my own cows, I think a good cow will make 12 pounds per week, allowing her to give milk nine months in the year, which would make 432 pounds in the year.* Ten cents being the price of butter in Belleville and Mansfield, will make the value of the butter from the cow in one year, $43 20; but the cow must be well fed during the year.

Neat Cattle.—Cost of rearing till three years old, $6 a year, making $18; price at that age, from $16 to $24; value of dairy cows, from $12 to $20 in spring; but in fall there is no demand for them. The beef fattened in this county is made principally on grass, and on corn ground and fed dry. The amount of beef made by one hundred pounds of corn I cannot tell; for I have not made the experiment. But few oxen are worked here, and I can give no information as to breaking steers to the yoke.

Horses and Mules.—Of mules there are but few raised. Rearing horses is the most profitable business the farmer can pursue. On no kind of stock that we rear in this county can we make more net profit than on horses. The expense of rearing horses till three years old is $12 per year, which will make $36. There is no particular method of taking care of the brood mare; we put to the horse in the months of April, May, or June—working them moderately until the time of foaling. We let the colts run with the mare till five months old; we then take them from the mare and put them in a close stable till they forget their dam—feeding them, during this time, one-half gallon morning and evening, with good hay. We then turn them out in good pasture, and give them their usual quantity of oats till spring. They are then put to pasture, and kept there till cold weather. They are then fed their gallon of oats per day with good hay, and so on, till they are three or four years old. At five or six we think they are ready for sale, when we get from $70 to $100 per head. To break them, we commence when they are two or three years old, by putting gears on and leading them about, to accustom them to the jingling noise. We then hitch them into a two-horse wagon, drive them for the first half day, then load in light, and increase until you have them properly broken. Keep them at light work till four years old, when they may be rode and broke to the saddle, and put to ordinary work.

[* A cow well fed, and a good milker, will give 200 pounds per annum.]

The best stock of horses for all work we have in this county, and adjoining counties, are *Thunderbolt*, *Eclipse*, *Shylock*, and the *Bell-founder*. There are many other fine horses, but these I consider the best and most sought after by eastern drovers—particularly the Thunderbolt stocks; they are of good size, very active, and spry. They are very high mettled, yet easy to govern. They are the fastest trotters, and cannot be beat as walkers. They sell here at from $10 to $20 more than any other horses reared in this county.

Wool.—Wool is considered the most profitable business of the farmer by some, even as much so as that of rearing horses. This may be so, but my choice is the horse for profit. However, keeping such sheep as will produce fine wool is profitable; and it is allowed to be a good business to rear them for mutton; but slaughtering sheep ought to be discountenanced by every well-wisher of his country, as we rear beef and pork enough for the consumption of our country; and it is well known that there is not enough wool made in the United States to supply and keep in operation our woollen factories one half the year; and, as long as that is the case, we will be flooded with the foreign woollen goods, which is a constant drain of our gold and silver. (I would wish to say more on this subject, but it is running into political affairs.) In the cost of growing either coarse or fine wool per pound, I do not consider any difference; because the fine-woolled sheep that I now have produce more, (being from five to eight pounds per head,) are as easily raised, increase as fast, are equally hardy, their wool of readier sale, and that at a higher price, than the old coarse-woolled sheep. It is true that the coarse-woolled sheep is the best sale to the butchers, because they have the largest carcass, and stand driving best. I shall close on the subject of sheep by saying, were it in the power of the authorities to put a stop to the slaughtering of sheep, it would be well for the people of these United States.

Hogs.—The most profitable hogs we can raise are those that are of full size at the youngest age; and, for this purpose, the best are the Leicestershire, Bedford, Berkshire, Chinese, and Calcutta; these all arrive at full growth at 18 and 20 months old, (provided they are well kept.) We know of no cheaper and more profitable method of keeping and fattening pork than to feed mush, as we call it, viz: have your corn ground, boil it to the thickness of mush, mix with it, when cool, all your spare milk and the swill of the kitchen. After clover is in head, let them run on it for pasture. Hogs raised and fattened in this manner will save to the owner at least 33 per cent. over the old method of letting hogs run at large through the summer, and in the fall putting them up in open pens and fattening them with corn in the ear. Yet most of the pork in this county is made after the old method. As to the amount 100 pounds will make, I have never as yet made the trial, but will say, through my own experience, that a saving of at least 33 per cent. will be made by cooking their feed as above recommended. As to the best method of putting up pork and curing hams and bacon, I do not pretend to know any other method than the old plan of salting and smoking.

Fruit Culture.—The culture of fruit is receiving increased attention; the value of apples grown on an acre of ground is certainly of more value, either for table use or feeding, than any crop of grain cultivated in this county. As to the comparative value of apples and potatoes, I cannot say, but should think one and a half bushel of sweet apples is equal to at least one of potatoes for feeding stock, &c. The best keeping apples we cultivate are Romanite, golden pippin, green pippin, winter yellow pippin, Robinson apple, signify, seek-no-further, Esopus Spitzenberg, French or Newark pippin, and many others that I might enumerate—all very fine fruit, which thrive well in this county; but the fruit of all kinds failed this season. No apples are exported from this county, on account of its inland locality. We know of no remedy for the blight on pear trees and apple trees; but few of our fruit trees are affected by it in this county. Our peach trees are somewhat affected with the yellows, but no remedy is known with us. The best manner of transplanting fruit trees is, to stake off your ground so that the trees will be 33 feet apart, then dig a hole 20 inches deep and 4 feet in circumference, mix 4 bushels of fine, well-rotted manure with as much of the ground you threw out of the hole you made for the tree as will fill the hole and plant your trees in. Place a post beside the tree, and keep the tree tied to it at as many places as necessary; a small band of straw is best to tie with.

Potatoes.—But few sweet are cultivated here. The Irish potato is cultivated to some considerable extent, but principally for domestic use. The average yield per acre is 200 bushels; the cost of producing, per bushel, (at that yield,) is 13 cents; the most profitable varieties are the blue Mashonock and the Baltimore blue, for table or cooking; but, for stock-feeding, the merino or red Mashanock and pink-eye are the most profitable, on account of their great yield. The best system of planting, tillage, and manuring is as follows: On 1 acre, put 30 two-horse wagon loads of well-rotted barn-yard manure; plough it under 8 inches deep in the month of October, before you want to plant; immediately after ploughing, harrow it well both ways; let it lay till about the 15th of May; stir it as deep as you broke it the fall before; harrow it till the ground and manure are well mixed and well pulverized; furrow it out about 3 feet 6 inches apart; drop the potatoes (those of a medium size I think the best) 2 feet apart, with two in a place; cover them so as to make the ground level; when they are 6 inches high, plough 2 furrows in a row; then, with a corn-hoe, draw a small quantity around each hill; let them stand for 10 or 12 days; then plough them out by 3 furrows between each row, and draw with your hoe plenty of ground around each hill; then let them stand till fit to dig, and put into the cellar. If they should become affected with black rot, dig them as soon as possible, and spread them on your out-house or barn floor, so that they may become dry; let them lie till cold weather before you put them in your cellar. If the potato bug should infest your patch, in the cool of the morning take a handful of slacked wood-ashes and sprinkle it in the centre of the hill, and the depredators will scamper for parts unknown; but keep watch, for in a few weeks they, or a new set, will come again, when a like process is necessary to drive them off. I have saved my potatoes for two years from rot by the above process, and likewise saved them from the ravages of the potato bug by the above means.

Manures.—The best plan of preserving manures: It would be out of place in me to give any particular method, as the only plan with me, and, as far as I know of, my neighbors, is to pile our straw in the barn-yard; let the cattle tear it down and lie on it; if we have stable manure, we throw it on the straw; in the spring we scatter corn plentifully over it, and let the hogs at it; they will soon root the straw up in search of the corn, and by the next fall it will be in good order to put on the field. I am aware that there is a better way of making our straw produce more manure; but the time has not come that we want it, as our land is yet fresh, and we are in the habit of keeping it in such order as to produce fair crops, by ploughing down heavy crops of red clover; yet I well know that our crops might be much increased by using manure plentifully. But, necessity being the mother of invention, I am of the opinion that the best manner of making and using manures will not be sought for till necessity compels us to try all manner of experiments. *Lime* is not used in this county as a fertilizer, on account of its scarcity and high price, as there is no lime-stone in the county; what is brought here is for the purpose of building; it is worth, when slacked, from 25 to 40 cents per bushel. *Plaster* is used to some extent on clover and Indian corn, and found to be of great benefit; it is sown on clover in the month of May, and we use it by rolling our seed-corn in it; by making as much stick to it as we can, it will cause the corn to vegetate and come up quick, with a black-green color, which it will retain if well tilled. *Guano* is not used here.

Cotton, Rice, and Hemp are not cultivated here.

Tobacco is but very little cultivated.

Roots.—Turnips.—There are a few raised. When sown on new land they produce well, and are a profitable crop to feed stock. *Carrots.*—None are cultivated here. *Beets* are cultivated in our gardens, but only for table use. The mangel-wurzel is somewhat cultivated, and is said to be the best kind of food for milch-cows; their yield is very great, but what per acre, I cannot say.

If you should find anything that may be a benefit to agriculture, or to the country generally, in the above answer to your Circular, you are at liberty to place it in your valuable Report.

JOHN YOUNG.

Hon. Thomas Ewbank,
Commissioner of Patents.

Bucyrus, Crawford County, Ohio,
November 28, 1851.

Sir: Your Circular, of the 18th October last, was duly received. Want of leisure has prevented an earlier reply; and I sincerely regret that reliable data, from which to obtain the information you ask, is so difficult to obtain.

The annual Reports from your Office have become of such importance, and are so much sought after by all classes of citizens—particularly the farming and mechanical portions—that it would appear of sufficient importance to induce the different State legislatures to make some provision for collecting all such information, and having returns made of the same to some one of the county officers in each county. This could be done in our State—with but little additional trouble or expense—by the different township assessors, and could be attended to at the time of making their yearly assessment; from which returns reports could be made to your Office, which would be of vast benefit to all classes.

Under present circumstances, much of the information furnished you must necessarily be very imperfect. I herewith annex replies to the different inquiries contained in your Circular, giving all the information in relation to the same which I have been able to obtain; and it is as correct as circumstances would allow, although I am aware it is, in many respects, very imperfect.

Very respectfully, your most obedient servant,

J. B. LARWILL.

Hon. Thos. Ewbank,
Commissioner of Patents.

To enable those who are not acquainted with the size of our county to form a proper estimate of its productions, as compared with those of other counties, it might be proper to state that it contains barely the constitutional limits of 400 square miles, which is smaller than most counties in the State; and that a part of the county was, but a few years since, purchased from the Wyandot Indians, and is, as yet, but thinly settled; and the whole county is new, as compared with the eastern portion of the State.

Articles listed for taxation in Crawford county, Ohio, for the year 1851, as returned to the auditor's office.

	Number.	Value.
Horses, all over 2 years old	5,252	$234,717
Cattle, all over 2 years old	14,069	136,276
Sheep, all over 6 months old	68,878	43,978
Hogs, all over 6 months old	18,386	25,014
Pleasure carriages	576	23,739
Pianos	4	400
Watches	502	5,699
Manufactured articles	—	26,277
Merchants' capital stock	—	81,929
Manufactures	—	26,737
Moneys and credits	—	206,202
Total value of taxable property, moneys, and credits, exclusive of lands		$810,968

The amount of wool exported from this county for 1851, from 250,000 to 300,000 pounds, at an average price of 37 cents per pound. As the wool passed through but few hands, the transactions in this article could be ascertained with tolerable certainty.

Principal Crops.—The principal crops are wheat, corn, oats, cloverseed, timothy-seed, and hay.

Wheat.—The usual average product of wheat per acre is from 15 to 20 bushels, although 30 bushels are often raised. Time of seeding, from 15th August to 15th September; some sow still later. The time of harvesting commences generally about the 1st to the 8th of July, and continues some 3 weeks. No particular preparation of seed known. Quantity sown per acre, from 1 to 2 bushels, generally 1½ bushel. What particular variety has proved most advantageous, not informed.

Corn.—Average product per acre, about 40 bushels. Cost of production: 12 cents per bushel is paid for raising. For that price it is raised, cut up, and delivered in the shock, not husked or shelled; the land and house-rent furnished, together with a small amount of pasturage—say for 2 or 3 cows and 2 horses. Not much manuring done for corn. The plough and hoe mainly used; some, however, use the cultivator. The general method of feeding is raw, and often fed in the field, without gathering; but it is believed that much saving would result from boiling or grinding, especially if ground with the cob, then fed to cattle and sheep. No knowledge of any experiment having been tried to ascertain what would be the product of any given quantity of manure of any kind.

The average yield of oats is said to be about 40 bushels per acre. Considerable quantities raised, both for home use and for exportation. Average price, 20 to 25 cents per bushel.

Barley.—Average yield of barley per acre, 40 bushels; but small quantity raised; price, 37 to 40 cents per bushel.

Rye.—Average product per acre, 25 bushels; price, 40 to 45 cents per bushel; none grown for exportation.

Peas and Beans.—No fields of peas or beans raised; some few beans raised with corn; usual price of beans, 75 cents per bushel.

Clover and Grasses.—Timothy usually produces about 1½ ton per acre. Large quantities of clover were formerly raised in this county. In one season, a few years since, over 20,000 bushels were exported. Since that time the seasons have not been favorable; the grasshoppers have destroyed much, and it has become more profitable to use the pastures for sheep than to cultivate clover for the seed. Timothy is generally preferred for meadows, when intended for hay or pasture. Some, however, prefer a slight mixture of clover. Quantity sown to acre usually about 1 peck of either, or both mixed; cost of growing hay, $1 50 to $2 per ton; average price, delivered, $4 50 to $5.

Butter and Cheese.—No particular or systematic method of making butter, although large quantities are annually made, both for home consumption and for exportation. The amount exported annually will not fall short of 200,000 pounds, and may be much more; average price, 8 to 10 cents. Very little attention paid to the manufacture of cheese; much that is consumed here is brought from the Western Reserve. No means of knowing the relative cost of making butter and cheese, nor the product of either per cow, or from a given quantity of milk.

Neat Cattle.—Cost of raising until 3 years old, about $13 to $15; usual price per head at that age, $18 to $20; value of good dairy cows in spring, $15; in fall, say $12. Cannot say how much beef 100 pounds of corn will yield, or which stock yields the most; but the Durham stock is generally preferred for beef. For breaking steers, no particular method

Horses and Mules.—The growing of these is esteemed profitable at present prices. The expense till 3 years old for colts, $45; mules, $35 to $10. Best method of breaking, *by kindness*. Harsh treatment to the horse is productive of much evil: it injures the disposition, and makes him unsafe. So say our best horsemen.

Sheep and Wool.—Our farmers consider the growing of sheep and wool, at present prices, as profitable as any branch of their business, if not the most so; but they do not expect the last year's prices to continue. Cost of growing coarse wool, per pound, about 18 cents; for fine, about 25 cents. I can hear of no experiments having been tried to ascertain how much wool a given quantity of hay would produce.

I believe our farmers prefer to raise good-sized sheep, although the wool should not be as fine as best Saxony; they then have more wool, and the sheep are worth more for mutton. For that purpose, they cross the Saxony with the French merino, and other large sheep. The proportion of lambs annually raised to the number of ewes is, I am informed, about 75 to the 100 ewes.

Hogs.—A considerable number of hogs are annually raised and fattened in the county; but the most approved breeds have not been introduced. No experiments have been made to ascertain the comparative merits of the different breeds, the best modes of feeding, or the best methods of curing pork and bacon.

Hemp.—No hemp has as yet been grown in the county; but I have no doubt that our lands (especially the plains) are well adapted to the culture of hemp, and that it would pay much better than wheat.

Turnips, Carrots, Beets, &c., are not cultivated as *field crops*, at least so as to be used as feed for stock, to any great extent.

Potatoes.—The *rot* has so completely destroyed the potato for some years past, that few are now cultivated. No variety appears to be exempt from the disease; no remedy known which has proved of much service. Some think they have found benefit by the use of *lime*, applied so soon as the potatoes are taken from the ground. The lime dries the surface, and it also prevents the disease from communicating from unsound to sound ones.

Fruit Culture.—The culture of fruit, particularly of apples, has for many years past received considerable attention. Many of the best varieties known in the United States have been introduced; and most kinds grow well, and are of equal flavor with those of any part of the State. The crop is usually good; but within a few years it has been much injured by an insect, which stings the apple when young, and deposits its egg, which produces a worm, that eats and destroys the core of the apple, and causes decay. No remedy has been discovered to prevent its ravages. Should this evil subside, and our projected railroads be completed, affording cheap transportation to the East and South, the apple crop will be quite productive.

The peach crop is quite uncertain; the blossom buds generally get winter bitten; yet when they escape, the crop is sometimes large, and the quality good.

Grapes.—The few experiments which have been tried with the grape go to prove that it could be cultivated to advantage in many parts of our county whenever it shall receive proper attention.

Manuring.—No experiments have been instituted to test the relative value of the different manures—no lime or plaster, and, so far as I can ascertain, certainly no *guano*. We have in this county several beds of *shell-marl* as good as to be found anywhere; but it has not been tried as a manure.

BUCYRUS, OHIO, *January* 5, 1852.

SIR: I have succeeded in raising a crop of corn the past season, the debit and credit of which stand thus:

Dr.		Cr.	
To 10 days ploughing...	$10 00	By 700 bushels corn....	$218 75
5 days harrowing...	5 00	Fodder............	75 00
2½ days marking out	1 87½	14 two-horse loads pumpkins........	10 50
8 days planting.....	4 00		
2½ bushels seed.....	62		
Going through with cultivator.........	3 00		
Going through with shovel-plough....	3 00		
Cutting and shocking	5 00		
Interest on value of land............	18 00		
Taxes............	1 20		
Whole cost......	$51 69½	Amount...........	$304 25

I find, by careful comparison, that the fodder on each acre is worth more than 1½ ton of my best hay for feeding sheep or cattle, the market value being $5 per ton for hay. These figures make the fodder exceed in value the whole cost of production $24 31, which will pay for boarding and husking—items not included above—amply, leaving all the corn and pumpkins as net profit.

The 10 acres on which this was raised have been in cultivation 12 years; it is rather a low price of ground, and has paid as great an annual profit, I think, as any in this vicinity. I see as much of the elements of crops in it at present as when first cultivated—a matter of vast consequence to the farmer. The above result is nothing more than every man, by ordinary good farming, can obtain if he will abstain from making an annual dividend at the expense of his capital. I know of no other source from which Hudson (the so-called Railway King) could have borrowed his system of management, unless our American farmers suggested the idea.

I have computed the labor and the crops at their market value, and am not able to see any error in my calculations. My plan will be to feed all the produce of this field, and return the manure so made back; give a thorough ploughing and harrowing, plant and cultivate as before, and seed with clover; then go through with the cultivator the last time; by which means as good or a better crop of corn will be obtained, and the field not exhausted. I have omitted to state that the field had been used as a pasture the season previous to planting with corn. I have been cultivating the Osage orange, as a substitute for rail fence, for three years; have sown a quart of seed each spring. The first quart was carefully sown, after soaking a number of days in warm water, from which I obtained nearly 1,200 plants, one-third not germinating until the second spring. The second quart, treated similarly, did not produce 100 plants. On the 30th of last April I sowed the third quart of seed, which had been soaked in warm water 5 days, to which I added as much saleratus as I could take up with my thumb and finger, repeating the dose as often as necessary. As soon as sown, the rows of seed were covered with boards, which were not taken off until some of the plants had made their way up to them. I think every seed must have vegetated, as it produced about 8,000 plants. I think 1½ inch the right depth to cover the seed, and that it is essential to have the soil deep, mellow, rich, and moist. My plan of planting the hedge has been to throw up land, ten feet wide, with the plough, going as deep as possible; harrow until well pulverized; strike a furrow on the centre, straight as a line; stretch a line over the centre of the furrow, put in the plants, 14 inches apart, carefully pressing the soil around them, and placing them exactly where wanted. I cultivate a row of potatoes, or some other vegetable which will not shade them, on each side the first and second seasons. As to their capacity to stand transplanting, I will state that, in 28 rods of two-year-old plants, put out last spring, not a single failure occurred. They were cut off at the surface of the ground when planted. They now stand nearly 5 feet in height. It is my impression that any clipping the first summer retards their growth. Taking all things in view, two-year-old plants are the best for setting. They require less attention, and make a fence quicker. The expense of preparing ground and planting will not exceed 10 cents per rod. There is a large portion of northwestern Ohio that is level, and abounding in low grounds that are more or less overflowed with water every season, which prevents their otherwise profitable culture. The soil being of the most fertile description, makes the draining of them very desirable, aside from the influence they exert upon the health and appearance of the country. They scarcely need a drain exceeding 18 inches or two feet in depth. Digging them with the shovel being a laborious, costly, and otherwise objectionable method, induced me to try ox-power for the purpose. I first ploughed, where I wished the drain, to the right width, and as deep as I could; then took a scraper and hauled the dirt into the low places adjoining them by improving the surface; if not deep enough, ploughed again, or until of the required depth.

The Report from your Office is annually diffusing much valuable information through our land. It is to be regretted that so many of them find their way to those who make politics, instead of farming, their business.

Yours, truly,

BENJAMIN SEARS.

Hon. THOMAS EWBANK,
Commissioner of Patents.

MOUNT GILEAD, MARION COUNTY, OHIO,
December 2, 1851.

SIR: Your Circular, making inquiries in relation to the agricultural products of the county, came to hand by the politeness of Mr. Chase; and I embrace the earliest opportunity possible to reply to your interrogatories.

Wheat.—Guano has never been used in this county; our soil is mostly a clay soil, with some muck bottom lands. Wheat is sown from the 1st to the 15th of September. An average yield is about 25 bushels to the acre. We sow about 1½ bushel to the acre. But little summer fallowing is done here; we have subsoiled some, with excellent results. Farmers are adopting the plan of ploughing from 8 to 10 inches deep. The average price of wheat at our market during 1851 has been about 55 cents for white wheat. I am satisfied that the best system of rotation on our soil is to turn sod and subsoil for corn; sow oats the next spring; and after seeding with oats, seed with wheat; then with clover.

Corn.—Our average crop of corn is about 50 bushels to the acre; average price, 28 cents per bushel. The average quantity of hay, per acre, is 2 tons; seeds preferred are clover and timothy, mixed. Average price of cheese, per pound, 6 cents; butter, 10 cents. Value of good dairy cows in the fall, $14; in the spring, $18. I think the best plan of breaking steers is to take them at the age of one year, when easy to handle; or to yoke them with oxen already broken.

Wool growing is considered profitable. Considerable excitement has existed in the wool-market, and consequently among wool-growers here, during the past season. Ordinary flocks sold readily last spring, after shearing, at $1 each. Thus 100 head would cost.......... $100 00

Thus 100 head would cost	$100 00
Interest on $100	6 00
Cost of keeping 100 head of ordinary sheep one year	75 00
Total	181 00

But to make it safe, we will estimate the cost at $200. Estimating the profits on the wool taken from 100 sheep of ordinary quality, and allowing 3 pounds per head, we have—

300 pounds of wool, at 35 cents per pound	$105 00
45 lambs, above loss of flock	45 00
100 sheep on hand	100 00
Total	250 00
Deducting cost of flock and keeping	200 00
Clear profit on 100 sheep, or 50 per cent. profit	50 00

This is a low calculation, and provides for graining the sheep during the winter.

We will next take a flock of fine Pennsylvania merino sheep:

100 head, at $2 50 per head	$250 00
Interest on $250	15 00
Keeping (in keeping, we find sheep with grain)	100 00
Total expense	365 00
Wool on 100 head of fine merino sheep, allowing 3 pounds per head, 300 pounds; which, at 50 cents per pound	$50 00
45 lambs, above loss of flock, at $2 50 per head	112 50
Worth of original flock	250 00
Total	512 50
Deducting expenses	365 00
Clear profit on 100 sheep	147 50

or 59 per cent. in favor of fine wool.

For mutton the ordinary sheep will excel. These fine-wool sheep can only be sold at those prices for stock-sheep, and raising wool. Again, take 100 head of fine three-quarter blood French or Spanish merino,

Vermont stock, at $10 each	$1,000 00
Interest on $1,000, at 6 per cent	60 00
Cost of keeping	100 00
Total expense	1,160 00
Weight of wool on 100 such sheep, at 6 pounds per head, 600 pounds; 600 pounds, at 50 cents per pound	$300 00
45 lambs, above loss of flock, at $10 each	450 00
Original stock	1,000 00
Total	1,750 00
Deducting expenses	1,160 00
Clear profit	590 00

or 59 per cent. on $1,000.

The last mentioned, being large bodied, are considered best for mutton.

We offer another calculation on 100 native sheep, at 75 cents per head:

Cost	$75 00
Interest on $75	4 50
Keeping 100 head native sheep, 75 cents each	75 00
Total expense	154 50
Weight of wool on 100 native sheep, allowing 2½ pounds each, 250 pounds; 250 pounds, at 30 cents per pound	$75 00
45 lambs, above loss of flock, at 75 cents per head	33 75
Worth of original flock	75 00
Total	183 75
Deducting expenses	154 50
Clear profit	29 25

or 39 per cent. on $75.

This calculation is, I think, about correct. It will be noticed that it requires a much larger capital for high-priced fine-woolled sheep than the same number of coarse; yet, with the latter, if the wool grower realizes the same amount of money, he must keep many more sheep, and consequently invest more in land, when he would not realize as much profit. Our most noted wool-growers are J. Mosher; Jonathan Wood; Stephen Brown, Mt. Gilead; McKibbor, Smith's Mills; Gilmore, Culmary, & Elliot, of Iberia.

I am, most respectfully, yours,

SAM'L N. WOOD.

Hon. Thos. Ewbank.

Galena, Delaware County, Ohio,
December 29, 1851.

Sir: The best method of raising *wheat* in this portion of the State of Ohio is to break a clover sod in the fore part of August, and turn under a half growth of the clover; let it lie from 3 to 5 weeks, then harrow thoroughly lengthwise of the furrow, and sow 1½ bushel of seed to the acre, and harrow both ways; all done before the 20th of September. Harvest, from the 4th to 15th of July; average crop, 15 bushels; worth, this year, 50 cents. We have a surplus, and no foreign demand; therefore, a very low price. Soon after the wheat is harvested, the stubble should be ploughed under 6 to 8 inches deep, and lie till the following spring, when one light ploughing will fit the ground for oats or corn.

Land thus prepared, and well tended, will average 50 bushels of *corn* to the acre; and, where it is designed for fattening steers, it is cut and shocked in the fore part of September, and drawn thence to the pasture lots altogether, and fed to cattle once per day during winter, which suffices for fodder and grain, and proves to be a profitable way of feeding corn to cattle.

This land is next ploughed in the spring for *oats*. It is desirable to sow in March, if the land is dry. One ploughing is sufficient. Sow 2 bushels of seed to the acre, and harrow; then sow 4 quarts clover and 4 quarts timothy seed, and harrow once more. This fits the land for pasture or mowing, in which state it is to remain 2 or 3 years before ploughing again. Land thus farmed, if well ploughed and thoroughly tilled, will improve for a succession of years.

Oats will produce from 40 to 50 bushels to the acre; worth 16 to 20 cents; and are considered a very exhausting crop.

We have here an article of winter *barley*, which should be sown and treated similar to winter wheat, and will be fit to harvest 10 days sooner; produces 40 to 50 bushels to the acre; weighs heavy, and sells readily at 1 cent per pound. It is considered a very profitable crop.

Beans will produce 10 to 12 bushels to the acre; are only raised for home consumption; worth $1 per bushel.

Clover and Timothy are our best grasses, and produce most hay or pasture when sown together; quantity of hay, about 1½ ton per acre. Clover, as a green crop, is far the best fertilizer, and should be sown early in the spring, 8 quarts per acre; should not be pastured first year. It will then produce a large amount of pasture for 1 or 2 years, and is fit to turn under for wheat.

Dairying is rather a new business for profit here; still, it is apparent that it is a money-making business.

Neat Cattle.—The price of cows varies between fall and spring from $15 to $20 for common stock cows. Durhams or improved breeds here are worth from $35 to $60, and will take on 25 per cent. more flesh, all other things being equal, than other cattle; are more peaceable and more profitable. The best oxen are made by breaking when quite young. Most farmers have boys who can yoke the steers before they are 1 year old. They are then easy to handle, and will do a little work at odd times, and become perfectly handy by the time they are three years old; and then, if well kept two years, will make a fine team.

Raising *horses and mules* is profitable. Colts can be raised until they are 5 years old for $10 per year, and will then be worth $75 to $100.

Mares that raise colts should graze in pastures summer and winter, with stacks of hay to eat from in winter. Colts would be benefited by having a little extra care the first winter of their lives; after that, the same range with the mares till five years old.

Wool-growing is a profitable business in this portion of Ohio. Sheep are healthy. A grade of wool between coarse and fine is most profitable. It will weigh more to the sheep, or fleece, than most others, and sell at a nearer price to the fine than its reality would seem to indicate; then the sheep are heavier and better for mutton than even the coarse kind. The average weight of fleece 3 pounds, and sold this year at 35 to 40 cents per pound. The proportion of lambs raised, about 75 from 100 ewes.

Hemp growing has been a profitable business, but is less raised on account of scarcity of hands to break and fit it for market. It produces about 600 pounds to the acre, and can be raised for $13 per acre.

Irish Potatoes are grown only for the table. They produce poorly—in many cases not over 100 bushels to the acre—and sell at 25 cents per bushel, unless scarce; therefore it is much more profitable to raise corn than potatoes. We frequently get as many bushels of corn per acre. It can be raised with the same tending, and not half the labor of planting and harvesting.

The Culture of Orchards has met with much attention for a few years past. Good fruit is not only valuable at home, but commands a good price and ready sale in all the towns and villages. I have no doubt a better profit can be realized from land set in choice orchards, even to feed stock, than from any kind of root crops. We have many kinds of good keeping apples; among them, of good keepers, are the Rhode Island greening, Roxbury russet, golden russet, Spitzenberg; and, finally, some of the Rambo keep well, and are excellent at all times.

Grasses.—I am told that, in Seneca county, Ohio, they have found a timothy sod better for wheat than clover, on account of winter-ing better. If so, it is worthy of particular consideration, for winter killing is of great damage to our wheat; and not only that, a timothy crop is far more valuable than clover, the hay always selling for 25 per cent. more than any other. I wish it were definitely understood that no grass is so valuable for hay as timothy, or herdsgrass.

Respectfully, yours,

NATHAN DUSTIN.

Hon. Thomas Ewbank,
Commissioner of Patents.

Milford Centre, Union County, Ohio,
December 25, 1851.

Sir: Your Circular was duly received, and I will proceed to answer your inquiries as well as my limited knowledge will permit.

Wheat.—Union county grows comparatively little—not much more than her home consumption. Our soil is adapted to grazing. Principal products, corn, beef, pork, butter, cheese, hay, and wool. There is no guano used in the county.

Corn.—Average yield per acre, 40 bushels. Cost of production, about 10 cents per bushel. Best mode of culture: plough 8 to 10 inches deep, plant in rows 3½ feet each way, or 4 feet one way, and drill 10 to 12 inches; stir the ground often (say twice a week) with plough and cultivator. Best method of feeding where corn is cheap, as it is here, (from 15 to 20 cents per bushel,) is that which requires the least labor; it will not do to grind or cook.

Clover and Grasses.—Quantity of hay per acre, 1½ ton; grass seeds preferred in laying down are clover and timothy. There should be 8 pounds of each used to the acre. Red-top used on moist land. Cost of hay in the stack, $2. Value of hay per ton, from $3 to $4; difference owing to its being near or remote from a village.

Dairy Husbandry.—Average yearly produce of butter and cheese, 300 pounds per cow. There have been instances of obtaining 500. Comparative cost, about 3 pounds of cheese, equal to 2 of butter.

Those who follow cheese-making here make very little butter until after the middle of October. They set their milk in pans or crocks, let it stand from 24 to 36 hours, then skim and let the cream stand as much longer, then churn in Crowell's patent thermometer churn. Common sack salt is used; buttermilk all worked out, then put down. No other substance is used. Average price of butter, 12½ cents per pound. Cheese, 5 cents at the place where manufactured.

Neat Cattle.—Cost of raising till 3 years old, from $12 to $18—average, say $15. Value at that age, from $15 to $30, according to size and quality—average, say $22. Value of good dairy cows in the fall, about $12 50; in spring, $20. I will merely observe, that our best farmers consider it necessary that their stock of all kinds should be furnished with a full supply of straw, &c., in their yards, stalls, or pens; and that the manure, when made, should be protected, as much as possible, from the heat of the sun and drenching rains.

Breaking Steers to the Yoke.—My plan is (and I have broken a good many) to break them the winter before they are two years old. First get them into the yard; then into a small pen, so strong that they cannot break out; then feed them corn-nubbing, and handle them gently. Get them yoked, if possible, before they are aware of it; then feed them more corn. Now hitch them behind a steady yoke of cattle; drive them around awhile; then feed them more corn; now make them fast, and then unyoke them, and feed a little more corn. Repeat the whole operation the next day twice, morning and evening; do not forget the corn. The third day put them in the lead. Handle them a little every day, morning and evening; yoke and unyoke every time. Do not beat them. If you cannot make them do as you wish, and get vexed with them, do not abuse them, but feed them corn. You will soon be able to drive them alone. This should be done soon, as they never will be broken right without. Now, if you have a small stock and a light sled, they will haul enough to feed them; and this will be enough for them to do morning and evening, and they will very soon be quite handy. But mind, you must give them corn every time you yoke, and enough, until they become quiet, so that you can handle them and get up to them in any place, and they never will forget it, but continue quiet and gentle all their lives.

Wool-growing is a good business. There is comparatively little difference in growing coarse or fine wool here. Cost per pound, 20 cents. Merino is more profitable than Saxony, however. The difference in price does not compensate for the difference in weight. We have to depend principally on the fleece here at our distance from market. A company have imported here from France, the past season, a lot of the Rambouillet sheep. Their average weight of fleece (in the dirt) was 13 pounds; live weight of heaviest ewe, 187 pounds; live weight of heaviest buck, 220 pounds. Sold the wool at 30 cents per pound. Wool has ranged (that is, the last clip) from 33 to 48 cents per pound, washed. Proportion of lambs to ewes in small flock, one to the ewe; large flocks, unless there is extraordinary care taken, one-fourth less.

A large proportion of Union county is yet comparatively new and unsettled. Some excellent stock are in the south part of it.

Respectfully, yours,

ELIPHAZ BURNHAM.

Hon. THOMAS EWBANK,
Commissioner of Patents.

TARLTON, PICKAWAY COUNTY, OHIO,
December, 1851.

SIR: I received your Circular of August, 1850, through the politeness of the Hon. Edson B. Olds, representative in Congress from this district, on the 26th of October last. The time being short, and I not aware of being called upon to answer any such questions, and the lack of education, and my imperfect knowledge of agricultural chemistry, I fear will render me incapable of replying in a satisfactory manner; yet the interest I have always taken in agricultural pursuits prompts me to say something. It will be a plain, simple statement of facts, of which you can make such disposition as you think proper.

There are four things that all farmers should strictly attend to: 1st, good fences; 2d, good cultivation in good time; 3d, save all manure and everything that will fertilize the soil, and apply it in time; 4th, good care of, and economy with all things.

Manure is one of the most particular things that all farmers should pay strict attention to, and see that it is all saved and well applied. I know nothing of agricultural chemistry only what nature and experience have taught me; and do not credit the statements of learned chemists, such as Liebig, and a host of others, who contend that vegetation receives the greatest part of its nourishment by and through the atmosphere—a thing reason and nature will not admit of. If such statements be true, I have toiled and labored with manure 50 years in vain; that is, if 98 loads of manure out of 100 are in vain.* In my opinion there is but one way that manure can be kept till it is decomposed without losing some of its virtue, and that is in a manure-cellar. (See Patent Office Report of 1848, page 363.) The next to manure is lime; as for plaster or guano, it is not used in this section of country. The quantity of lime to be applied is immaterial; there is little danger of applying too much if mixed with the soil. In a freestone soil, lime is equal to manure, if not preferable. In this section of country, our lime is all burnt of pebble stone, taken out of the Scioto river and smaller streams; there is no rock limestone in the Scioto valley south of Columbus, while north it is in abundance. Lime out of pebble stone is better for land than that which is burnt out of rock stone. In the year 1839 I put up a brick building; I hauled out all the rubbish and riddlings of lime, which was about four loads, on to a quarter of an acre, which has ever since produced a fourth more than any other part of the field of all kinds of grain. I formerly thought no soil could be fertilized by its own productions; but long experience has taught me otherwise. I commenced improving in the woods in 1808, and have lived on my farm since 1812; it was a thin, white-oak soil—the most of it. When I first commenced, I had to burn considerable logs, brush, &c.; but, by trying experiments, I have ascertained that the brush, litter, and leaves, taken from one acre of new land when first cleared, and spread on an acre of old worn-out land, and let lay a year or two, will make it equal to new land, if not better. There is not an acre of my cleared land that is not better now than when first cleared; but it has cost me labor, attention, and care. I burn nothing on the farm except wood in the house, &c. I do not agree with some learned chemists, who say burn your straw and carry out the ashes, and your land receives all the nutriment it drew out. I have a neighbor that tried that to his sorrow. I burn nothing. Stubbles, weeds, briars, and even stumps—draw them out on a poor spot.

In this section of country *wheat* and *corn* are the principal crops, though other kinds of grain are raised to a considerable extent. The corn this year is considerably better than last—I am not able to say to what per cent. I expect it will be made known by abler hands than myself. One thing I will state: A. R. Foreman & Co., in Wayne township, measured one acre of a field of 300 acres, which yielded 150 bushels. In this section of country we cut up all our corn and shock it in 12, and some in 16 hills. Square 16 is rather large; if the season is wet it is apt to mould; it is then generally husked out (when dry) in the field; the fodder reshocked for feed through the winter. I have taken a different plan: I built a shed by planting forks of white oak, which were about a foot in diameter, which have been in the ground 21 years. As soon as my corn is dry, I haul it into my yard, husk it, and put my fodder in the shed. In this way I lose nothing, and have my fodder dry all winter for feeding, and feed on the same yard all winter; and against the middle of August it is ready for hauling out, and is the best manure that can be applied on wheat land. I have often been surprised to see most of our farmers feeding their fodder outside of the fences and in the roads, and losing all their substance. Those that feed fat cattle feed corn and all together in feed lots. I know a number of feed lots that have been fed on several years that are apparently as rich as land can be made.

As to your last question—*time and degree of highest and lowest range of thermometer*—I have kept a journal for the last two years, and I know no other way than to copy the last year, though I expect it will be of no service, as I only took the degrees of the thermometer each day at sun-

[* No chemist teaches the doctrine that "98 loads of manure out of 100 are in vain" or worthless. Our correspondent is fighting a windmill of his own setting up. His theoretical views are of no value; but his suggestions in farm economy are worthy of attention.]

rise; therefore, I cannot give the range. The thermometer is placed in a fair exposure to the northeast, and out of the rays of the sun. We have a changeable climate, as will be seen by my journal. I have frequently known it to change from 10 to 20 degrees in 6 hours. It appears that we are situated between two climates: south—say, for instance, in the neighborhood of Chillicothe, which is 20 miles—the harvest is generally from 6 to 10 days earlier than here. I have seen it frequently. Their apple blossoms were all shed off when ours were in full bloom; and north from us—say 40 miles—it is about that much later.

Abstract of my Journal for the year ending December 1, 1851, *in Salt Creek township, Pickaway county, Ohio.*

Date.	Thermometer.	The weather.	Date.	Thermometer.	The weather.
1850.	*Degrees.*		1851.	*Degrees.*	
Dec. 1	42	Cloudy.	Jan. 14	34	Clear.
2	52	Rain.	15	48	Cloudy.
3	36	Cloudy.	16	36	Thunder.
4	38	Rain.	17	29	Clear.
5	39	Rain.	18	6	Smoky.
6	32	Snow.	19	14	Clear.
7	36	Sleet.	20	38	Smoky.
8	28	Snow.	21	17	Clear.
9	26	Cloudy.	22	46	Smoky.
10	28	Cloudy.	23	35	Clear.
11	32	Cloudy.	24	36	Clear.
12	44	Cloudy.	25	28	Clear.
13	26	Cloudy.	26	45	Clear.
14	21	Cloudy.	27	40	Clear.
15	36	Rain.	28	42	Cloudy.
16	26	Rain.	29	14	Cloudy.
17	28	Cloudy.	30	3	Clear.
18	22	Clear.	31	0	Clear.
19	44	Rain.	Feb. 1	16	Cloudy.
20	26	Cloudy.	2	33	Snow.
21	21	Clear.	3	34	Smoky.
22	37	Rain.	4	34	Cloudy.
23	30	Snow.	5	34	Clear.
24	13	Storm.	6	33	Clear.
25	21	Snow 6 in-	7	34	Cloudy.
26	27	ches deep	8	56	Rain.
27	24	Cloudy.	9	60	Clear.
28	30	Rain.	10	24	Snow.
29	29	Snow.	11	35	Cloudy.
30	18	Clear.	12	24	Clear.
31	20	Cloudy.	13	35	Clear.
			14	49	Rain.
1851.			15	50	Snow.
Jan. 1	20	Clear.	16	22	Cloudy.
2	23	Clear.	17	20	Clear.
3	28	Cloudy.	18	32	Clear.
4	31	Cloudy.	19	34	Clear.
5	29	Cloudy.	20	50	Rain.
6	40	Cloudy.	21	55	Rain.
7	36	Cloudy.	22	42	Cloudy.
8	34	Cloudy.	23	44	Rain.
9	54	Thunder.	24	66	Thunder.
10	38	Cloudy.	25	36	Clear.
11	32	Cloudy.	26	46	Cloudy.
12	38	Cloudy.	27	60	Smoky.
13	35	Cloudy.	28	37	Snow.

ABSTRACT—Continued.

Date.	Thermometer.	The weather.	Date.	Thermometer.	The weather.
1851.	*Degrees.*		1851.	*Degrees.*	
Mar. 1	26	Clear.	May 1	44	Heavy frost.
2	32	Clear.	2	29	Fruit killed.
3	23	Clear.	3	37	
4	43	Cloudy.	4	50	Rain.
5	46	Clear.	5	36	Frost.
6	37	Snow.	6	40	Frost.
7	31	Cloudy.	7	43	Frost.
8	32	Snow.	8	56	Clear.
9	28	Clear.	9	62	Clear.
10	32	Cloudy.	10	61	Rain.
11	40	Cloudy.	11	60	Clear.
12	38	Clear.	12	72	Clear.
13	38	Clear.	13	76, 88 at noon.	Clear.
14	39	Clear.	14	71	Clear.
15	50	Rain.	15	56	Clear.
16	54	Fog.	16	64	Clear.
17	44	Rain.	17	65	Rain.
18	38	Rain.	18	66	Rain.
19	32	Cloudy.	19	64	Clear.
20	40	Clear.	20	70	Rain.
21	32	Clear.	21	64	Clear.
22	40	Rain.	22	70	Cloudy.
23	42	Snow.	23	74	Cloudy.
24	46	Clear.	24	44	Frost.
25	42	Clear.	25	56	Clear.
26	62, 72 at noon.	Clear.	26	46	Clear.
27	64	Clear.	27	76	Clear.
28	46	Rain.	28	74, 92 at noon.	Clear.
29	46	Cloudy.	29	72	Rain.
30	68	Cloudy.	30	68	Rain.
31	64	Cloudy.	31	54	Cloudy.
April 1	48	Rain.	June 1	70	Clear.
2	64	Cloudy.	2	68	Clear.
3	44	Clear.	3	42	Clear.
4	48	Clear.	4	68	Rain.
5	64	Rain.	5	64	Clear.
6	44	Frost.	6	68	Rain.
7	42	Frost.	7	76	Clear.
8	58	Rain.	8	67	Clear.
9	40	Cloudy.	9	58	Clear.
10	58	Frost.	10	53	Clear.
11	48	Clear.	11	64	Clear.
12	32	Frost.	12	68	Clear.
13	44	Rain.	13	65	Clear.
14	43	Rain.	14	55	Clear.
15	36	Snow.	15	57	Clear.
16	36	Cloudy.	16	64	Clear.
17	45	Cloudy.	17	62	Clear.
18	30	Clear.	18	62	Clear.
19	56	Rain.	19	58	Clear.
20	43	Frost.	20	68	Clear.
21	44	Heavy frost.	21	70	Clear.
22	36	Cloudy.	22	70	Rain.
23	36	Clear.	23	68	Clear.
24	45	Clear.	24	54	Clear.
25	52	Light snow.	25	60	Clear.
26	50	Clear.	26	70	Rain.
27	56	Clear.	27	72	Rain.
28	45	Clear.	28	70	Fog.
29	49	Rain.	29	76	Clear.
30	46	Frost.	30	75	Rain.

ABSTRACT—Continued.

Date.	Thermometer.	The weather.	Date.	Thermometer.	The weather.
1851.	*Degrees.*		1851.	*Degrees.*	
July 1.....	62	Clear.	Sept. 1.....	74	Clear.
2.....	59	Clear.	2.....	74, 92 at noon.	Clear.
3.....	66	Clear.	3.....	60	Heavy rain.
4.....	54	Clear.	4.....	68	Clear.
5.....	62	Clear.	5.....	68	Clear.
6.....	68	Clear.	6.....	70	Clear.
7.....	74	Rain.	7.....	72	Clear.
8.....	70	Rain.	8.....	73	Clear.
9.....	74, 91 at noon.		9.....	94	Clear.
10.....	77	Rain.	10.....	74, 93 at noon.	Clear.
11.....	70	Clear.	11.....	76, 94 at noon.	Clear.
12.....	69	Clear.	12.....	79, 95 at noon.	Clear.
13.....	76	Clear.	13.....	76, 94 at noon.	Clear.
14.....	68	Clear.	14.....	68	Cloudy.
15.....	68, 88 at noon.	Clear.	15.....	54	Clear.
16.....	76, 90 at noon.	Clear.	16.....	56	Clear.
17.....	74, 93 at noon.	Clear.	17.....	57	Clear.
18.....	71	Fog.	18.....	57	Cloudy.
19.....	70	Rain.	19.....	64	Cloudy.
20.....	60	Clear.	20.....	62	Cloudy.
21.....	64	Clear.	21.....	64	Clear.
22.....	67	Clear.	22.....	68	Cloudy.
23.....	72	Clear.	23.....	72	Rain.
24.....	74	Rain.	24.....	58	Light frost.
25.....	72	Clear.	25.....	47	Light frost.
26.....	76, 91 at noon.	Clear.	26.....	55	Cloudy.
27.....	80, 92 at noon.	Clear.	27.....	52	Rain.
28.....	78	Cloudy.	28.....	46	Rain.
29.....	68	Rain.	29.....	48	Rain.
30.....	68	Rain.	30.....	48	Clear.
31.....	74	Clear.			
Aug. 1.....	64	Clear.	Oct. 1.....	48	Clear.
2.....	62	Cloudy.	2.....	52	Clear.
3.....	67	Rain.	3.....	59	Clear.
4.....	70	Cloudy.	4.....	54	Clear.
5.....	67	Heavy rain.	5.....	48	Clear.
6.....	68	Clear.	6.....	48	Clear.
7.....	76	Clear.	7.....	48	Clear.
8.....	74	Large rain.	8.....	52	Clear.
9.....	66	Clear.	9.....	60	Clear.
10.....	76	Rain.	10.....	60	Clear.
11.....	72	Rain.	11.....	62	Clear.
12.....	70	Fog.	12.....	65	Cloudy.
13.....	63	Fog.	13.....	56	Rain.
14.....	66	Clear.	14.....	47	Clear.
15.....	76	Clear.	15.....	44	Clear.
16.....	76	Clear.	16.....	42	Clear.
17.....	67	Rain.	17.....	41	Clear.
18.....	68	Rain.	18.....	52	Rain.
19.....	66	Clear.	19.....	56	Rain.
20.....	68	Clear.	20.....	48	Clear.
21.....	72	Clear.	21.....	48	Rain.
22.....	68	Rain.	22.....	44	Clear.
23.....	65	Clear.	23.....	36	Clear.
24.....	61	Clear.	24.....	36	Clear.
25.....	70	Clear.	25.....	54	Rain.
26.....	59	Clear.	26.....	38	Snow.
27.....	52	Clear.	27.....	26	Cloudy.
28.....	68	Clear.	28.....	41	Cloudy.
29.....	64	Clear.	29.....	55	Cloudy
30.....	60	Clear.	30.....	60	Rain.
31.....	70	Clear.	31.....	56	Fog.

ABSTRACT—Continued.

Date.	Thermometer.	The weather.	Date.	Thermometer.	The weather.
1851.	*Degrees.*		1851.	*Degrees.*	
Nov. 1.....	56	Clear.	Nov. 16.....	40	Clear.
2.....	52	Rain.	17.....	39	Clear.
3.....	42	Cloudy.	18.....	34	Clear.
4.....	36	Clear.	19.....	33	Clear.
5.....	34	Snow.	20.....	40	Rain.
6.....	35	Snow.	21.....	38	Clear.
7.....	28	Clear.	22.....	32	Clear.
8.....	38	Cloudy.	23.....	34	Clear.
9.....	38	Snow.	24.....	35	Clear.
10.....	28	Snow.	25.....	30	Snow.
11.....	34	Cloudy.	26.....	29	Clear.
12.....	40	Rain.	27.....	34	Clear.
13.....	56	Rain.	28.....	42	Cloudy.
14.....	58	Rain.	29.....	28	Clear.
15.....	50	Cloudy.	30.....	37	Cloudy.

The coldest days were in January—on the 18th, at sunrise, the mercury was 6° above zero; on the 30th, 3° above; and on the 31st, precisely at 0. The warmest days were in September—the mercury was, on the 10th, 93°; 11th, 94°; 12th, 95°; 13th, 94°. The season was very dry in June, July, August, September, and October.

Very respectfully, your most obedient servant,

WILLIAM JULIEN, SEN.

Hon. THOMAS EWBANK,
Commissioner of Patents.

GALLIPOLIS, GALLIA COUNTY, OHIO,
November, 1851.

SIR: Through our mutual friend, the Hon. D. C. Goddard, I had the pleasure of receiving a package of Agricultural Circulars, which I promptly forwarded to such of the practical farmers of southern Ohio as I supposed would be enabled to give you full reports on the agriculture of that portion of the State. Should they comply with my earnest solicitations, we shall have the pleasure of seeing them in your next Patent Office Report. But, as a large portion are more practical than theoretical, in all probability they will decline the request, and southern Ohio will continue unreported. Therefore I have taken upon myself the task of saying something of the soil and agriculture of this portion of Ohio, in order to remove the impression set afloat by the State Board of Agriculture in their report to the Legislature—that this region of country was susceptible only of being used for sheep pastures. I trust I shall be able to show, most conclusively, that it is the very best portion of Ohio; and, taking into consideration the susceptibility of the whole country for agricultural improvement, and the inexhaustible partially-developed mineral wealth, it is not extravagant to say that no portion of Ohio, nor of any part of the United States, of equal extent, exceeds this in prospective wealth; which we shall take the liberty to speak of in the sequel of these desultory observations.

From the junction of the Big Scioto to the mouth of the Muskingum, and extending back some 40 miles, the physical topography presents about the same aspect of hill and dale. The first, when examined as to fertilizing ingredients, is found to contain silica, calcareous, and argillaceous compounds, in all localities, in greater or less proportions of each, and by an improved system of farming—that is, returning a *quid pro quo*, and keeping the land in heart—can, and does often, turn out from 60 to 100 bushels of corn per acre, and from 20 to 30 of wheat. The valleys or low lands are compounded of deposits of vegetable decompositions, with less portions of calcareous ingredients, based on an argillaceous subsoil, with an adaptation to corn and Irish potatoes more particularly; and, when deprived of its vegetable exuberance, is well adapted to wheat culture. In a latitude of 39°, and in the valley of the Ohio, all products of the temperate zone grow well. Corn is planted in lands already exhausted, and in lands well kept up: the average crop is reckoned at about 35 bushels per acre the present season; which is about an average, in a series of five years, of ordinary seasons.

Wheat is cultivated with more system and care than corn, as it is one of the staple articles of agriculture. From results well ascertained, it is believed the average crop this season is about 15 bushels. The season was remarkably favorable. The spring was wet and cool, and wheat, even in poor lands, shot up and was hastened to maturity, and generally harvested in June, without the presence of fungus, or rust, or Hessian fly. The berry was full and plump, weighing about 62 pounds to the bushel; and never have the millers turned out a better article of flour than is about being shipped to southern markets.

When lands are kept in heart by a rotation of crops or fertilizers, bountiful crops are taken off; but when kept in corn until run down, and then sown in wheat, the crop is invariably small. Many are now going on with a regular rotation of clover and cereal crops, and occasionally bringing in a crop of corn; by which a full remuneration for labor is obtained. When it is supposed that wheat designed for seed contains the embryo of weevil or Hessian fly, previous to being sown it is soaked in alkali, which effectually destroys it. By many, blue grass is preferred as a fertilizer.

Oats succeed well here in an ordinary season; it averages about 40 bushels per acre. With wheat, it is also cultivated for exportation. Since the Mexican war has terminated, it does not command a price to remunerate the labor of cultivating; but our farmers are habituated to cultivating various crops, and continue it more particularly for home consumption; the surplusage is sold for foreign or southern markets.

Potatoes grow well, and on good lands, well adapted to potato culture, 200 bushels are taken from each acre. Those of early varieties, set early in March, and kept clean, need no other labor, and will mature by the 1st of August, and are harvested in September, and sent to market on the first tide in the Ohio. At the present time, on the margin of this county, (Gallia,) there are over 50,000 bushels of potatoes now on flatboats, attached to the Ohio shore, awaiting a tide to go off; they readily command, when dug, 30 cents per bushel.

Beans are an important branch of agriculture in this portion of Ohio. One of our most extensive merchants and produce-dealers is of opinion that some 6,000 bushels will go from this county (Gallia) the present season. While out obtaining that information, and on making inquiry what number of barrels of flour would be shipped from the steam-mills of this county during the present season, one of our largest operators informed me that it would reach some 20,000 or 30,000.

Grasses.—Hay is also an export article, and was most abundant during the past season. On good bottom-lands, the average yield is about one and a half ton per acre. Herdsgrass, or red-top, is the predominant grass; although timothy, on dry lands, succeeds well.

Dairy Husbandry.—No great attention is given to dairy operations; but, during the spring and summer, every family makes a surplus of butter, which is sold to merchants, rewashed, and the extraneous water extracted, and packed into kegs, and sent off to foreign markets.

Cattle.—But little attention is paid to the improvement of the breeds of cattle. The common stocks are of a kind that live on browse a great portion of the winter, and short pasture in summer, and are worth, at three years old, from $12 to $16. This is the stock that best suits common farmers not provided with sheds and plenty of provender, and will be fat, with half a chance every fall, with less food than is required to fatten the improved breeds; thus enabling ordinary farmers, on small farms, to supply their families with the luxury of fat beef almost spontaneously. At the same time, a better class of farmers, with extensive pastures of luxuriant grasses, and well supplied with winter food and shelter, are paying some attention to the improvement of their stock, having some fine crosses of Durham and the stock introduced by the Scioto Company some years since.

Horses are not raised, except for domestic purposes, and but few fine horses are to be found; good draft horses are more highly prized than those for the saddle.

Some attention is paid to raising *mules*, both for domestic purposes and other markets. They readily command, at 2 years old, from $40 to $60. They are in demand, and are considered profitable stock.

Sheep and Wool attract much attention, both for home consumption and foreign markets; but few have engaged in the sheep business as an exclusive branch of agriculture. Every farmer has his flock, and many have those of the best crosses of the merinos and South Downs, and other approved stocks; and all sell wool. Large quantities are annually purchased and shipped to eastern markets; it commands remunerating prices, and is considered a profitable branch of business to those who raise wool to sell.

Some extensive woollen factories are established among and near us, and are in active operation, manufacturing fabrics for home consumption and for the people in the valley of the Ohio, and thus relieving them of the burden of duties on imports, or onerous charges for land transportation from eastern manufactories; and enabling every one, in that respect, to be independent, and consequently happy.

Hogs are not produced in great abundance. The continual demand for corn, to supply the wants of the people at the iron furnaces in our vicinity, and the Kanawha saline, distant some sixty miles by the Kanawha river, makes the stock of corn too limited to spare much to hogs; consequently, pork cannot be raised here, converted into bacon, and go into market in competition with that produced in the more fertile regions of the Western country. Tobacco succeeds well; yet but few are engaged in it beyond a home demand.

Fruits of fine varieties are being raised in this country. Apples, peaches, pears, apricots, nectarines, cherries, &c., are produced to a limited extent; but, as yet, fruit culture is in its infancy, though the day is not far distant when the valley of the Ohio will vie with any portion of the United States in the production of good fruit.

When these desultory sketches are read, the reader may at once conclude that this is truly a region better adapted to sheep-farming than other agricultural operations; but we say to such that agriculture here is not the predominant and exclusive business of the country, like the other more favored agricultural districts of Ohio. We boast of our inexhaustible beds of iron-ore, stone-coal, lime-stone, Burr mill-stone,* earths for stone-ware, fire-proof brick, with our forests abounding in timber suitable for ship-building, steam-boats, house-building, and a variety of other purposes; while we possess the enviable privilege of being in the vicinity of one of the noblest and most majestic rivers in the known world—"the beautiful Ohio."

Already is the mineral wealth of the country being developed; within the extent of forty miles are some twenty blast-furnaces in operation, turning out annually some 40,000 tons of pig-iron, worth $25 per ton—thus returning at least $1,000,000. To dig the ore, to haul it, to chop the wood to make the charcoal sufficient to make that quantity of iron, to quarry and haul the lime stone, to haul the iron to the Ohio river, and take it to market—require an expenditure of money and labor to an extent that is unknown to any but the owners. But the farmers in this region of country can bear witness to the immense quantity of beef, pork, vegetables, butter, eggs, and other agricultural products sold annually at the furnaces. The millers in the vicinity can also tell that it takes a "right smart chance" of flour to supply them. So, also, the merchants can tell what an immense quantity of shoes and boots, coffee, sugar, molasses, ready-made clothing, shovels and axes, it takes to supply them. And the two or three hundred wagons can tell how many tons of pig iron they have hauled to the river. Indeed, so lucrative is the iron business considered, that all concerned are promptly remunerated for their labor, and all are in favor of laying an import duty on foreign iron, and thus giving home manufactures an increased spur to more extended operations.

In the vicinity of the furnaces, agricultural products find a ready market, and often seemingly at exorbitant prices.

The coal business is a no less concern. The Pomeroy banks, some 16 miles above, are extensively engaged in digging and shipping coal to towns on the Ohio, and supplying steamboats. A steamboat of immense power is running in that trade, often taking down some 6 or 8 barges, averaging say 6,000 bushels; and often, on her return-trips, she propels against the stream from 8 to 13 empty barges.

[* We suspect that proper "burr mill-stone" is not found anywhere north or west of the Allegany mountains. The rock exists in Georgia, and, doubtless, to some extent, in South Carolina and Alabama. In Georgia it is extensively wrought, and is equal, in every respect, to the best French burr—being precisely similar in its geolological position and lithological character.]

If it were possible to ascertain the number of bushels mined; the hands required in all the operations of loading, going to market, selling, and delivering; together with the hands engaged in every department, and families dependent on that enterprise for support; it would be swelled to an immense amount, and astonish those not acquainted with such operations. Here, again, is a home demand for an immense amount of agricultural products. So extensive are the coal operations of the Pomeroy banks, that a town has sprung up at that locality, numbering some 2,000 persons; where but a few years since was a forest and rocky desert—fit abode of the owl and beasts of the forest. From the upper banks in Pomeroy to the Middleport banks are some four miles, and presents a continuous village, although subdivided into four local towns, united on the river. Within that distance there are perhaps some two or three merchant flouring-mills; as many, or more, steam saw-mills; one or two founderies; a rolling-mill; and many other extensive establishments, required by the enterprise and industry of the people at that place.

In addition to the blast-iron furnaces and coal operations, there is springing up another operation that will require a large number of hands, and another demand for agricultural products—we mean the *salt furnaces* about going into operation at Pomeroy, where salt water equal to the best Kanawha water has been found, and can be manufactured into salt at as little cost as perhaps at any other establishment in the Western country; to which may be added the immense *lumber trade* going on from Racoon river, in Gallia county, to Cincinnati, employing, during the winter season, an immense number of hands, who have to be fed and clad also. A large number of hands are also employed in building barges, or, in Western parlance, flat-bottomed boats, to carry off the surplus products of agriculture. And now—taking some thirty-five miles on the Ohio, and embraced in Gallia county—there are some 40 barges, loaded with agricultural products, which will depart for other markets on the first tide in the Ohio, averaging some 80 tons each. And with such an association of varied interests, acting as handmaids to each other, it will at once be seen that this part of southern Ohio is to be the favored spot in Ohio, and, in point of industry and intelligence, will outstrip many of the older portions.

We set out to write on the subject of agriculture; but it was found necessary to notice the home demand for agricultural products, and to show that all the varied interests are going hand-in-hand in making the people of southern Ohio rank among the most intelligent and wealthy portion of the western country.

I am, sir, very respectfully,

LEWIS NEWSOM.

MUSKINGUM COUNTY, OHIO.

SIR: In answer to your Circular, I send the following:

Wheat has been more than an average crop this year. I think it will be near 20 bushels per acre. There is a decided improvement in farming throughout this county. Farmers are beginning to inquire into the best modes and most advantageous manner of farming, that they may get the best yield, and, at the same time, not impoverish their land. Many are using the subsoil plough, and nowhere do they tell better than on our clay, wheat-land hills. First, they stir the ground deep, that in a heavy rain it may be prepared to retain the water, and thus prevent its washing the soil, or forming gullies. Wheat is generally sown on fallow, or after oats; but frequently two or three crops of wheat are taken in succession. This year, owing to the drought, corn ground has been sown more than usual. The average yield of our county is on the increase, as the farmers are being more convinced of the importance of ploughing deep. The prevailing kind is "*red chaff bearded;*" but the *white blue stem* is coming into favorable notice; it is thought to make the best yield, and commands from 3 to 5 cents better price; the average price this year is about 60 cents.

Seeding wheat is generally done between the 20th of September and 15th of October; but some farmers plough and seed until winter shuts in upon them, or rather shuts them out.

Harvesting is generally from the 1st to the 15th of July, and many farmers thresh from the shock with the machine; preferring that kind of machine that threshes and cleans at the same time.

Guano is not known among us yet as a farm fertilizer.

Corn this year is less than an average crop; was considerably affected by the "*wire-worm*" and *September drought.* Some few fields will not be worth taking care of for the grain; yet there will be an average of 35 to 40 bushels per acre in the county. The price varies from 25 to 30 cents per bushel, influenced by the facility to market. The principal crop is on the river and creek bottoms; and is frequently followed up year after year, for 20 or 30 years; and some bottoms have grown corn every year since the Indians left them, or the first settlement of the country.

Oats—This crop was above an average this year, and an unusual quantity was put in. The average yield may be said to vary from 35 to 40 bushels per acre, and price about 25 cents per bushel.

Barley and Rye are but seldom sown in this county.

Peas and Beans.—As a field crop, but seldom met with.

Hay has been a full crop; the average will not fall much short of two tons per acre; sells for from $6 to $10 per ton. Farmers are improving their meadows, and the quality of the hay is very much improved within a few years. Timothy prevails.

Dairy.—But a limited quantity of cheese is yet made in our county, although some farmers are turning their attention to it. Some as fine as any in the State was exhibited at our last county agricultural fair.

Butter is made in abundance for our own and foreign markets. Large quantities are annually shipped to the eastern cities, and some families of Philadelphia rely upon our county for their yearly supply; and when our great Central railroad is finished, it will be no small article of traffic. A better quality than is made by some of our farmers cannot be produced. Most of our best butter-makers are from Bucks county, Pennsylvania. The average price is from 10 to 20 cents per pound; varies with the season.

Cattle.—Some of our farmers deal considerably in neat cattle for droving and home consumption. Beef retails at from 4 to 6¼ cents in our market. The price of cows varies from $12 to $20. Durham, Devon, and Hereford are being largely introduced, and the stock thereby much improved.

Horses are principally used in this county, although mules are coming into use very rapidly; they are believed to be much more profitable, either to raise or for use.

Sheep.—Many of our farmers have entered very extensively into wool-growing; are introducing the finer grades, and find it to be profitable. There have been purchased in our town the past season 450,000 pounds of wool at an average of 40 cents per pound.

Hogs are not extensively raised in this county, and pork-packing is done but on a limited scale. Some two or three persons do something at it for a few weeks each season.

Hemp is only cultivated to a very limited extent.

Root Crops.—Roots are not extensively cultivated as a field crop, although some farmers are trying the experiment with their own stock.

Potatoes.—Both Irish and sweet are extensively cultivated; and for the last few years the former have commanded a fair price, averaging from 30 to 50 cents per bushel. This year the crop of late potatoes has been seriously affected by the drought; consequently, the price is stated at 50 cents.

Fruit is well nigh a failure, both apples and peaches; a very few inferior ones are offered in our market at from 75 cents to $1 50 per bushel. In ordinary seasons we have an abundance of each; but few pears are yet cultivated.

Manure is not sufficiently appreciated as yet. Some of the better farmers husband it, and are beginning to use lime to a limited extent.

Yours, respectfully,

JAMES L. COX.

THOMAS EWBANK, Esq.,
Commissioner of Patents.

McCONNELSVILLE, OHIO,
December, 18, 1850.

SIR: Your Circular for 1849 was duly received, but not answered, because it called for information by States. That of the present year is before me, and I proceed to answer it, so far as my information extends, or the good of the public appears to me to require.

I shall, in most of the answers, confine myself to reliable information from books and persons, to my own observations and experience, and the results of comparisons of the published Reports from your Office, and those of the Ohio State Board of Agriculture. A few, however, must, of necessity, be the result of analogy.

This (Morgan) county lies in the valley of the Muskingum river, is very hilly, and, in parts of it, almost mountainous. A great portion of the lands are, however, arable. The soil is greatly diversified, from light sandy loams to stiff, blue, yellow, and red clays, varying from those which are fully saturated with lime to such as scarcely contain a trace. It is a wheat-growing county; and on the one-third of the area of the county which is under cultivation this grain is sown to excess.

Basing my estimates on former crops and ascertained exports, I estimate as follows: 41,800 acres, at 15 bushels per acre, give 627,000 bushels. Of this, 45,000 acres, seeded at $1\frac{1}{2}$ bushel per acre, require about 67,500. Twenty-nine thousand inhabitants, at 7 bushels each for bread, is (say) 200,000 bushels. Export 80,000 barrels, at $4\frac{1}{2}$ bushels is (say) 300,000. If there is any error in the above, it must be in the estimats for bread. If I have estimated this too high, the aggregate of the crop is erroneous to the extent of that error, and no more. The export will be fully realized. I have estimated the average yield per acre at 15 bushels. In 1848 it was over *eighteen*. In 1849 there was a great failure, from the rust, &c. It should be borne in mind that where there are new lands, in a state of transition from forest, the *average* of crops is greatly reduced from this cause. Roots, stumps, imperfect tillage, late and imperfect clearing and seeding, in a few fields, reduce very rapidly the average which fully-cleared lands would show. In this county many fields produce from 20 to 25 bushels per acre. In 1848 I saw hundreds of acres which yielded from 20 to 35 bushels per acre.

Wheat.—The cultivation of wheat with us is very simple. With our best farmers, on their lime-stone lands, this is the course: say a new field is cleared and sown in wheat in September, 1850; in February or March, 1851, clover-seed is sown among, or on, the wheat; the wheat will be harvested in July; hogs then permitted to glean the field, and the clover may be pastured very lightly. In May or June, 1852, there will be a crop of clover suitable for mowing for hay. When this is removed another crop of clover starts immediately, which by September is covered with ripe heads, full of seed. This crop, seed and all, is ploughed under; wheat sown on the single furrow, and harrowed in. In July, 1853, this wheat is harvested; in September the stubble is ploughed in, and wheat is again sown on the single furrow. The clover-seed which was ploughed under in the heads in September, 1852, having been brought near the surface by the ploughing in September, 1853, will vegetate in the spring of 1854, and produce a new crop, which should be treated in the same manner as the first. Thus a crop of wheat is followed by a crop of clover; this by two crops of wheat and one of clover, in succession, without any additional sowing of clover-seed. Under this course the land is constantly increasing in fertility. In some situations an occasional dressing of lime is necessary to prevent an excess of vegetable fibre.

The varieties sown are numerous. The large amount of harvesting, and high price of harvest hands, have caused our people to changetheir seed from a single variety to several, which will ripen, in succession, for about four weeks. The Mediterranean is an early variety, seldom injured by the fly, and ripens well when down; hence it is extensively cultivated. Several varieties distributed from your office did well until stricken down by the rust of 1849. The best remedy against the Hessian fly is late sowing—25th September till 1st November. Usual time of seeding, from 25th August to 10th October; of harvesting, all July. Our seed wheat is sown without any preparation, except that which it receives from the threshing machine or fanning mill. One or two bushels are sown to the acre—average, one bushel and a half. I wish here to record a fact in relation to seed wheat. It is this: *one-third of all wheat threshed by a threshing machine will never vegetate. Its vitality is entirely*

destroyed. Hence wheat thus threshed should never be used for seed. If it is, the owner becomes a loser in seed and in his subsequent crop. Depth of ploughing, about five inches. Average price, 65 cents per bushel.

Corn.—The best varieties of corn are yellow gourd-seed and hackberry. Average yield per acre, 35 bushels. The cost of production depends on the value of the land, nature of the soil, distance from market, &c. The usual price is 25 cents. The average cost of production I set at 24 cents per bushel.

The entire crop is fed, raw and unground, to stock, except what is eaten by our citizens, and that is a small portion. Eight bushels of corn in the ear are allowed to each fattening hog. This will generally double his weight from the commencement to the close of the feeding. I believe if the cobs of these eight bushels of corn were carefully saved, with all the excrements, solid and liquid, and carefully mixed, daily, with suitable absorbents, the aggregate would be about five-fold the bulk of the corn. These 40 bushels of compost, spread on a common soil, would, agreeably to some experiments of my own, increase the crop about five bushels the first year, three the next, and two the next—10 bushels. Spread raw, the result would be a little less; but the effects will be perceptible for five years. While on this subject, I will venture the opinion, that the excrements of a man, fed entirely on unbolted wheat-bread and water, if saved and properly applied to a suitable soil, will produce an aggregate of wheat greater than the amount fed.

Barley, Rye, and Peas are not cultivated. A few *beans* are grown.

Oats are considered too exhausting a crop, and interfere with the rotation above described; hence, they are not much cultivated.

Grasses.—Our meadows consist of red clover, timothy, red-top, and a little blue grass. Average yield per acre, at one mowing, $1\frac{1}{2}$ ton. Many of our upland farmers dispense with all meadows, and cut no hay, except the clover, in their wheat rotation. The quantity of seed sown varies from five to ten pounds per acre.

Tobacco.—Yellow tobacco is grown to some extent on our new lands.

Root Crops.—None grown, except Irish and sweet potatoes—the latter the most profitable; at 50 cents per bushel for each.

Fruit Culture.—The cultivation of fruit is receiving increased attention. I am of the opinion that apples may be grown to a greater profit, for stock, than any other agricultural product; and that, bushel for bushel, the advantage is in favor of apples over potatoes.

A fruit tree, planted on a well drained *poor soil*, will seldom suffer from blight of any kind. Too much trimming, too much moisture, and too rich soils are, in my opinion, some of the causes of blights in pear and apple trees. I believe there are several varieties of blights in apple trees, and probably in pear trees also. I think I am in possession of facts and observations which will explode all the *blight theories* which I have seen published.

S. A. BARKER.

MICHIGAN.

TROY, OAKLAND COUNTY, MICHIGAN,
November 20, 1851.

SIR: Your Circular of August, 1851, has been forwarded to me by Hon. K. S. Bingham. I desire to add my mite to the mass of valuable information collected in your excellent Agricultural Report.

Agriculture has been my study and employment for a number of years. I emigrated to Michigan 30 years since, when it was a wilderness, and have continued in the same employment, on the same farm, since that period.

The staple productions of this county, and of the whole State, are wheat and wool, and beside these are the various articles adapted to the climate and soil.

The true policy of a good farmer is to cultivate a proportion of all the different and various crops, and to rear a portion of the different animals well calculated for the climate in which he resides.

Wheat.—Oakland county is appropriately named—three-fourths of the land in the county being oak openings; the soil is impregnated with lime, and well adapted to wheat. One-fourth of the county is heavily wooded land, covered with linden, ash, white and black walnut, &c.—little or no maple or beach.

I have raised, for 20 years past, from 500 to 1,000 bushels wheat per year, and have made this valuable article my study, both in its character and cultivation. We have all the different varieties raised in the northern and eastern States. Some years ago the red chaff bald wheat was all the go; it is now in disrepute. I have raised the white flint, which does well. I am quite positive, from accurate experiment, that barn yard manure will greatly increase the straw, and not add as much to the grain as some other manures. It will be a most valuable discovery for some Liebig to inform farmers what will increase the berry in wheat, when they can so easily add to the straw. Some years since I carted 400 loads of barn-yard manure upon 5 acres of land, and the result was an immense crop of straw, and not more than 20 bushels per acre. I have tried corn-stalks, and consider them a valuable manure. In passing through Indiana and Illinois, I was struck with the suicidal practice of burning the corn-stalks. It looked like working a first-rate horse hard all day and turning him into the stable to starve.

The French near Detroit river, in old times, hauled their manure from the barn-yard on the ice, in the winter, to pass off in the spring. That was not more strange than to see large fields of corn stalks burned on the land. The time will come when the prairie farmer will rue such practice. I have found that a strong clover-sod, well turned, 8 inches deep, and properly cultivated, is a profitable and economical method of raising wheat. The practice of summer-fallowing is not as much followed as formerly. The wheat crop of 1850, in Michigan, exceeded anything ever before raised. The weather, in May and June of that year, was attended with a severe drought. At one time a general failure of the crop was apprehended; but that Being who governs the weather so directed, that every garner was full. Thirty bushels per acre was an average in this neighborhood; and to thresh 400 bushels per day, with a common thresher, was very common. The crop this year is remarkable

for heavy straw, but will not yield as much as last year. With all the manuring and cultivation, much depends upon the weather. We generally have a fine plump berry, yielding a barrel of flour from $4\frac{1}{15}$ to $4\frac{8}{15}$ bushels. The price this year is low, ranging from 50 to 60 cents per bushel. We plough from 8 to 10 inches. I find deep ploughing indispensable to a good crop. We have not, for years, been injuriously affected by the fly, and the weevil has never crossed Lake Erie.* Our winters are generally favorable to wheat. We sow, between the 5th and 25th of September, from 1¼ to 1½ bushel per acre. We have never used guano. I believe the yield per acre is increasing, arising, in some measure, from the more perfect system of cultivation. This beautiful peninsula may well be depended upon for wheat.

Corn.—Corn is increasing in quantity, and, from the mode of cultivation, bids fair to rival wheat. I commenced the last of April, this year, turning over an old pasture, containing 20 acres, with two ploughs. To one I attached three horses abreast; to the other, two yoke of oxen; ploughed 7 and 8 inches deep. I then harrowed the sod with a thirty-tooth double harrow, and commenced planting on the 14th of May; planted the "white-gourd seed," 4 and 5 kernels in a hill; hills 4 feet apart. I hoed the corn once, and continued with a single horse cultivator, and passed through each way. We have housed 2,300 bushels of ears (sound corn) from the 20 acres. The price in Detroit, 20 miles distant, has been 40 cents per bushel during the last summer. I believe it a more profitable crop than any we have. I have a large amount of fodder from this lot, equal in value to one-half the hay raised from the same quantity of land immediately adjoining. Cost of production is 12½ cents per bushel. I feed the corn whole and raw; but I believe grinding corn for hogs will pay the expense. This corn is softer than "flint," and more easily masticated; is sweeter, but perhaps not so fattening. It yields more than flint-corn—1½ bushel of ears making a bushel of shelled corn, which will make my crop 1,534 bushels; equal to 76 bushels per acre.

Sheep and Wool.—Wool is the most profitable article raised by Michigan farmers. More cash is realized from the same amount of labor than by any other article. I began, in 1828, with 18 sheep. I have not purchased any since; have killed and sold 500, and now have 450. The full-blood Spanish merino is the sheep for us. The wool improves in quality, and they become very fat and hardy. Wool varies like other crops. Some years the same number of sheep—say 300 head—will fall short 100 or 150 pounds, and with the same keeping. Why it is so, I cannot tell. I sheared, last spring, 345; 100 were lambs a year old. I had 1,005 pounds of wool, and sold it at Pontiac, our nearest market, for 45½ cents per pound. My lambs have paid the pasturage and wintering of the flock, and I have the wool net profit. I have over three-fourths the number of lambs to the whole number of ewes. Merino can be raised as cheap as other wool, excepting the large Leicestershire, whose fleeces are from 12 to 18 pounds each; wool coarse and long; profitable for worsted. My success with sheep is common with hundreds in this county.

[* If this statement be true, the fact that "the weevil has not crossed Lake Erie," or is found west of it, is important in the history of that most destructive insect.]

Oats, Barley, Peas, and Beans.—Oats is a good crop here. We can raise from 50 to 60 bushels per acre. I have always considered oats exhausting to the soil. They are not cultivated to the same extent as in other States.

Barley, Peas, and Beans are produced to some extent.

Clover and Grasses.—We cut from 1½ to 2½ tons per acre, according to the season. This year our hay was equal to 2½ tons per acre. We sow four quarts of clover and four quarts of timothy seed per acre. Our best fertilizer is plaster from Ohio, and Grand Rapids, in this State.

Dairy Husbandry.—This county is not considered a dairy county, although butter is made to some extent; not much cheese. Farmers are so much engaged with wheat and wool, that not much attention is paid to the dairy.

Neat Cattle.—Our cattle cost more at three years old than they are worth in market. It is worth $18 to raise a steer until three years old, and he will sell for only $14 or $15.

Horses.—It has become quite an object to raise horses. A good three-year-old colt will cost little more than a steer, and is worth four times as much. Good matched young horses command a fine price and ready market. I have a stud of Arabian blood, bright bay, of the third degree from a horse imported by Mr. Cox, American consul at Algiers, and find no difficulty in getting $100 for his colts at four years old. Brood-mares should be turned to a stack, and fed on the ground through the winter.

Hogs.—I purchased some of the first Berkshire hogs brought into Michigan; paid $20 for two pigs three weeks old. The breed is too small, and is now nearly extinct in this county. We have the Byfield and Leicestershire hog. He will weigh, at 18 months old, from 350 to 400 pounds. The best food for hogs is boiled potatoes, and ground buckwheat mixed with the potatoes when hot. To fatten hogs successfully, their food should be changed at every mess: corn, buckwheat, barley, and boiled apples, &c., alternately; feed often, as much as they will consume.

I wish to give you an excellent plan for *churning milk*. It is simply a motive-power, similar to the one-horse power for threshing, or sawing wood, on a small scale, for a *dog:* endless straps of harness-leather nailed to lath. The straps run around a number of cylinders in a row; a box confines the dog, and he trots off, making the dasher fly. We procured one this fall; and every farmer who loves his wife will have his dog churn his butter.

Very respectfully, yours,

STEPHEN V. R. TROWBRIDGE.

NORTHVILLE, WAYNE COUNTY, MICHIGAN,
December 20, 1850.

SIR: Our wheat crops this season are the largest ever raised in this part of the State. The average product per acre will not vary far from 20 bushels. No guano is used here in raising wheat or other crops. Time of sowing wheat, from the 5th to the 20th of September. Time for harvesting varies with the season—from the 5th to the 20th of July.

The common manner of preparing the ground for wheat is to break it up in May, or early in June, 7 or 8 inches deep; afterward, till with a cultivator, or harrow, to keep down the weeds and grass. About the 1st of September the ground is cross-ploughed, and is then ready for the seed. On our plains and openings one ploughing and a fair use of the cultivator are all that is considered necessary. From 1¼ to 1½ bushel per acre is the usual amount sown. The yield per acre is increasing, owing, no doubt, to a more perfect system of tillage and rotation of crops. The most approved rotation of crops is clover, wheat, corn, and oats. Plaster is much used on clover.

The weevil has not made its appearance in this State—at least to an extent to injure the wheat crop. The Hessian fly—one of the greatest enemies to our wheat-growers—visits us at intervals of from 4 to 6 years, continuing its ravages through two or three seasons, and then apparently disappears.

I have observed that samples of wheat received from the Patent Office, or other distant parts of the country, and sown here, have almost invariably escaped the ravages of the fly; while our common wheat was almost entirely destroyed. I therefore think that a frequent change of seed-wheat is one of the most efficient guards against the fly.

Corn is cultivated here to a considerable extent. The most approved varieties are the Dent, eight-rowed yellow, Dutton, and white flint. The yield this season is 25 per cent. below that of last season; average yield per acre, 30 bushels; cost of raising corn the past season, including interest and taxes on land, about 20 cents per bushel; price, at nearest market, 37½ cents per bushel.

My system of corn culture is to plough early in May, pulverize thoroughly with a harrow, then lay the ground off in ridges 3½ feet apart at the top; plant about the middle of May, in rows 3½ feet apart across the ridges. The after-culture is performed almost entirely with a plough and cultivator.

The early part of the season was favorable for the *oat* crop; but the drought, at the time of filling, materially affected the yield. Average product per acre, 30 bushels.

Barley, Rye, Peas, and Beans are not raised in sufficient quantities to furnish data for estimates.

Clover is more natural to our soil than the grasses. The yield will not vary far from 2 tons per acre. The quality is indifferent. Clover was badly lodged; and, in consequence of wet weather, was not well cured.

Dairy Business is not carried on very extensively in this place; most farmers, however, make some butter for market. Common price of butter, 12½ cents per pound.

Neat Cattle.—The cost of raising neat cattle until three years old is about $15. They are raised, to some extent, by most of our farmers, for the purpose of converting waste fodder into cash. Average price at that age, from $14 to $20. Price of good dairy cows, from $18 in the fall to $25 in the spring. A commendable zeal has of late been manifested in the improvement of our stock. Several fine specimens of the Durham and Devon breeds have been introduced among us, which will, no doubt, make a very decided improvement in our stock of cattle.

I kept two calves together through the winter—one, a native; the other, seven-eighths Durham—and am satisfied that the same amount of feed gave at least one-fifth more meat in the Durham than in the native.

Raising Horses is a good business with us. The cost of raising a colt until three years old is not far from $40. Price, at that age, from $60 to $85, according to the quality of the animal.

In this State farm labor is scarce, and land cheap.

Wool-growing is undoubtedly the most profitable business that farmers can engage in. The high price obtained for wool the past season has induced farmers to engage more extensively than heretofore in this branch of husbandry. Large numbers of fine-woolled sheep have been introduced among us during the year from Vermont and other places, for the purpose of improving our stock of sheep.

Common-sized sheep, of fine wool and long staple, are the most profitable. A pound of wool can be grown on a cross of the French and Spanish merino as cheap as on our common coarse-woolled sheep. The proportion of lambs annually raised to that of ewes is two to three.

Hogs are raised by almost every farmer; but pork-raising for the market is not generally a profitable business with us. The best breeds raised here are the Berkshire, with the Leicestershire and Byfield. Our method of making pork is to keep the hogs in clover pasture, feed them with the refuse from the kitchen and dairy until fall; then shut them in pens or small lots, and fatten on corn. We put our pork down with salt in barrels, and cover it with strong brine. The hams are cured in a pickle made of common salt, saltpetre, and molasses; and then thoroughly smoked.

Roots are not generally raised as a field crop. Enough are generally raised by most of our farmers for family use.

Potatoes have sufficient security from the wet this season. I can form no correct estimate of the yield this year, and, consequently, of the cost of production.

Fruit.—The cultivation of fruit is receiving increased attention. Young orchards, of large size, have been planted by many; and old trees, bearing natural fruit, have been yearly grafted with most approved varieties.

We consider the Rhode Island greening, northern spy, Spitzenberg, Swaar, Newtown pippin, and Roxbury russet among our best varieties for winter use and exportation.

Manures.—Plaster is used extensively on the clover fields; barn-yard manure in the production of corn and wheat. I have made use of swamp muck with the most satisfactory results, especially on root crops. It should be hauled into the field in the fall, thrown into heaps, and left to the action of the frost until spring. It can then be spread over the land, and ploughed under, as barn-yard manure. This is a powerful manure,* and has not received the attention from farmers that its merits demand.

We do not feel the necessity of applying fertilizers to our soil, in order to secure a good crop, that is felt by farmers in the old-settled parts of our country. Our land is new, and yet under the influence of the vegetable matter that, in the state of nature, was spread over its surface—the probable accumulation of ages.

[* Very few farmers who have tried "swamp muck," or marsh mud, *alone*, will concur with our correspondent in regarding it as a powerful manure. Composted with ashes or lime, or with stable manure, it is a valuable assistant in yielding the food of plants.]

The State of Michigan is yet in its infancy; but her resources have been developed sufficiently to show that she possesses all the elements of future agricultural greatness. With a soil naturally rich and productive, and a population eminently devoted to agricultural pursuits, she is destined to occupy a prominent position in this great republic. I would suggest that, with the facilities which we now possess—by means of railroad and other communications with the East—for exporting neat cattle and horses, and in consequence of the low prices of produce, particularly wheat, our farmers would find it much to their advantage to turn their attention now to raising stock.

Respectfully, your obedient servant,

J. D. YUKES.

The Commissioner of Patents.

South Nankin, Wayne County, Michigan.

Sir: In your Circular for the present year, you invite farmers to answer certain questions therein propounded. I will endeavor, in my poor way, to answer some of them that relate to the *potato crop*. Our soil is a light sand. The average yield per acre, taking the town together, does not exceed 150 bushels; the cost of production, 10 cents per bushel. The most prolific are the early June, (white,) flesh-colored, the long pink-eye, and a large black potato, similar in shape to the merino. The best system in planting is in drills, about 3½ feet apart; last of April, tillage. I prefer a clover sod; it should be ploughed early in October; deep, flat furrows, thoroughly pulverized with a steel-tooth cultivator, the last week in April; strike furrows with a light plough, north and south—(so that the sun can shine on both sides of the rows;) drop the potatoes once in a foot; cover with the plough. Potatoes should be kept perfectly clear from weeds, as the yield depends almost wholly upon this. Manuring should be done, just before the potato breaks the soil, by using green manure, so as to cover the drills from two to three inches deep, which keeps the ground moist just at the right time; and, as soon as the potatoes are large enough, cover the manure with earth, as a preventive of the rot. Use an early variety of potato and plant early.

Respectfully, yours,

HARRY LEWIS.

Hon. Thos. Ewbank,
Commissioner of Patents.

Ann Arbor, Washtenaw County, Mich.,
December 25, 1850.

Sir: In replying to your Circular of August last, I would say that this season has been a very productive one, in this region, for grain of all kinds, and other produce of the farmer; nearly everything of which has commanded a liberal price in cash; so that there has never been a year of greater prosperity to the farmer than this. Our soil is naturally so rich, and as yet so little exhausted, that but little attention has been paid to manure. Guano has not been used.

Wheat.—The average product of wheat is 22 bushels per acre, and somewhat increasing, owing to improvement in preparing the ground; indeed, some of our best farmers find it very easy, by a superior manner of tilling, to make their average exceed 30 bushels per acre. The best method for fallow is, to plough twice or three times, six to ten inches, or more, deep; harrow well; and sow one bushel and a half to the acre, with a cultivator, from September 1 to October 5. Early-sown generally best. I wait until after the frost, to avoid the Hessian fly, which has not been troublesome lately. It is also a great benefit to keep sheep on the fallow whenever the feed will support them. Average price of wheat this fall, 60 cents.

Corn.—Average product of corn this season is about 40 bushels per acre, costing about 25 cents, exclusive of use of the land to raise it. Best method to feed is to grind and cook; but we generally feed in the ear.

Oats yield about 40 bushels to the acre; *barley*, 35; *rye*, 30; *beans*, 20. *Peas* did better the past year; but, from the frequent failure, few were sown. Oats most injurious to the land; barley, peas, and beans leave it in a good state for wheat.

Hay.—We cut from one and a half to two tons per acre. Clover is the best fertilizer.

Cattle do well in clover pastures; but sheep like herdsgrass or timothy.

Dairy.—Average cost of rearing calves until three years old is $12, which is about their worth; good breeds, worth $16; new milch-cows, worth $15 to $25. I give the product of my neighbor, who supplies me with cheese. He has ten good cows and ten ordinary ones, from which he has made, from 1st May to 1st December, 6,600 pounds cheese—about 330 pounds per cow—and 400 pounds butter, before and after making cheese.

Raising Colts is profitable; it costs but little more to raise a colt than a calf; they require but little care, except giving them and the mares good feed. It is well to halter-break them the first winter, bit them at three years old, and harness with a strong, gentle horse, and drive without a load until they become gentle and thoroughly broken; avoid using the whip, if possible; kind treatment by far the best; colts, like children, are easiest governed by kindness with firmness.

Wool-growing is very profitable, quite as much so as any other branch of business. It is very extensively carried on in this vicinity, and is on the increase. With wheat, it is the great staple of Michigan. Cost about 15 cents per pound to grow common native wool or Paular merino; other merino 18 cents. Saxony 30 to 35 cents. Large sheep are most profitable for mutton, and those with heaviest fleeces for wool. There was little difference of price between coarse and fine wool the past year. Any kind of clear wool sold for 35 cents, while the very finest sold for only 40 to 45 cents. Native and Paular ewes will rear about their own number of lambs, while Saxony and small merino will not average over half their number; and they require a great deal of care during the winter.

Hogs.—I see by the pork brought to market this fall that our hogs are again improving. The Leicester, Byfield, and cross are the most esteemed. Best method of putting up pork for family use is to take out all the bone and lean meat, pack the side pork with rock-salt, and cover with strong brine. Hams and shoulders should be divested, as much as possible, of the bone; then packed in a molasses hogshead, covered with a brine made of eight pounds rock-salt, five ounces saltpetre, two quarts molasses, three large raw peppers, three gallons water, to 100 pounds. Heat and skim it. Keep in brine three weeks, then smoke thoroughly with cobs or hickory chips, and keep them from the flies.

The Culture of Fruit is receiving increased attention, and is becoming a very profitable crop, particularly good varieties of apples, peaches, and pears; all of which do remarkably well.

Russets, greenings, and Spitzenbergs are among the best varieties for keeping. The bellflower, gilliflower, and Newtown pippins are about the best for exportation, perhaps. The last is the very best. In conclusion, allow me to say that, by comparing the statements in your last Report of the amount of produce in the different States, and by my own observation, I am more than ever convinced that this county in Michigan is one of the best, if not the very best, county in the Union for the farmer; and I should advise the young men of New England, instead of slaving themselves in fertilizing the rough sides of their mountains, or waiting for their good old fathers to die, so that they may divide with their brothers or sisters their already small and worn-out farms, to come to Michigan and secure to themselves a better and larger farm than their fathers ever had—each taking care, before starting, to engage a good, industrious daughter of one of his neghbors to come on as soon as he gets his first wheat field enclosed and his log-house built.

Respectfully, yours,

WM. S. RAYMOND.

Hon. Thos. Ewbank,
Commissioner of Patents.

Adrian, Lenawee County, Michigan,
December 3, 1851.

Sir: The state of agriculture in this county is constantly improving. Hitherto the *wheat* crop has been almost the sole reliance of the mass of our farmers, and the principal effort has been to put in as large an amount of it as possible, at the least possible expense, and to hurry it to market in the shortest possible time. Half-cultivated fields, poor crops, and those often injured from not being secured as soon as they should have been, owing to so much of the labor of the year being crowded into a few days, have been the result. But the opinion is fast becoming prevalent that the wheat crop is the least remunerative of almost anything a farmer can devote his attention to, and the eyes of agriculturists are being turned in other directions for something that will better repay them for their outlay and toil. The cost of raising wheat in this State, including interest on the capital invested in the soil, and excluding the expense of harvesting, varies from 40 to 55 cents per bushel when an ordinary crop is obtained; and this, where the crop is so uncertain as it is in Michigan, leaves but a narrow margin for profit, the price in market ordinarily ranging between 50 and 88 cents per bushel.

The average wheat crop of this county, which is universally conceded to be one of the richest in the West, will not exceed, I think, 12 bushels per acre for the last 10 years. There are many reasons for this, but I think the most prominent of all is the careless manner in which the wheat field is so generally cultivated. Shallow ploughing, that merely skimmed the surface, successive cropping year after year, until the surface-soil was exhausted, or sowing after corn, first turning under a luxuriant crop of weeds, and leaving weeds and wheat to struggle all through the season for the mastery, may almost be said to have been the rule, and thorough cultivation the exception. As our farmers improve in their circumstances, a great change is observable in this respect. That mode of cultivation—which at present is cheap, but eventually dear, and the prime motive to which is quick returns for small outlays—is being abandoned for a more judicious and less exhausting course. The crop of the present year is probably the best ever raised in the county, and was certainly the best put in. It is difficult to say what will be the average, but I think 20 bushels per acre will not vary much from the truth. The best five acres in the county averaged 55 bushels, but the second best that was reported to the County Agricultural Society averaged only 34½. A great many fields averaged from 32 to 34, and the most of them, too, without unusual cultivation. On almost any of the cultivated lands in this county there is no difficulty in raising from 20 to 35 bushels of this grain per acre, by proper cultivation, when the season is favorable. Still our open winters always render the crop an uncertain one, and make it the interest of the farmer to devote his attention more particularly to other branches of agriculture. Of the varieties raised, the Mediterranean would seem to be the most profitable, were it not that the dark color of the flour detracts greatly from its price in market. It is the most certain to produce a good crop of any kind with which we are acquainted here, and ordinarily weighs heavier than any other; but it is never a favorite with the pastry cook, and commands in market about six cents per bushel less than the white varieties. The white-flint is a very general favorite, but the Siberian and Soule's varieties are perhaps equally so.

Wool.—Next to wheat, wool is now the most important crop raised for sale in this State. The kinds of sheep kept are mostly of the coarse-wool varieties, with some small proportion of Saxon and merino blood; but the imported breeds are fast being introduced from Chautauque county, New York; from Vermont, and other portions of the eastern States; quite a number of Paular merino, and other fine wool bucks, have been brought into the county the present year. A better quality of wool is now every year exported, but buyers make so little difference in the price as rather to discourage than encourage this state of things, and to induce many to incline to the long coarse-wool breeds. But more care and discrimination are observable every year in the purchase of this commodity.

The quantity of wool purchased in this village the present season was 170,000 pounds, at an average price of 39 cents. There are several other villages in the county; but, as near as I can ascertain, the above amount is full three-fifths what was purchased in the county. This is an increase of about 33 per cent. on the purchases of last year. A large

amount is retained for home manufacture, but it is impossible to say what proportion of the whole clip. The population of Lenawee county is less than one-fourteenth of the whole population of the State. Beyond question, more sheep are kept here, in proportion to population, than in newer counties; and I doubt if it would vary much from the fact if the amount of wool exported from this county should be set down at one-tenth the total sales of the State. An estimate on this basis would produce the following result, and show the vast importance of the wool crop to this State:

Exports of wool from Lenawee county............	280,000	pounds.
Cost, at 39 cents..............................	$109,000	
Total exports from the State...................	2,800,000	pounds
Cost, as above.................................	$1,090,000	

The clip of another year may not bring so high a price, but it will certainly be larger in amount than the figures above given. The wool-growers of Michigan possess an advantage over those of the eastern States which will not fail to be soon appreciated. Owing to the cheapness of land, they require a capital of only from 20 to 50 per cent. of the amount needed further east; and from the more mild and open character of our winters, they can produce the same amount of wool at a cheaper rate. They can then sell it at prices differing only nominally from those paid at the doors of the manufacturer.

Corn.—The quantity of corn raised is constantly increasing. The season this year was wet, and the crop comparatively a poor one—probably not averaging over 30 bushels per acre. The white and yellow Dent are raised principally, and yield better than other varieties. A good deal of this county is naturally well adapted to the growth of corn; and, with proper cultivation, in favorable seasons, crops of from 75 to 120 bushels may be raised. The best 5 acres raised in the county this year averaged 77 bushels per acre. The average price this fall has been about 33 cents; and, at this price, it is considered more profitable to raise than to grow wheat at 75 cents. Taking one year with another, the labor and expense that will be required to raise 10 bushels of wheat will be sufficient for the production of 25 bushels of corn. The great bulk of the corn raised is fed out at home to hogs, cattle, and horses; but a large amount is also exported. Taking one year with another, there is undoubtedly now more corn than wheat raised in the State, and I think there is more even this year.

Barley.—But a trifling amount raised—little more than sufficient to supply the two or three breweries in the county. Price, about 38 cents.

Oats.—This grain is raised principally for feeding horses, and is more relied upon as food for them than any other. The amount raised is from 30 to 60 bushels per acre, and it varies in price from 18 to 30 cents, averaging about 22. Our best farmers do not ordinarily raise much for sale. Corn is quite as profitable, and less exhausting to the soil.

Rye.—None of consequence raised. It brings, in market, about the same price as barley, and is raised at an additional expense of probably 50 per cent.

Potatoes.—A larger proportion than usual of this vegetable was destroyed by the rot this year. On sandy soils the disease was less prevalent than elsewhere; but no kind of soil seems to be entirely exempt from its ravages. Potatoes are now bringing 50 cents per bushel; which is about twice the usual price. No remedy yet devised for the disease seems to be effectual.

Sweet Potatoes.—But two or three years have elapsed since people in this county commenced the cultivation of this root, and then only as a garden vegetable. On dry, warm, sandy soil, it is productive, and grows to a good size; but the experiments made, as yet, are on a very limited scale. Price in market, from 6 to 8 shillings per bushel.

Other Root Crops.—Beets, carrots, turnips, and cabbages are, in general, raised only for consumption in the family. The importance of root crops for feeding swine and stock does not seem to be generally understood; and corn, oats, and other more expensive feed are more used. Even potatoes, though raised at a much greater expense than carrots or turnips, are yet more generally used than both together. The cultivation of the ruta-baga turnip is, however, increasing, as is also that of the carrot, to a less extent. This last, for milch-cows, is usually considered the best of the roots.

Hay.—The crop of hay the present season is about an average one. A good portion of this county is well suited to the growth of the grasses, and from 1 to 3½ tons per acre (depending principally on the manner in which the soil is cultivated) are raised. Some little corn is sown broadcast for fodder, but to no great extent. The price of hay this fall averages about $6 per ton.

Manures.—But a small portion of our farming lands, as yet, needs manure; but the difficulty is in stopping the exhausting process when once begun.

Clover is quite popular as a manure, particularly for wheat; and some of our farmers never sow wheat without also sowing clover, either for a change of crops or for turning under, as a preparation for wheat again.

Buckwheat is sometimes sown for the same purpose; but the manure principally used is the farm-yard manure; and farmers are beginning to employ much care and pains in properly preserving it. But little, comparatively, is now wasted. That made in villages is generally either given or sold to farmers in the vicinity, and thus turned to good account.

Plaster is used, but not to the extent needed—particularly upon the worn-out lands. I say worn-out lands; but this may seem a very strange term to apply to soil that, 25 years since, had never felt the pressure of the white man's foot. In truth, we have, as yet, no worn-out lands; and those farms which appear such are only those which, year after year, have been skimmed over by those who have held the honorable name of farmer, and subjected the soil to the sluggard's cultivation, or the careless man's ill usage. Ordinarily, deep ploughing, and a little plaster, or a proper dressing of other manures, will induce such land to return thirty or fifty fold, while, for such fellows, it had reluctantly yielded five or ten fold.

Agricultural Society.—There is established in this county an agricultural and horticultural society, which is accomplishing much good. It distributed this season $588 in premiums, and its annual fair would have done no discredit to any county in the valley of the Genesee.

Very truly, your obedient servant,

THOMAS M. COOLEY.

Hon. Thomas Ewbank,
Commissioner of Patents.

INDIANA.

La Porte, Indiana, *December* 3, 1850.

Sir: This being a frontier county of our State, although possessed of many natural privileges—such as nearness to a good and ready market, a rich soil, good, natural roads, &c.—yet our population is so fluctuating, that, for many years to come, we may not arrive at much excellence in agriculture or manufactures. Notwithstanding this, our exports are very considerable—especially if we take into consideration the comparatively high cash price which our agricultural products bring.

First, as to our crops:

Wheat.—The wheat sown down in autumn, 1849, made a fine appearance before the winter set in; and, the winter being favorable for the young wheat, its appearance in the opening of the spring was also auspicious. The coldness of the spring, and its lateness, were favorable; the warm rains and warm weather in June caused a most rapid growth, which pushed it principally out of the reach of the rust; which, in this county, did but little harm, either to winter or spring wheat; which we will now show: our county contains about 350,000 acres; of this, one-seventh was estimated to be cultivated in wheat and corn—20,000 acres wheat, and 30,000 corn.

The wheat crop averaged about 25 bushels per acre; making 500,000 bushels; its average weight 63 pounds per bushel; at 60 pounds per bushel, standard, we have 525,000 bushels. Deducting 25,000 bushels for consumption, we have for market 500,000; the average cash price at Michigan city is 70 cents per bushel; equalling the amount of $350,000 for wheat.

The specimen of Troy wheat received from the Patent Office I had planted 21st October, by a careful wheat grower. Mr. G. Rose, of this county, informed me, when east, he purchased some wheat at $6 per bushel, called *Troy* wheat, and had it sown by way of making experiment. It *may* be the same kind I received.

Corn.—This crop, I said, covered about 300,000 acres; its average product per acre is, by estimate, 40 bushels; average weight per bushel, 62 pounds. The standard weight in market is 56 pounds per bushel; amount of measured bushels is 1,200,000; overplus in weight is six pounds each bushel, 129,000 bushels; this added to the measure, 1,390, marketable weight; deduct for home consumption, 30,000 bushels, and we have for sale 1,360,000 bushels for market. This season, so far, new corn is at the average price of one-third of a dollar per bushel. The amount of our corn crop in market will be $450,000; this added to the receipts for our wheat, gives us $780,000. I will, out of this, make a large deduction of $30,000—the *gross* expense of seeding, harvesting, and threshing, and carrying to market—which leaves the net sum of $750,000. In my estimate of expenses, we must take into consideration the rapidity with which a crop of wheat may now be seeded, harvested, threshed, and cleaned, compared with the tardy way in which all these operations were performed ten years ago, and we cease to wonder at the small expense of corn. The most tedious operation is the shelling of it; by machinery, 1,000 are shelled in two or three days.

Potatoes.—This crop is safer from the rot than heretofore. The portion of the crop which has been most affected by the rot is the mercer potato. The pink-eyes, both kinds, the black Meshanock, (so called,) and the red potato are free from the disease, and are very good and abundant; price, 25 cents per bushel. Sweet potatoes abundant and very good; average price, 38 cents.

The crops of *oats* and *barley* are short, being much injured by the drought about the middle of June. The heavy warm rains at the close of the month, though they made the corn, were injurious to the oats and barley, which had their growth.

I may remark here that the crop of *wheat* now in the ground looks admirable, and is quite a large crop; no fly or worm has yet molested it. The varieties of wheat sown are the Mediterranean, which is a hardy grain, not subject to be injured by the fly or rust; it has a hard, strong stalk, and produces heavy crops. The next best for this climate and soil is the white-chaff bearded wheat, a different variety from the Troy wheat; its yield is not equal to the Mediterranean. The third variety is the Canada; its best quality is that it resists the winter's severity. The fourth is the yellow lammas; it produces good flour. Another variety introduced is the Hutchinson; its quality is not known. The depth of ploughing for wheat depends upon the character of the soil. The amount of acres cultivated in wheat and corn, and harvested, cannot be noticed in the United States marshal's report. Other matters, which I have reported in this connexion, seemed to me inseparable from the estimate. The soil is of four varieties—prairies, burr-oak barrens, oak openings, and the thickly timbered land, covered with poplar, sugar maple, walnut, white pine, oak, aspen, and a variety of small under-growth, all rich; but perhaps the prairies have the deepest soil, and produce the heaviest crops of corn. Three methods are adopted in seeding down wheat. Three times ploughing are considered necessary in fallows. One method of seeding is to harrow the seed thoroughly; another is, after the second ploughing, to harrow well the ground, sowing broadcast, and *ploughing* down the wheat. The third plan, and the best, is to prepare as in ploughing, and then seed with a drill. It is alleged that this resists the frost, and is not so much exposed to the bleak winds of the winter when the ground is bare.

Let me say a word or two about culture of corn. The two varieties of corn are white and yellow; but a better than either seems to be a mixture of the two. In a field which a neighbor cultivated, and which I saw when planted, consisting of 90 acres, corn was produced, the ears of which were about 10 inches in length, with 20 rows filled closely to both ends; of mixed seed, and somewhat indented like ground seed; long grain, and small cob; the average per acre, 50 bushels. This was on prairie land. Rotation in crops has not been much attended to as yet. This is much to the injury of the soil, both in impoverishing it and in causing it to become foul.

Cattle.—In the feeding of cattle heretofore, the usual method has been to turn beef cattle for market into the corn-fields at a certain season, when the corn is out of the milk; and hogs, also, are fattened in the same way. In this way of fattening no estimate can be made. Young cattle, of 3 years old, average $15 per head. Fat hogs, 18 months old, weighing 200 pounds, $2 50 to $3 per hundred. When otherwise fattened than as above, the grain is ground.

Wool.—Whether this will become a grazing county or a profitable wool-growing county, cannot yet be decided. This is, however, certain: wool commands a ready sale and fair price; average per pound, 33 cents.

Pork.—Mess pork, put up in good barrels of 200 pounds weight, is worth per barrel, at home, $8.

Fruit.—Our county will excel as a fruit-bearing county. This year the fruit is abundant. A gentlemen from this county carried some fruit—apples and pears—and obtained the 2d premium therefor, at the Cincinnati great fair, during October last. Excellent grapes—Isabella, and some other varieties—have been in great abundance this year.

The amount of iron cast at the furnace in La Porte this season is above what it was last year considerably, perhaps as high as 1,000 tons. a large portion of which is hollow ware and stoves, which find a ready sale. Plank roads are multiplying from this place as a centre. A *railroad* (the Mississippi and Buffalo) will reach this place next season.

Observations on Meteorology.

Date.	Highest degree.	Day of month.	Lowest degree.	Day of month.	Average time—degrees.	Various remarks on the seasons, &c.
1849.						
Dec., 6 o'clk. a. m....	36	16	10	31	23	16th foggy; on five days rain fell nine inches; snow; calm weather.
1850.						
Jan., 6 o'clk. a. m....	42	18	4	31	23	On five days snow fell twelve inches; weather throughout pleasant.
Feb.......do........	46	28	10	4	28	Snow fell nineteen inches; one-half clear, the other snowy.
Mar., 5 o'clk. a. m....	46	13	20	4	33	Snow three inches; fine weather for winter crops; winter mild.
April......do........	58	27	24	9	41	Dew second day; eight days rain; fine for wheat and grass.
May......do........	60	28	34	7 and 8	47	Cold northwest wind twelve days; good for wheat, but backward.
June.......do........	70	5	46	1	60	Rains on ten days; wheat promising; other crops backward.
July......do........	74	13 a 29	56	19	65	1st week, harvest; twenty-one days fine weather; corn grows rapidly.
Aug.......do........	74	9 a 13	56	31	65	Thirteen days warm rain every day; corn and grass rapidly growing.
Sept., 6 o'clk. a. m....	74	24	40	30	55	Still warm, heavy showers for fifteen days; corn ripening.
Oct.......do........	68	11	28	7	48	Corn ripe; eight days Indian summer; 8th, first frost; 19th, snow.
Nov.......do........	60	26	14	17	38	Fine weather for gathering corn; two days Indian summer; crops gathered.
Dec.......do........	40	2	22	6	31	10th—at this time ten inches of snow; weather mild.

Here I close my communication for the current year. Had I anticipated your call on me for this year, I would have made exertions to have this report fuller; as it is, I thought it would be best not to trouble you with what would be more fully exhibited by the United States marshal. If the observations on the temperature and state of the weather have anything in them which you consider superfluous, you are the judge of the matter, and can reject what you deem so.

I remain yours, with much respect, &c.,

JNO. C. REID.

LA PORTE, INDIANA, *December* 21, 1851.

SIR: Had time permitted, you should have heard from me sooner, although my essay (if entitled to the name) will be short. Yet I would consider myself inexcusable if I did not comply with your request. There are some things respecting public works, the state of trade, and the future prospect of this region of our State, which may not be uninteresting. The great western railroad from Dunkirk to this place will be finished westward from Toledo by the 5th or 10th January, 1852. The immense revolution which will be occasioned by the completion of this road, together with the competition to which it will give rise, can hardly be calculated.

Heretofore the transit charges upon our produce, amounting to more than 25 per cent., to New York, and the charge on dry goods from New York to La Porte, at from 75 cents to $1 05 per cwt., must be diminished more than 50 per cent. All these abstractions went into the hands of the intermediaries, such as merchants, commission merchants, brokers, peddlers, &c. Our beef and pork will not cost half the price for transportation to market. All this must benefit the agriculturist.

The arrival of the railroad at La Porte has given a spur to all kinds of business; manufactories, with fine public buildings, and many dwellings, have been erected this year. One thing, however, is of dubious utility, which has increased very much in our county, as well as in all parts of the United States: probably double the usual amount of merchantable dry goods has been brought to market here. This inflation of our market by a foreign importation, although it enriches the merchant, impoverishes the consumer, who inevitably pays the duty.

Crops.—I will now proceed to give some account of our crops for the current year. As a whole, our crops have been better, uniformly, than usual. The county of La Porte contains about 500 square miles, or 320,000 acres. Of this 25 per cent. is in cultivation, 25 per cent. marsh lands, which leaves 160,000 acres not under cultivation, of wild land. From the best information I have been able to obtain, the land in crop the season now closing may be classed as follows:

In wheat, 15,000 acres; corn, 40,000 acres; oats, 15,000 acres; grass, 10,000 acres. The average crop of the wheat is estimated at 15 bushels

to the acre...	300,000	bushels.
The corn at 40...	1,600,000	"
The oats at 50...	750,000	"
The hay at 1½ ton...	15,000	tons.

For the current year the prices have been the following average, which I have been curious to ascertain monthly:

For wheat, 67 cents per bushel; for corn, 32 cents per bushel; for oats, 20 cents per bushel; for hay, per ton, $7.

Wool.—I learned from the principal agent for the purchase of wool in La Porte, that 60,000 pounds were purchased this year, at an average of 35 cents per pound. The agents who sent the manufacturer the wool sold it at an advance of about 30 per cent. I am told the manufacturer makes at least 50 per cent. on his purchase out of his cloth. Now, if the cloth is returned in trade for the wool the succeeding year—and this is the fact—how much does the wool-grower lose in the trade? What would be his gain if the manufacturer removed his manufactory to the wool, where living is cheap, and a permanent abundance?

Now, if we have wool, and cotton, and iron, &c., and an abundance of breadstuffs, and every facility of power by steam or water, I ask, Why all this circling of trade? Here comes in the intermediary, or many of them, who pick up a living out of other men's labors; yes, sir, they gather up all the loose specie and carry it off; and the next operation is to shave paper. But there is another deep scheme in operation for the benefit of idle swindlers; and their *patrons*, or *dupes*, are legion in number, and their *palaces* are in every city: I mean here the patent-medicine men, and I ought to include the adulterers of drugs of foreign countries.

The population of our county is rated now at 15,000 inhabitants. The town of La Porte has a population of 2,500. The prospect of the completion of the Buffalo and Mississippi railroad has already raised the prices of grain and pork.

As the thing comes to my mind just here respecting the growth of pork in Virginia and North Carolina, I now advert to it. I find in one of the volumes issued from the Patent Office, that in raising pork for market, or otherwise, they estimate pigs at 18 or 20 months, *fattened*, to weigh, on an average, 150 pounds. Our hogs in Ohio, Indiana, and Illinois, of the same age, uniformly weigh about 250 pounds. The exact reason of this I would like to see explained. It may be altogether in the breed; but why?*

A word more about the prices of grain: From the best information I can get, our corn can be safely purchased at *Rochester*, New York, at 64 cents per bushel, and landed on the wharf at *Liverpool, England*, at $1 per bushel. Here we see that the cost of carrying our corn to Rochester is just 32 cents per bushel. Now, I verily believe that it can be carried to New York city by railroad next season for perhaps less than 32 cents per bushel; then the farmer should receive for his corn at La Porte 64 cents per bushel.

Best flour, per *barrel*, costs from New York to Liverpool, including wharfage and cartage at New York, freight to Liverpool, commissions, insurance, wharfage, &c., 96 cents. Now, a bushel of corn may be set down at one-fourth of 96 cents, which is 24 cents; add 24 to 64, and we have 88 cents. This gives the shipper 12½ cents per bushel. Of course

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[* Pigs in Connecticut, Rhode Island, and Massachusetts frequently weigh 250 pounds when 10 months old, instead of waiting until they are 20 to attain that weight, as in northern Indiana. In all cases it is the neglect to feed high that makes hogs light in weight at maturity; and it is good keeping that gives a large yield of meat in the shortest time, and, usually, at the smallest cost.

See Report of Committee of Brooklyn Agricultural Society, Windham county, Connecticut, in which they say that pigs 10 months old weigh, when dressed, 350 pounds.]

this will inevitably produce a final removal of all *intermediaries*, who, like the horse-leech, are never satisfied, but cry, "Give, give!" As for our flour, if we can find consumers in the shape of mechanics and manufacturers at home, we had better let them have it than pay on the wharf at Liverpool cost and charges of various kinds, making the cost per barrel \$5 25, and on sale only be able to get \$4 50; clear loss, 75 cents per barrel.

I am, sir, now convinced that our region should become a manufacturing district; yet I know, also, that it will not become so immediately. We are convinced that a judicious wool-grower would make more money from 640 acres of suitable land from raising sheep than making corn.

Should this communication reach you, and meet with your favor, I ask your further favor in sending me two articles—a few grains of the Maryland blue-stem wheat, which produced in Caroline county, Virginia, last year 54 to 60 bushels per acre; and, next, a few grains of what is called Lloyd corn—a beautiful white corn, and very productive. It was cultivated last summer in Chester county, Pennsylvania, by five or six farmers. The Troad wheat you sent me two years ago I had carefully sown apart from other wheat, but not one grain sprouted; the reason I know not.

Of the prevailing kinds of wheat sown last year, and harvested the past summer, were the Mediterranean, the white-bearded, the rock wheat, and the Genesee. I saw them all growing in the same field—20 acres of each; all came uninjured to the harvest. The Mediterranean was most productive—produced 25 bushels per acre. The others averaged 20 bushels per acre. All heavy, good wheat.

The variation in the corn crops was occasioned chiefly by bad or good cultivation, ranging from 25 bushels per acre to upwards of 80 bushels.

I have made from my daily minutes of the season thermometrical observations as far as the temperature is concerned, together with the amount of rain monthly; also, the amount of snow during its season. I have no barometer; therefore no calculations from it.

Date.	Average.	Heat.	Latitude.	Rain.	Snow.	Remarks.
1851.	*Degrees.*	*Degrees.*	*Degrees.*	*Inches.*	*Inches.*	
January	25	42	—2	1	8	Mild.
February	28	45	4	3	7	Mild.
March	36	60	16	2	3	Mild.
April	40	54	22	6	1	No more snow.
May	50	65	30	10	—	Birds numerous.
June	60	70	52	2	—	Warm.
July	64	76	56	14	....	At one time, 12th, incessant rain.
August	65	70	48	7		
September	54	73	40	4		
October	45	60	30	4		
November	34	50	24	....	....	Little rain or snow.
December	20	42	—12	11	16	All melted.
				64	35	

NOTE.—The mark — signifies below zero.

It has here been a good crop season. The present winter crop is exceedingly fine.

Our winter, which is thus far pretty severe, is this day quite mild; ground nearly bare; no frost in it.

Of imported goods there has been the amount of from \$80,000 to \$200,000 worth brought to La Porte.

I am, respectfully, &c.,

JOHN C. REID.

Hon. THOMAS EWBANK,
Commissioner of Patents.

FORT WAYNE, ALLEN COUNTY, INDIANA,
November 20, 1851.

SIR: Your Circular, containing numerous interrogatories, soliciting information on the subject of the agricultural products of the country, came duly to hand; but various causes have conspired to delay an answer until the present moment.

This county (Allen) has a soil adapted to the raising of all kinds of grain, as well as grass.

Wheat.—As a wheat-growing county, the last United States Census shows it to be the second county in the State. The variety generally preferred is the Washington blue stem; the *white* Mediterranean can be sown late, and is preferred by some. The success in the crop, experience has proved, consists more in the thorough method of cultivation than in the variety sown. An illustration of a single instance in our county in 1850 will demonstrate it: One individual sowed about 70 acres; three different varieties of seed—white Mediterranean, and two varieties of red-bearded. The soil was different—one field was hard clay; the other two varied from deep mould to sandy loam. The ground was ploughed twice (summer-fallowed) and harrowed *three* times thoroughly. Product about 40 bushels to the acre. Scarcely any perceivable differeuce in any part of the 70 acres. This was considered an extraordinary crop. The average produce of the county it is impossible to get at; the yield ranging from 10 to 30 bushels. The yield is on the increase, as we plough deeper, and harrow oftener and better, thoroughly—to pulverize the ground with drag or harrow being one of the great secrets in raising wheat. Add to this early sowing and early harvesting, and the product will be generally satisfactory.

Corn.—Very little manure of any kind is used in raising corn in the Mississippi valley, especially on the river bottoms. Average yield, 40 bushels; cost of cultivation about $12\frac{1}{2}$ cents; average price, 25 cents. No experience in testing the comparative value between raw, cooked, and boiled food.

Oats.—Average yield, 40 bushels. Side oats stand up best, and are most productive.

Barley.—A somewhat uncertain crop.

Beans.—Soil rather rich; continue to grow too late in the season; do not ripen well; yet fine crops are sometimes raised.

Peas.—Commonly a good crop. Average yield 20 bushels; 3 bushels sown to the acre. The bug is very destructive to our early crop. Sow from 1st to 10th of June, and you escape it altogether. I have tried it. This is an item of information that ought to be extensively diffused, as the pea crop is an important one. It can be grown on almost any soil, and is not exhausting. Average price here, $1.

Grasses.—Clover, timothy, and red top do exceedingly well. Average yield about two tons to the acre. The application of any kind of manure as a top-dressing is valuable. Even straw, carefully distributed in the fall, has shown itself visibly in the crop. I have used plaster this year on a clover field with marked success.

Dairy Husbandry.—Strictly speaking, very little done in that branch. No data worth communicating.

Neat Cattle.—Cost of raising, very trifling. After the first winter they run out in the range most of the grazing season, and in the stalk fields, and to straw mostly during the winter, which is short. For this kind of treatment it is thought grade cattle do best; some fine Durhams, however, are being introduced. Common price of three-year-old steers from $10 to $12.

Horses.—The raising of horses is considered more profitable than any kind of farming business. They are frequently raised in the same manner as I have described in the raising of cattle, and the expense but little more. Price at three years old from $30 to $50.

Sheep.—Very little done at wool-growing. Sheep did not do well when the county was first opened. The wild parsnip, which was somewhat abundant in certain localities, sheep are fond of, and it is very fatal to them. This has deterred many farmers from going into the business. The farmers are now experimenting with more success.

Hogs.—My method of hog-raising is to keep them in clover fields. Sows raise two litters—one in April, and the other in October. Feed the sows and pigs with milk and slops. The April pigs I butcher at 8 months old; the October pigs, at 14 months. I give them a good start, early, with green corn, cut up. They will eat stalks and all. Follow it up with boiled pumpkins and potatoes, giving it more body after the second week with meal and boiled buckwheat, &c., and finish with six weeks on corn and meal. This is my method, which I think profitable. My breed is a cross of the Leicester and Lincoln. I purchased a pair of pigs at the State Fair in New York some three years ago. They keep easy, mature young, and weigh well. The hog I purchased received an injury, and was fattened last fall. He weighed nearly 600 pounds. Other breeds and crosses are preferred by some.

Root Crops.—Do well; but cannot be raised profitably, owing to the expense of raising. Labor is too high for that purpose. Turnips grow well, but are only raised for family use. Price, 12 or 15 cents.

Potatoes.—One of our best crops. The varieties are too numerous to give particulars. Quality fine. Average yield about 150 bushels. Sweet potatoes are raised to a considerable extent, and with varied success; not considered a profitable crop.

Fruit.—All the choice varieties cultivated elsewhere. The "pear blight" and "yellows," on peach trees, are not known among us as yet. Grapes do well. The Catawba and Isabella are the principal kinds cultivated. The Catawba is rather late; but it surpasses everything else, and is raised as easily as currants.

Very respectfully,

J. D. G. NELSON.

JEFFERSON, INDIANA, *November* 30, 1851.

SIR: I have just received the second part of the Patent Office Report for 1851 from the Hon. J. McDonald, late member of Congress from this district. In regard to the organization of the agricultural part of the Patent Office, I beg leave to offer a few suggestions. Suppose each county had an officer, whose duty should be to report to the Commissioner of Patents, monthly, the condition and prospects of the crops in his respective county—such officers being elected or appointed in all the States and Territories of the Union: the Commissioner of Patents would thus be put in possession of agricultural information the most accurate and extensive.

From these county reports, general State reports could be drawn up and published monthly in Reports from the Patent Office: thus the State agricultural reports of the month of May to appear in the Patent Office Report for June, and those of June in the July Report, &c.; so keeping the people advised of the true state of all the various crops of our widely-extended country, from the time of planting or sowing, through the progress of their growth, to maturity, until they were gathered and saved. I need not say to you that agricultural wealth is the true basis of all of her wealth, individual or national.

Suppose the office of furnishing the Commissioner of Patents these county monthly agricultural reports was attached to the office of county assessor in each county. County assessors are, or ought to be, judicious, practical business men, and competent to estimate and give the county reports correctly; and, in addition to that duty, they ought to be required to ask each farmer, while assessing his property, the number of acres he has in wheat, the number in corn, in oats, in cotton, rice, sugar, &c.; and from these data make out an annual county report of the agricultural productions of the county, the average quantity of grain, or other agricultural productions, per acre, and the sum total of each; which reports should be filed in the clerk's office of each county, and a copy should be forwarded to the Commissioner of Patents, and thus furnish him the proper data for his Annual Report, which would present an accurate account of the number of acres of each article of agricultural production, with the sum total of the entire quantity of each annually raised in the United States and Territories. Thus in a few years an approximate estimate might be made of the quantity of each article of agricultural production consumed, and the surplus, if any, and the deficiency, if any. It is obvious that such information would enable the people to seek the best market for their surplus productions, and the best way of supplying deficiencies when crops fail. It is required, I believe, of consuls abroad to furnish seeds for distribution among the people by the Commissioner of Patents, through the Post Office. It would be well for them, also, to furnish agricultural reports of counties where they are respectively residing. These reports should be monthly, and drawn from the best sources of information in their power. Thus besides a correct knowledge of the agricultural productions of our own country, we would be put in possession of comparatively correct accounts of the agricultural productions of other countries.

Some such comprehensive system of agricultural organization is required in the United States. Hitherto agricultural improvements have sprung mainly from individual effort. Agricultural fairs, agricultural newspapers, and, of late years, the Patent Office Reports—all these, valuable as they unquestionably are, and have been, are not sufficient to disseminate knowledge of the best modes of culture of the various productions of our widely-extended country. This, it may be said, would not disseminate such knowledge. No, it would not directly; but it would turn the attention of the public to agriculture, and that would be sufficient. I have no doubt you would soon see model farms established in every State, and agricultural schools in them, the pupils of which laboring on the farm, would carry into practice, one half of the time, instructions in science which they have received the other half.

I believe it is a practice of some, when a new enterprise is proposed, to sit down and count up the costs. Well, the extra duties it would impose on assessors would not probably average more than six or eight days' labor a-year. This to each county would not be much. What the extra expenses of the Patent Office would be, I am not able to say; you, of course, would be the best judge. Printing the reports would be considerable. To reduce this item of expense, I would suggest that the public printer—after furnishing a proper number of copies of Reports for the use of the government—should be allowed to furnish subscribers with copies at as low a rate as he could afford. Now, if he had 200,000 or 300,000 subscribers, or half a million, or more, he could afford to furnish copies at a little over the price of the materials and labor, and have a handsome profit besides. The whole cost of an efficient agricultural organization would be very small. The federal government would enact laws to organize an agricultural bureau, and the State government would enact laws adding the above-mentioned duties to the assessors.

If you have time, and think the above suggestions worthy of your attention, be so good as to drop me a line; let me have your opinion in regard to them.

Yours,

R. WATT.

Hon. THOS. EWBANK,
Commissioner of Patents, Washington City, D. C.

NEAR RICHMOND, INDIANA, *January* 1, 1852.

SIR: Through the kindness of my friend, George W. Julian, M. C., I received, some time since, a copy of thy Agricultural Circular, which I laid aside, intending to make a brief reply at some convenient time. I have again opened it this evening; and, notwithstanding the lateness of the hour, I feel inclined to drop a few lines.

Wheat.—Guano is not used in the production of this crop in this vicinity. From 1 to 2 bushels of seed is sown per acre, (usually 1½ bushel.) Time of sowing from the 1st of September to the 15th of October. Early sowing generally preferred.

Wheat has been sown in the months of June and July with moderate success. Harvesting usually commences about the 25th of June, and continues about 2 weeks. We seldom plough our ground more than once. Additional ploughings would generally pay—I think not always. Wheat is made faster with manures; stable manure is the best—for clay soils particularly. This it is best to spread after the plough, and before the harrow. Wheat, well manured in this way, cannot easily be winter-killed. The yield per acre is various—from 10 to 25 bushels—principally owing to the kind and strength of soil. Wheat has not been more than 50 cents per bushel; when harvested, will average 47 or 48 cents. It is said that sheep penned in a barn infested with weevil will effectually expel them.

Fruit.—The culture of this crop here does not receive as much attention as it deserves. Apples are, or rather would be, a profitable crop, did we have a cash market for them, which we hope soon to have. In a good fruit year we usually sell apples (hand-picked and delivered) at 20 cents (sometimes 25) per bushel; which yields a moderate remuneration. At 25 cents, apples would well pay for cultivation. I prefer budding to grafting, especially on small trees. When the bark peels the freest on a thrifty limb, half an inch, more or less, in diameter, make an incision with a sharp knife crosswise; then split the bark barely to the sap; from this cut downwards an inch or more with the point of the knife, and open the bark a little each side of this slit; from a twig grown since the preceding spring, in which the sap is also flush, cut a bud, with the bark of the twig an inch in length; carefully take out the wood that has been cut with it; slip the bud into the prepared place for it, as above; wrap moderately tight with a woollen thread; in two weeks take off this thread, and the nature of the tree is changed.

If rightly budded, pears and apples seldom fail to "take;" peaches and cherries are much more uncertain. I budded a few cherries the past season in the way described; some of which have grown several inches; one about 2 feet.

Thine, very respectfully,

ROWLAND T. REED.

COMMISSIONER OF PATENTS.

MUNCIE, DELAWARE COUNTY, INDIANA,
November 17, 1851.

SIR: Yours of August, 1851, making inquiry respecting agricultural products of this county, is now before me, and I return you the following:

Wheat.—There is no guano used in the production of crops in this county. The average product of wheat is about 15 bushels per acre. Time of seeding is about the 15th of September; harvesting, from the 1st to the 15th of July; quantity of seed per acre, 1¼ to 1½ bushel. We plough generally, if fallow, twice; if in corn ground, once, and harrow once. The yield is increasing. Rotation is—first corn, then wheat, then clover, and then corn again, &c. No remedy for Hessian flies. Usual price per bushel is 40 cents.

Corn.—The average product is 35 bushels. No experiments have been tried here in feeding. We feed whole; no doubt there is a better way. Oats yield about 25; barley 25; rye 15. Seed used: oats, 2 bushels; barley, 1½; rye, 1¼.

Peas are not cultivated.

Clover and Grasses.—One and a half ton per acre. Stable manure is the only manure used.

Neat Cattle.—Cost of raising till three years old from $10 to $12; price from $12 to $14; good cows are worth from $12 to $15.

Horses.—The growing of horses is profitable. Cost of raising a colt or mule to three years is $40. Brood mares and colts should be tenderly treated and properly cared for; kept in good pastures, and sheltered in stormy weather. Colts should be handled while young.

Hogs.—The best breeds are the Berkshire, Russia, and China.

Potatoes yield from 100 to 150 bushels; the best variety is Meshanock.

The *Culture of fruit* is receiving increased attention. There can be fruit enough raised upon one acre to render it profitable. The experiment for winter use and exportation not fully tried.

Yours, respectfully,

SAML. W. HARLAN.

Hon. THOMAS EWBANK.

COTTAGE HOME, HENRY COUNTY, INDIANA,
January 18, 1851.

SIR: In reply to your Circular, I answer:

Wheat.—The culture of wheat is receiving increased attention, and every year adds to the amount grown. It is either sown among corn, after wheat or oats, or on clover sward. The first frequently yields a good return, and some farmers believe it the surest crop. Wheat in this county is subject to be winter-killed. We have less snow than in the Atlantic States, and it is urged that the unevenness of the ground, and the dead corn stalks, protect the young wheat plants against the winter winds. The second, third, or even the fourth crop, especially in our rich alluvial bottoms, is sometimes better than the preceding ones. This fact has induced some farmers into the very erroneous belief that wheat may follow wheat *ad infinitum*. This error will be corrected and their folly punished by the exhaustion in their soils of the elements of wheat, or, at least, some of its elements. Wheat after clover is the surest crop, and the yield the greatest. The old "naked-fallow" system is generally abandoned. The weevil is unknown here; the Hessian-fly not a frequent visitor. The two formidable enemies of wheat here are the rust and the winter. Early sowing is the best defence against both. "White-chaff bearded" is the principal variety raised. Blue-stem has been tried by some farmers, and highly approved. Mediterranean wheat is not in much repute. Wheat is sown broadcast, two bushels to the acre. The average crop per acre for the last year, 18 bushels; weight, about 61 pounds per measured bushel. Guano is not used for this or any other grain. Time of sowing, from the 1st to the 20th of September. Average price, 50 cents per bushel.

Corn is the great staple of Indiana. Average product per acre, 50 bushels. The cost per bushel varies greatly in different soils; average cost about 10 or 11 cents per bushel. Indian corn is a very hardy plant, and will grow on almost any soil; but its partiality for a rich, warm soil is manifested by its increased yield. Its maximum yield per acre is scarcely known. Deep ploughing, fertile soil, and good culture will seldom fail to produce 100 bushels to the acre. The kinds raised are the white, chiefly for bread, and a large yellow, for stock. The latter is the most productive, and is thought to be better for stock. For cattle it should be ground and steamed, or boiled. Prepared in this way, it will produce of fat double the amount of the same quantity fed in the ear. Corn is planted here about the first of May, in hills three and a half feet apart; four grains in a hill; ploughed three or four times with the shovel-plough, (the cultivator is sometimes used,) and dressed once with the hoe. Where the ground is mellow, and free from weeds, this last is dispensed with. Thriftless husbandry is the only enemy it has.

Oats are not extensively cultivated. Average yield, 30 bushels to the acre.

Barley and Rye are still less cultivated. Some farmers who have tried the former consider it excellent for horses, and a profitable crop.

Peas and Beans are raised only for table use.

Clover and the Grasses.—Few crops pay better for the labor of the cultivating than clover. The average yield is not far from one and a half ton per acre, but three tons are frequently grown. Clover yields two crops in a year. The last crop is grown chiefly from the seed. It produces from one and a half to two bushels of clear seed to the acre. Price in the market, $5 per bushel. After the second crop it throws up a fine crop of aftermath, which, if turned under by the plough, is highly beneficial to the soil. Timothy is the principal grass grown for hay, and blue-grass for pastures. Timothy produces one crop (average about one and a half ton) per year, and a fine aftermath for fall pasture. It stands first among the grasses. The long ears, filled with seed, are extremely nutritive. Cattle, sheep, and especially horses, greatly relish it. Red-top is grown sometimes on wet land, but it is neither so productive nor so nutritive as timothy.

Dairy Husbandry.—Of dairy husbandry I can give little account. Farmers usually keep enough milch cows to make their own milk and butter, and supply the home market. One farmer in the county pays considerable attention to the dairy, and it is said to be profitable; but I am not able to give the figures for it. Average price of butter, 10 cents per pound.

Neat Cattle.—It is generally believed that cattle at three years old may be bought for less than the cost of raising them.

We live too near the prairies, where the pasturage of *commons* is unlimited, to compete successfully with our neighbors of Illinois in raising cattle. Cattle, however, if not satisfied, will live and thrive on coarse feed, such as wheat straw, the winter pickings of the corn-fields, &c. The largest and finest cattle cannot be raised entirely on this kind of food, but still they will winter upon it; and many farmers have herds of forty or fifty wintering around straw ricks. In the coldest weather they give them some grain.

The Durham is thought to be an improvement on our native stock; and if to have large fine cattle be the only object in raising them, there can be no doubt of the fact. But as no accurate experiments have been made to test the matter, I am scarcely able to give an opinion. As opinions, unsupported by actual experiments, are worth nothing, I shall not venture one.

If the prevalent opinion is true, that mere beef-cattle cannot be raised to profit if grain-fed during winter, the excellency of the Durham may be questioned; for—though high feeding may not make Durhams of our common stock—it may be true that hard fare may produce the common stock, or something not superior to it, of the Durham. But time will test this matter. The Durham, it is believed, fats more easily than the native breeds.

Much attention has been paid to the improvement of cattle, and some of the finest animals have been introduced.

Horses.—Horses are in much demand, and raising them is thought profitable. A good horse, six years old, frequently sells for $100. Horses are generally taken to the South; some, however, to the eastern markets.

Sheep-raising is yet in its infancy. Public attention is beginning to be attracted to the subject, and fine-woolled merino command a very high price. Hitherto only wool enough has been raised for domestic use; judging from present indications, a few years will make a great change in this respect.

Hogs are first among our domestic exports. The breeds raised are crosses of several improved varieties with the native stock. The Berkshires, a few years ago, were in high repute; but now fallen—I think without much reason—sadly into disgrace. The hog is a great consumer; and to be raised with profit, should not be fed more than one winter. Pigs littered in the fall should always be brought into market the next fall. Clover, for summer feed, is decidedly the cheapest; corn ground and cooked, as I have already stated, is the best for fattening. When fed in this way, they should be kept in close pens. Hogs are frequently turned at large in the fields of corn, with full privilege of helping *themselves*. This costs less labor; but if it is true, as some experiments have shown, that corn ground and cooked will produce double the amount of fatted pork that corn fed in the ear will—bushel for bushel—then economy is not on the side of this wasteful practice.

Tobacco.—Some attention is beginning to be paid to the culture of tobacco; but I am unable to answer any of the queries in the Circular concerning it.

Hemp is not raised.

Root Crops.—These, as yet, are only raised for table uses. Attention is beginning to be attracted to the subject, and next season will witness several experiments of the culture of roots as a field crop. That they will ultimately constitute a part of our system of rotation of crops, I have no doubt.

Potatoes, (Irish and sweet.)—The first are just recovering from the rot; they have never been raised here for other than table use. Last spring I planted several varieties together; by mid-summer the tops of all, except the long Johns, were destroyed by the blight, though the tubers were not affected. This kind continued to grow until frost, the tubers being large and numerous; while those of the other varieties scarcely paid for gathering.

Ashes and well-rotted manure should be spread over the ground, and the potatoes dropped on top of the ground, rather than in furrows made by the plough. The sweet potato should be planted in hills, or ridges, (hills are better,) two and a half feet across at the base, tapering to one foot at the top. If in hills, one plant only should be placed in a hill; if in ridges, about the same proportion. The vine should not be allowed to take root. The plant, in this latitude, should be raised in a hot-bed; the sweet potato is a native of the South and loves a sunny exposure. Ashes are a good manure for this root; 200 or 300 bushels may be raised to the acre.

As you will receive a communication from a distinguished orchardist of this county, it is not necessary to answer your queries respecting fruit.

Manures.—Neither guano nor plaster of Paris is known here as a fertilizer. Agriculture is not studied as a science. The laws which govern vegetable reproduction are not as well known as they should be. In this county, as in all others where the soil is rich in the elements of vegetation, no attempt is made to improve the natural fertility. Barnyard manure is almost the only fertilizer known. Even lime and ashes are little used. Our soil is rich in the carbonate of lime; and it is questionable whether an additional portion would prove beneficial. Ashes are a manure on almost all soils; on cold clays they will often double the crop.

Some attention has been paid to draining the land lying between our streams. After we leave the river bluffs, it is inclined to be wet. This land, believed at first to be of inferior quality, is found to be much improved by ditching. One man informed me that the increased products of two years more than compensated him for the expense of ditching.

Deep ploughing is becoming much more common; the effect of which is abundantly evident in the increase of crop.

There is an agricultural society in this county. It was organized this year. It was entered into with zeal by our farmers. The benefits of it will soon be manifested.

Very truly yours,

ISAAC KINLEY.

The COMMISSIONER OF PATENTS.

WASHINGTON, WAYNE COUNTY, INDIANA,
December, 1850.

SIR: Being prevented from replying before to your request, I at this late hour design giving what information is in my reach respecting some of the subjects of your inquiry.

Corn is the principal grain produced in this county. As the soil is exhausted, other grains and clover are substituted. When the land is first cleared of timber, it will produce 60 or 70 bushels per acre; but by continued corn-growing from year to year, in the course of 12 or 15 crops, 30 to 35 bushels are all that can be produced. More white corn is raised than yellow; though the yellow will yield most per acre, and is considered most nutritious. In all lands cultivated in corn, 40 bushels are an average crop per acre; yet, by proper rotation with wheat and clover, 75 bushels might as easily be produced on the same ground.

Cost of production, 15 cents per bushel; price this season, 30 cents. Average price for last four years, 20 cents per bushel. But few experiments have been made on ground or solid corn; the price being too low, for both corn and pork, to induce many to economize their grain. It is common to turn hogs into a field of corn and give no further care to them than to salt and water them until the corn is consumed; then turn into another field. Fields thus managed will produce good corn from year to year, without change of crop.

Wheat is now a staple crop. Perhaps half as much wheat as corn is raised in this region. The greatest enemy to the wheat crop is *rust;* to prevent which, the earliest varieties are selected, and sown as early as the 1st of September. The best varieties for this purpose are the rock, which is a smooth head, and red-chaff, and the white-chaff bearded. Rust seems to *strike* all wheat about the same time in the same vicinity; after which, the berry, in whatever state of maturity it may be, begins to dry up; so that late wheat is often left in the field unharvested. Ordinary time of harvesting is from the 1st to the 10th of July.

More wheat is sown among corn than in all other modes of sowing; when it produces 12 bushels per acre. But if, when fallow or clover ground is ploughed in June or July, then ploughed again in September, you sow the wheat and harrow well, 20 bushels per acre are produced. Three and four crops of wheat have been raised in succession, and the last was better than the first. Five pecks are sown per acre. Some experiments this season in deep ploughing more than doubly repay the labor, both for corn and wheat. As attention is paid to better modes of preparing ground, the crop is increasing. Price, 60 cents per bushel.

Oats are not very extensively cultivated, and are not considered a profitable crop, as they are thought to exhaust the ground more than wheat. Seed sown per acre, $1\frac{1}{2}$ bushel; price per bushel this season, 25 cents.

Clover is begining to be much cultivated for the purpose of resting and enriching the soil. It is principally pastured by hogs and cattle; seldom being cut for hay.

When the early part of the season is wet, I have known three tons of clover hay to be mown per acre. As the time for cutting clover comes in the most busy season for working corn, and as that time is generally liable to frequent rains, which are much more injurious to clover hay than other grasses, it is not commonly mown for hay.

Timothy is commonly used for hay, and yields, on an average, $1\frac{1}{2}$ ton per acre. It is not a profitable crop to raise for market; the price generally averaging $5 per ton. This season, however, owing to drought last summer, the price is $8. Too little attention has been paid to this branch of husbandry to know much about the effect of manure or flooding meadow lands.

Hogs.—Until recently, owing to the distance to market, hogs were the principal means of obtaining wealth, as they could better be driven 80 miles to market than to haul grain the same distance. Hogs are generally sold at the age of from 18 to 24 months. They are not generally fed, but eat what they can get until the last four months of their lives, when they are made fat by feeding them with what corn they will eat in the ear. They are generally pastured on clover in the summer, and fed on grain. In the winter they are fed enough corn to keep them in what is called "growing order." I am satisfied that more pork, with less expense, can be produced by keeping pigs fat from their birth, until they are slaughtered. A pig, kept fat until it is 12 months old, is larger and better for

pork than one 20 months old kept three-fourths of the time in only "growing order." The average weight of hogs in market is 200 pounds net.

Irish Potatoes are considerably cultivated. Owing to the potato rot during the last four years, comparatively few have been raised. The variety most cultivated, until recently, seems to be much more liable to the rot than other kinds—that is, the Mashanocks. To avoid the rot, we select the kinds of potatoes least liable, and then plant on a gravelly or sandy hill-side as early as the potatoes will vegetate—say the 1st of April. They flourish best on new soil, or that which has been highly manured with stable-manure. Price this season, 60 cents per bushel; average yield per acre, 150 bushels.

Sweet Potatoes grow well here of a dry season, planted in a sandy soil; best manure, ashes; price this season, 65 cents per bushel.

Apples.—The only fruit profitably cultivated; they are abundantly grown for cider, and family use. No experiments have been made as to their adaptation to feeding stock. The best winter varieties in use are the Rambo, bellflower, greening, golden russet, white winter pippin, Newtown pippin, never-fail, and wine-sop.

Pears are a very uncertain crop, as the trees seldom live more than 10 or 12 years.

Peaches have been an entire failure the last 10 years, owing to the yellows and the severity of the winter. Perhaps, however, the winter would not injure them were not their vitality first affected by the yellows.

W. W. BUNNELL.

Hon. THOMAS EWBANK,
Commissioner of Patents.

RICHMOND, WAYNE COUNTY, INDIANA,
8th month, 25th, 1851.

SIR: Thy Circular reached me a few days since; in answer to which I may say, no lime, guano, or plaster has been used on our field-crops, excepting some few cases, which have not been so successful as to justify the expense; nor have I seen any benefit from their application to our vegetable gardens, unless it is to frighten the potato-bugs from the plants. I have been much diverted at seeing the haste with which they will leave the premises after having their heads well powdered with lime, &c.

My *Rotation of Crops* differs from most of the farmers in this settlement. I put all the green manure I can get upon my sod-ground in early spring, and, as soon as spread, I turn it under from 8 to 10 inches deep; then harrow it well, and plant the corn from $3\frac{1}{2}$ to 4 feet apart each way, with 4 grains to a hill; cover it $2\frac{1}{2}$ to 3 inches deep with light soil. My reason for this deep planting is, that the cut-worm does not go so deep in the soil as to reach the heart of the corn, and then cutting it above the bud does very little injury. Let the farmer try it, and I think he will not go back to a half, or an inch deep. As soon as it is 2 or 3 inches high, we commence with the cultivator 2 or 3 times in a row both ways, and continue on until near wheat harvest—say 6 times each way—when we lay it by; and as soon as the grain is glazed, I begin to cut the corn close to the ground, putting 32 hills to a shock. (Now, it is to be understood that there are no weeds or grass in the field.) We then go 2 or 3 times in each row both ways; then sow about 1½ bushel wheat to the acre, and, with a large harrow, 12-inch iron tooth, we go over the whole field, levelling the ground. Immediately after this, I sow 1 bushel timothy seed to 8 acres; and, in the 3d month, (March,) I sow a half bushel clover seed on the same ground. I pasture it the next year, and the following two years mow for hay, then green manure, &c., as before. My reasons for this course of cropping are drawn from observation, and some little experience. I have noticed, when the juices of the barn-yard run through my corn-field, that the corn could hardly be better; and when they pass through any part of my wheat-field, it would be perfectly worthless; hence I concluded the green manure was just what the corn wanted, and that portion of the manure the corn did not take up was precisely what the wheat required; and by following these notions, I have seldom raised less than 50 to 70 bushels of corn, 20 to 28 bushels of wheat, and, fair seasons, 2 tons of hay per acre. Now, I can give no chemical reasons for my whys or wherefores; but more of this by-and-by.

I try to get my wheat in the ground not later than the middle of the 9th month, (September;) and I am careful to try not to sow one seed of cheat, for I know it will grow; and I would as soon believe that Indian corn would turn to broomsedge, as to believe a clean grain of wheat would grow chess. Why not turn to fox-tail, blue grass, or any other kindred grasses? The thing is incompatible, and should be frowned at by every practical farmer. But to return: My reason for sowing wheat early is to avoid the rust; and I often found it so well ripened before the fogs and hot suns fell on it, that it sustained no injury. I also try to cut my wheat as soon as the milk will not press out of the grain; it shatters less, and the wheat is just as good. Our oats are sown on our poorest corn-ground in the 3d or 4th month, (March or April.) Perhaps it would not be apart from the subject to say, our corn, wheat, oats, and hay were never better, in quality or quantity, in this settlement.

Butter and Cheese.—Very little attention is paid to butter and cheese over the wants of the settlement.

Horses and Mules are raised with us, though but few of the latter. Of the horse we have raised some very fine, at a cost not under $50 at 3 years old. Very little attention is paid to *sheep*, and less to improved varieties.

Hogs and Corn are our staples. We try to slop them twice a day, and give them an ear of corn each at slopping-time. By this course we get them to weigh 250 to 300 pounds at killing-time, which is generally about the close of the year. The Berkshire, when they will be from 18 to 20 months old, crossed with the Irish grazier, is preferred by most of us. Root crops are not raised for distant markets. The little surplus finds a low market in our city.

I now take up the subject of my ignorance (referred to on the other page) as regards the proper application of things to things in farming. If I understood the drift Congress had in gathering all practical facts, it was that they might be embodied in a permanent form *for the good of all;* and if this had been done, perhaps I might have been much better qualified to give good reasons for my course of farming. I believe if the Reports of the Commissioner could reach the farmers and mechanics, as they justly should, they would be considered a treasure to us; but what are the facts of the case? Do not the members of Congress, * * * * * * * except a few hundreds put into the hands of the Commissioner—first tying his hands before he shall distribute them, sweep off the whole lot? These books, with other like things, are taken to their respective homes by cart-loads, and there distributed among just such men as themselves—lawyers, doctors, &c.; some of whom, I venture to think, if I were ploughing, and wanted my plough to run a little deeper, and were to ask their advice, would be as ignorant as a child to advise me. Many such men as these get the books, and these men may consider themselves the public; but the facts are, the public do not get them—the farmers and mechanics, who are the largest portion of the community, do not get them, though they need them most.

I have inquired of many for the late Report of the Commissioner, and none have so much as seen it. It is true, I had the privilege of looking into one about five minutes, and this was in the hands of a doctor; and I have my doubts whether he has seen the inside of it for three months past. Not a farmer or mechanic of my acquaintance has this book, that I can find. My word for it, the thing is wrong as regards its distribution.

I remember, not long ago, I asked the present Commissioner to continue to me the favors I received from his predecessor (Ellsworth) in sending me a copy of his Reports; and he was kind enough to send me the law governing him in the distribution, by which I found he had no right to do so unless contributions to the Agricultural Bureau were first made. Now, was it not known by the makers of this law that not one in fifty of those who would delight in reading the book could scrape up and put together his ideas, of the adaptation of thing to thing, of manures to soils, of effects and their causes, such as would make a paragraph in one of his Reports? and knowing this, to require of us to do that which we have no capacity to do, is verily too much like Pharaoh requiring of the Israelites the full tale of brick, without furnishing the means to make them. Give us the books; they are the property of the farmers and mechanics, in common with others, by a fair construction of the law; and justice should be done them. I do not blame the Commissioner. I think he stands excused by law; but the law does not make it right that his hands should be tied thus. I think he should have ten times the present number of copies placed in his hands; and such as would ask for them should have them; and then I have little doubt but in time that Bureau would become one of the richest treasuries of practical agricultural facts on the face of the earth; but keep them out of the hands of these who hunt more for the loaves and fishes than the good of the whole community. Could some of you only feel a little of that pleasure we would have, whilst our horses were feeding, to sit facing a pleasant breeze at our windows, and reach from the table and read some of the reports touching some of the branches of farming that we had just been engaged in, I think more liberality would be extended to us. I say, again, give us the books—the key—that we may, with industry on our part, unlock to our understanding some of the laws—the wondrous laws—of the God of Nature.

Very sincerely, I am thy friend,

JOSEPH P. PLUMMER.

Cedar Farm, Hanover County, Indiana,
December 25, 1851.

Sir: Having just received a copy of the Patent Office Report of 1850-'51, in compliance with a promise contained in your Circular, I make haste to lay you under a similar obligation for the next year. In my former communication I was silent on the subject of your inquiries, save hay and fruit, which had received most of my attention up to that time. During the past season my crop has been of a more general character, and therefore I shall endeavor to extend my communication, by stating the result of my experience and observation on some others of the many crops raised in my neighborhood.

Wheat is produced here at an average of from 10 to 15 bushels per acre, and is considered a very uncertain crop, on account of the prevalence of the rust, weevil, &c. It is badly farmed—in most cases being sown on corn land, or on oat stubble, after a shallow ploughing, and receiving but a partial harrowing, and frequently sown as late as the months of October and November; all of which render the crop more liable to the attacks of rust. There are, however, exceptions to this system of wheat culture—such as sowing on a clover-lay, deeply turned under, or early summer-ploughing, and stirring before sowing; and, in a few cases, the grain-drill is used: almost all of which increase the yield from 25 to 50 per cent.

The Mediterranean wheat is mostly sown in my neighborhood, being considered less liable to disease than other varieties. It has been grown here for the last ten years, and has uniformly produced a remunerating crop when sown early, if there is moisture enough in the land for the seed to vegetate, which, however, has not been the case this season and last; both of which were too dry for successful sowing in the month of September. The consequence is, our present crop is scarcely more than up above the clods at this time. This was the case, to some extent, last year; but the favorable weather in May and June matured a crop of good quality, and in most cases we had a fair yield.

I received a small package of white wheat from the Patent Office, which I sowed in drill, and manured; but it was too late for it to vegetate before winter set in. I hope it will be up in the spring, and may prove a good variety. Should it fail to come up, I shall apply for more from the same source. I received a few grains sent me by a friend from the shores of the Mediterranean; it was sown late last fall, and from the produce I selected what appeared to be five varieties in color, all of which will be distributed if thought to be valuable varieties. The same friend has promised to send me a cask of seed wheat from the Black sea, of the best grown there; also, the best seed oats to be found in Europe; all of which will be forwarded to the Patent Office—if found to be of superior quality—for distribution.

The reaping machine is coming into use here, giving general satisfaction where used. I used one this season made by * * * * * * and can say that it is a most valuable labor-saving as well as grain-saving machine. It does the work of six cradlers, requiring only two hands and four horses to manage it, laying the grain in wide grips or bunches behind the machine, evenly and without waste, requiring six binders and two men to gather and shock the grain as fast as it is cut. It also saves lodged or leaning grain better than it can be done by hand, and is equally adapted to the cutting of oats, barley, timothy seed, &c. I have also a mowing-machine, which does equally well—doing the work of nine scythes. I have also a patent improved eight tooth drill, which works like a charm on properly prepared soil, drilling the wheat or other small grain so regularly in rows that they may be distinctly seen across a square of five or six acres. There is no questioning the advantage arising from the use of the drill in the wheat crop, as the plant is left to stand in a shallow furrow, being less liable to freeze out.

The average price of wheat at our nearest markets is 75 cents.

The *Oat Crop* here yields an average of about 25 bushels per acre. Price 20 cents per bushel.

Potatoes are grown to a considerable extent near the navigable streams, for the New Orleans market. Most productive planted in drills $2\frac{1}{2}$ feet apart, and set six inches apart in the drill. Small and cut seed as good as any; proved so beyond dispute. Produce, in good natural soil, of fair seasons, 200 bushels per acre; twice that amount in a few instances. Mercers most saleable, but considered more liable to disease. Price \$1 per barrel, of 2 to $2\frac{1}{2}$ bushels each.

Corn is the crop most cultivated; but a system of injudicious farming has reduced the yield from 60 and 70 to 30 and 40 bushels per acre on upland.

But experience has shown that soil, thus impoverished, may soon be restored to its original fertility, either by manuring or ploughing in crops, such as oats, corn, and buckwheat, sown broadcast and turned under; when sufficiently grown, to call into requisition the turning capacities of a good two-horse plough, such as are made by * * * Pittsburg, of cast iron. These I have found to be the best in use.

I have this fall harvested a crop of *corn* from a field which was cultivated in corn last year, producing, from ordinary cultivation, about 50 bushels per acre. This season, from the use of a subsoil plough, procured from * * * * * * New York, I have raised, without the use of any fertilizing matter, on the same field, at least 75 bushels per acre; the season being not better than the last. My method of culture was this: I first broke the ground with a heavy plough, drawn by two yoke of oxen, following immediately in the furrows with a subsoil, thus breaking the land to the depth of from 12 to 14 inches. The crop was then planted in shallow furrows, 4 feet apart each way, and from 3 to 4 plants in a hill. Yellow gourd seed, ploughed first time with a subsoil plough, drawn by two horses, one on each side of the row, running close to the young plants. The cultivator was then passed through both ways, to clear out the middles. In about 10 days a wing-plough was passed through one way, going twice in a row, and throwing the dirt to the corn; in a few days the cultivator was used both ways again, as a finishing stroke to the crop, leaving the ground level and in fine order for timothy, which was sown in the month of August, the corn being a protection from the hot sun. This experiment has fully convinced me of the importance of deep tillage, as one means of good crops, and security against injury in wet and dry seasons.

Fruit.—Having noticed the crops mostly grown in my neighborhood, I would say, on the subject of fruit, I have nothing new. This was a fruitless year in this part of the West, and what apples we see in market are of New York growth. Good, however, may result from this, as many varieties, new to the West, will be brought into notice, some of which may be adapted to our soil and climate.

The peach tree is grown here with ordinary success; but the fruit, for some years past, has rotted more or less. Elevated locations are said to be more secure from this disease. Much finer varieties than formerly are now grown by process of inoculation.

The small fruits and berries flourish here, among which I have found the red Antwerp raspberries the most remunerating upon the labor bestowed.

Grape.—The grape grows the vine well, nor does it freeze in winter; but of late years the fruit is attacked by a rot just before maturing, and not unfrequently a fine prospect will fall a prey to this disease in a few days. This disease seems to be produced by hot, showery weather, which, of late years, frequently occurs at the time fruit is maturing.

Horses, Cattle, and Sheep are only raised in southern Indiana for domestic use.

Pork is only produced for domestic purposes. In the counties bordering on the Ohio river it is made from the native breeds, in the ordinary way, by feeding corn in the ear; and, as a consequence, the hogs are not regularly fed while young, and are of small size when slaughtered, compared with those raised upon slops, in pens.

In reading the Patent Office Report, I have seen much complaint of the ravages of bug, fly, and skipper in meat, in some latitudes. Having myself been a sufferer in this respect, I will embrace this opportunity of publishing a recipe given me by a Mississippi farmer, who had formerly resided in Virginia. His farm was located in the corn-growing district of Mississippi, and he grew pork for the market, as well as corn. I inquired of him whether he was annoyed more or less by these pests to bacon than we of the northern and middle States. He informed me that they were more numerous there than farther north, but a farmer who put up his bacon right need have no fears from those insects. He then, at my request, gave a detailed account of his mode of curing bacon, which was as follows:

After the bacon was sufficiently smoked, at a season in the spring before the fly made its appearance, he coated the cut-side of ham, shoulder, or middling with wood ashes, packing it on with the hand one-eighth, one-quarter, or one-half an inch in thickness, as might be most convenient, being sure to have the cut-surface entirely covered, taking care to cover the hams thickest where the bone comes to the surface, on the thick part of the ham.

Scaffolds are to be made in the upper part of a rat-proof smoke-house, of poles or sticks, at a suitable distance to allow the ashed bacons being placed on them in rows, taking care that the pieces of meat do not touch, carefully examining each piece after it is laid down, to see if the ashes have fallen off, which, if so, must be replaced. After your bacon is thus placed on scaffolds, or shelves, one above another, it is in a position for occasional smoking, if thought necessary, and free from heating or moulding, which is not the case when packed away in barrels, in salt, charcoal, and other materials thought suitable; and if you have done your part in carefully covering the surface of the cut-part of the bacon with ashes, I would be willing to pay a dime apiece for all the skippers found in your meat for the space of one, two, or more years. This remedy I have tried for years, and feel unwilling to try any other, knowing this to be effectual; whilst all other remedies have been, to my mind and experience, objectionable.

Manure.—I am sorry to say we are very deficient in theory and practice. Our winters being mild, the housing of cattle is but little practised, and but little stable manure is made, and that so exposed to the weather as to be robbed of half of its fertilizing matter. Plaster of Paris, as far as tried, has not proved of much benefit; nor is it to be had in the West, only as shipped from the eastern States.

Peruvian guano has not been experimented upon here yet, not being within our reach. A manure of this quality, possessing great merit in small bulk, would be well suited to the capacities of the West, as it would require but little labor to put it on the crop; the labor being a great item where it is as scarce as it is here.

I remain, most respectfully, yours, &c.,

JACOB L. KINTRED.

Hon. THOS. EWBANK,
Commissioner of Patents.

ILLINOIS.

PLAINFIELD, WILL COUNTY, ILLINOIS,
January 4, 1852.

SIR: I acknowledge the receipt of your Circular of August, asking for information respecting the different branches of agriculture; in answer to which I respectfully submit the following:

Wheat.—The prairies, when new, produce wheat of a good quality, and an average crop of about twenty bushels per acre. But as the land becomes older, though it continues to produce a heavy growth of straw, the grain is gradually diminishing, both in quality and quantity, until it does not produce, on an average, more than ten bushels per acre. The light crops generally produced, added to the numerous total failures, render wheat-growing a very hazardous business.

The only preparation seed receives is a thorough cleaning in a fanning-mill.

The usual time of seeding is from the 15th of August to the 20th of September. I am satisfied that from the 20th to the last of August is the proper time for seeding. It will then be ready for the reaper about the 10th of July, and is much safer from rust than that which ripens later; also, when late sown, the plant makes but a feeble growth in the autumn; consequently, it is more liable to injury from the winter; and when the scorching rays of the sun in June and July are poured upon it, it must ripen—and that, too, prematurely. The consequence is a light, inferior quality. Still, if seeding is done in proper time, it is very liable to be destroyed by the freezing and thawing, with the drying winds that prevail during the later part of winter and early part of spring, unprotected, as it often is, by snow.

The circumstance of new land producing good wheat a few years, alternated with corn, together with the consideration of the corn stalks, as a protection during the winter by retaining the snow, has led to the adoption of this plan as the general rotation.

The general results of the wheat crop may be set down as follows:

Interest on one acre	$1 00
Seed, 1½ bushel, 75 cents	1 13
Putting in seed	37
Cutting stalks	06
Harvesting	1 60
Threshing	75
	4 91

Average crop 12 bushels.
Average price 70 cents—70 × 12 = $8 40.

Expense of producing one acre	$4 91
Value of crop	8 40
Net profit	3 49

If wheat is made to follow oats, 75 cents more must be allowed for ploughing, which will leave a profit of $2 74.

The recent numerous failures in the wheat crop have caused a general inquiry after some other system, that shall prove less hazardous.

I will suggest the following rotation, which succeeds better than the general plan, though it is acknowledged to be very imperfect. I will suppose the land to have been cultivated to grain five or six years or more; the rotation is then commenced by seeding to clover; the following June, so soon as it is in full bloom, a crop of hay of about two tons may be taken off. In the fall it will give a crop of seed of about three bushels per acre. If the land has not been too much exhausted by grain-growing, a crop of hay may be taken off the following June; but if that has been the case, it will be better to turn the entire crop under, the first of August, to the depth of six inches. The surface should then be finely pulverized to the depth of three inches and drilled to wheat the latter part of August. In February or March one-eighth of a bushel of clover seed should be drilled per acre. The clover will afford a partial protection to the wheat plants from the scorching rays of the sun during the period of its ripening, and also prevent the growth of noxious weeds, and afford a growth of fall feed, which will again be returned to the soil as a manure.

The wheat crop may be set down as follows:

Interest on one acre	$1 00
Expense of cultivation and threshing	7 00
Average crop, twenty bushels; worth	15 00
Net profit	7 00

In October or November following the wheat harvest, the ground should be ploughed *ten inches deep*. In the spring it should receive a top-dressing of manure. The surface should then be *finely pulverized* by the use of cultivators, which should be immediately followed by the *drill*, with corn from the 1st to the 10th of May.

As soon as it is up sufficiently, the cultivator should pass through twice between each row every week until the ears begin to set. A man should go through once with a hoe, at an expense of about one dollar per acre, to take out the weaker of the surplus stalks and the weeds that are left by the cultivator.

Interest on one acre	$1 00
Ploughing ten inches	1 75
Manure	5 00
Spring culture	25
Seed and drilling	38
Culture of crop	2 00
Husking and shelling	3 00
Total expense	13 38

Average crop, 75 bushels; value, per bushel, 40 cents; value of fodder, 75 cents; total value, $30 75; net profit, $16 37.

In August, wheat may be sown among the corn at an expense of $6.

Average crop, with the above culture, 20 bushels; price, per bushel, 75 cents; value of straw, $1; value of crop, per acre, $16; profits, per acre, $10.

In October or November, after the wheat comes off, the ground should be ploughed not less than six inches deep; and in the spring, so soon as the ground is sufficiently dry, *drilled* to barley and timothy seed.

Cost of barley crop, per acre, $7 45; average crop, 40 bushels; price, 40 cents; value of straw, $1 25; value of crop, per acre, $17 25; profits, per acre, $9 80.

The timothy may be cut for seed two years, with about the following results:

Interest on one acre	$1 00
Seed, one-fourth bushel	50
Drilling	25
Harvesting and threshing	3 50
Expense of crop	5 25

Average crop, 5 bushels; price, $1 75; value of straw, $2; value of whole crop, $10 75; profits, per acre, $5 50.

Respectfully, &c.,

LORING HERRICK.

The Commissioner of Patents.

Athens, Menard County, Illinois,
December 29, 1851.

Sir: The following observations on a few of the subjects embraced in your Agricultural Circular are respectfully submitted for your consideration:

Wheat.—Varieties chiefly used: red-chaff and Mediterranean. The former, a bearded variety, has been a universal favorite, but has become less productive, and of inferior quality. The Mediterranean has received the go-by. Millers regard it as little superior to rye. Its flouring qualities are inferior to any cultivated. It ripens six to ten days earlier than any other kind, and consequently affords facilities in a large harvest. Several varieties have been recently introduced, which promise to exceed either of the above, in quality at least. Harvest, from June 28 to July 10; quantity per acre, from 10 to 40 bushels; average, 20 bushels. The fly has recently made its appearance, and seriously injured several crops. Remedy, late sowing, from 1st to 15th of October. From rust the loss is light with winter varieties. The spring varieties are generally more or less affected—frequently to the loss of the crop; which, however, is not much relied on here. The greatest drawback on this interest of the agriculturist is the severity of our winters. The whole country is sometimes cleaned out by this cause, which may be effected either by a dry freeze, with bare ground, or with much wet and freezing. It is "spewed out," as it is called. For the latter, ridging up is advantageous; for the former, no effectual remedy. No preparation of seed except thorough cleaning, which is accomplished in no better manner than by winnowing through a heavy northwester. Average price per bushel, at nearest market, (1851,) 60 cents. Not profitable.

Corn.—This is emphatically our crop. We rely upon it for our profits, not to sell, but to feed to stock—cattle and hogs. Varieties in use, white gourd-seed and common yellow, both large. The average yield, per acre, is 50 bushels, with ordinary tillage; though this amount can be doubled by manure and high culture. Cost of raising, per bushel, 6 to 15 cents. It is cut and shocked in the field, and hauled out when wanted for use, and fed to cattle whole and on the stalk. The waste and droppings are used for hogs, saving all; fed whole and raw to every species of stock. This is the cheapest and most profitable plan, in consequence of the scarcity of mills.

Clover and Grasses.—Red clover and timothy are the only species that are esteemed for meadow. White clover is regarded as a pest. The herdsgrass of Pennsylvania, or red-top, has been introduced, but is not valuable; yield, too light. A species of *Poa*, called blue-grass—not the *Poa campressa* of the East—is an invaluable pasture-grass, furnishing food for stock, if the season be favorable, until January, and even later. It spreads rapidly from running root stocks, and is tenacious of life, as every prairie farmer has sad experience of in his fields. It grows early in spring, and furnishes the first as well as last pasture-grass. Quantity of hay per acre, from 1 to 3 tons; cost of growing, from $2 to $5. It is stacked in the meadow, in and on pens, in which the animals are pastured; and, having free access to the stacks, they help themselves, or it is thrown to them when not so convenient. Timothy and clover are grown together.

Sheep and Wool.—No interest of the farmer pays so well as that of wool. The few who have engaged in the business extensively, realize the largest profits. Every farmer, however, has a flock, principally to afford wool for home consumption; any surplus is sold in the nearest markets, but is thought not to pay well in this way. With the aid of blue-grass pasture, the cost of keeping is trifling; will not average annually more than 50 cents per head. The cost of raising the different qualities is not ascertained; probably from 8 to 25 cents per pound. Large sheep, if healthy, most profitable.

Hogs.—We have a variety of crosses of almost every kind. The cheapest method is to fat en at one year old; when, if well kept, they will weigh from 250 to 300 pounds. Winter them on the offal of the farm; pasture on old clover in summer; feed corn on the cob to fatten. Sixteen bushels, fed with this treatment, will make 300 pounds of pork.

Irish Potatoes.—The most common kinds in cultivation are the Meshannocks, pink-eyes, and Irish grays. The yield has greatly diminished since the malady. Localities not affected with the rot, yet seem to be under the general disease; the vines grow small and die early. I have not seen a matured ball of seed for two years, though I have examined my whole crop for the purpose; the tubers are fewer and smaller than formerly, and probably unhealthy. The average yield per acre is now less than 100 bushels; the cost of raising and harvesting, 15 to 30 cents per bushel. I never lost any with the rot until the present year, and now only a few grown on the north side of a row of peach trees, and a small quantity in a highly manured spot. The shade of the trees on the former was dense, and kept the ground wet. It was thoroughly saturated and heavy (it being a clay) when I harvested them, though the adjoining ground was remarkably dry. They were then principally rotten, and were still rotting. The crop was affected in no other part but in the above-mentioned places; and in this case, at least, I believe the direct cause of the rot was the shade and manure. I also planted a few tubers in the garden which I raised from the seed the previous year, and highly manured them with thoroughly-rotted stable manure. The result was, that the yield was heavy, but badly rotted; nearly every tuber being affected, and satisfying me that no remedy is to be looked for in the seeds of the ball, if it could be obtained; which I believe to be doubtful at this stage of the disease. The best plan of cultivation is to plant early and cultivate thoroughly until the tops fall; never touch them afterwards; and, to avoid the worst effects of the rot, let the soil be dry and light. If autumnal rains be abundant, dig early, thoroughly dry in the sun, and secure from the atmosphere. Use no manure.

Sweet Potatoes.—This invaluable and palatable esculent offers, in my opinion, no barrier to its introduction and succcessful culture throughout the greater portion of the Union. I doubt not but that it can be matured sufficiently to be a profitable crop anywhere that the common varieties of Indian corn will ripen. The yield here is from 200 to 400 bushels per acre. Cost of raising and harvesting, per bushel, 15 to 30 cents. It will furnish an excellent substitute for the Irish potato at least four months in the year; and doubtless methods will be discovered, when once their importance becomes appreciated, of preserving them much longer. It is a tender root, truly, and requires great care in preserving for seed. This is the great obstacle preventing it from becoming more generally cultivated in the northern States; and we confess this is our difficulty. It is a great deal easier to raise them than to keep them. They require to be kept warm and dry; that is the secret. A degree of cold considerably above freezing will soon destroy them; and I doubt if a degree of warmth, independent of artificial heat, can be provided for them that will preserve them through our long, cold winters, where the mercury frequently abates to 11° below zero. But every farmer who has a chimney that he uses through the whole winter, can, with from $3 to $5 additional cost in its construction, keep them safely in any latitude where they can be raised, by building a double wall around its basement, filling between them with dry stable-manure, saw-dust, or any good non-conductor, and placing his potatoes, with dry sand or dust, within, having the apartment not exceeding 15 inches wide, and covering with dry saw-dust or any other non-conducting substance, and securing from moisture above by covering the whole, and from beneath by raising up, if necessary. There will be warmth sufficient conveyed to them through jambs and back to preserve them, if they are sufficiently secured from the cold without. I have succeeded in keeping them here, latitude 40°, in this manner for many winters, with a small proportion of loss. As soon as the silver leaf, *Hepatica triloba*, is in bloom, take them up and sprout them in a hot bed; this must be done here and northward, and is advantageous further south. The best plan of cultivation: plough the land at least twice before planting; if thin, manure lightly; but this must be done with care, for there is danger of growing them all to strings and vines; a sandy loam lying southward is best without any manure; throw the land in ridges three and a half feet apart, with the *plough;* let them be east and west, if practicable; but, as of first importance, arrange them so that the furrows between them will immediately carry off the surplus water. Nothing can be more detrimental to this crop than continued wet. Finish the ridges with the hoe, and plant the sprouts 18 inches apart. This is as near as they ought to be set to yield large tubers, though the quantity can be doubled by planting them one-third that distance. If the weather is dry, half a pint of water will be necessary to each plant; otherwise, nothing is required but careful setting. When weeds appear on the surface, trim the ridges down with a hoe, plough between, and again hill them up before the vines spread so much as to obstruct the work. This is all the cultivation necessary, provided the ground be not very foul, when more labor will be required to keep the weeds subdued. Yams have been recently introduced; they are prolific, but are thought to be inferior in quality to the common red. This requires, however, to be further tested.

Fruit.—The cultivation of fruit is receiving increased attention; many get more profit from their orchards than from all their farm besides. Poorer varieties of seedlings are being replaced by superior seeded and grafted varieties. I know no remedy for the pear and apple tree blight, and fear I never shall; heavy losses this year. The yellows on peach-trees are rare; know no remedy.

Manures.—None are used for the field, except stable-manure, which is hauled indiscriminately on the land most convenient, when it becomes necessary to remove it from the stable. Mother earth is left to her own resources, in which she is rich.

Yours, truly,

ELIHU HALL.

Hon. Thos. Ewbank,
Commissioner of Patents.

Arenzville, Cass County, Illinois,
September 24, 1851.

Sir: In reply to the Circular issued from the United States Patent Office, the following statements may be taken as generally correct for this and the adjoining counties, south of the Illinois river:

Corn is first in order as a staple article; a good average yield is 50 bushels per acre. Cultivated land is worth from $10 to $20 per acre; and farm laborers receive from $12 to $15 per month. Seed, ploughing, planting, and harvesting corn, are worth $5 per acre. The average price for corn in ears, during this season, has been 20 cents per bushel at the farm; yielding a profit of $5 per acre. Three-fourths of the corn raised is consumed in feeding hogs and cattle.

Hogs.—Beardstown, in this county, is the best market for pork on the Illinois river. The hogs killed last winter numbered 36,000, averaging two hundred weight, at a price of from $3 to $3 50 per hundred weight. A pig, having the advantage of timber and prairie for range, will require 10 bushels of corn till the age of 18 months, and 15 bushels to fatten, and then weigh two hundred weight. Feeding steers has been more profitable than hogs, but requires more capital.

Wheat averaged about 20 bushels per acre; worth at the farm 50 cents per bushel. The season was unusually wet, and much grain damaged. The cost of seed, planting, harvesting, and threshing wheat, exceeds that of corn, and is less remunerating to the farmer.

Oats and Grasses yield large crops; timothy and clover, mixed, readily produce 2 tons per acre; worth from $5 to $6 per ton.

Irish Potatoes.—There will not be more than half a crop of Irish potatoes, owing to the rot, with the exception of a few small localities.

Fruit.—There was an entire failure of fruit, caused by late frosts in the spring. The blight on apple and pear-trees, which made its appearance two years ago, has been on the increase this season.

Grapes rotted mostly before maturing, except on young vines. The only mode to succeed in raising grapes here is to have young vines; the rot on the berry makes its appearance about the third year of bearing, and increases with age, as far as my observation enables me to judge. The cause of blight on fruit-trees, as well as the potato rot, is not known, and all the alleged causes are mere matter of speculation.

With great respect, yours, respectfully,

FR. ARENZ.

Hon. Thomas Ewbank,
Commissioner of Patents.

Adams County, Illinois.

Sir: Your Circular, calling for information on agricultural statistics, came to hand in due time, and for this act of courtesy you have my sincere and heartfelt thanks.

Wheat.—The farmers of Illinois must, sooner or later, abandon wheat-growing as the principal crop; the outlays are so enormously expensive. Three hundred dollars for a threshing machine, $125 for a reaper, and $100 for a seed drill, are quite too much to be invested in a wheat crop to commence with; and to this may be added its liability to winter-kill, in light, loamy soil, and the fluctuations in the market. The wheat crop is a decided failure in this section this year, owing mainly to winter frosts and heavy summer rains. The product annually is from 15 to 25 bushels per acre. This year it is reversed, and comes nearer 10 or 15 acres to the bushel.

Corn.—Our corn crop this year is very light on our large flat prairies. The season was so remarkably wet that many farmers never put a plough or a hoe into their fields after planting. The question to be decided is not how many bushels per acre, but how many acres it will take to make a bushel? The best method of feeding is to turn the cattle into the corn fields; and, if no snow, they may live until Christmas.

Grasses.—Our best crops for wet seasons are the cultivated grasses; and for common use, or for marketing, what is called, in the eastern States, herdsgrass or timothy stands first in order; for pasture for milch cows, common red clover is preferable. The quantity of seed used per acre is one bushel of timothy for five acres, or one of clover to ten acres. A good meadow of timothy, in common seasons, will yield a ton and a half to two tons per acre; worth, in the stack, $5 per ton. The best fertilizer for our meadows is a coating of barn-yard manure, which will often make it yield double the quantity of hay for from 4 to 6 years afterwards. There is no question to my mind but that the cultivation of hay or stock-raising is the most profitable business which can be engaged in for years to come in the West, where the farmer has a good range for stock. After a meadow is well down to grass, the cost of cutting and stacking cannot exceed $2 per acre; and this estimate is too high when mowing machines are used.

Neat Cattle.—I am not sufficiently posted up on the expense of raising neat cattle to give you the items. I would remark, however, that they are not very neat; most of them, except the cows, being old stags, who get their living by plundering their neighbors' corn-fields when not gathered in season.

Fruit.—The culture of fruit is receiving considerable attention in this section; but it has so many enemies to contend with, that it takes a man with strong resolution not to give up in despair. First comes the borer, which commences at the surface of the ground; and if a man does not watch his apple trees with both eyes open, they are dead and gone before he knows it. For the last three seasons *the blight* has killed hundreds and thousands of fruit trees, mostly apple and pear trees. Some think it is caused by electricity; while others seem to refer it to the flow of too much sap into the tender shoots, either causing them to burst or be scalded by the noonday sun. None of them are satisfactory to my mind; but I will give you my observations. On the 27th of May, the trees in my orchard being remarkably thrifty, there came up in the afternoon a tremendous storm of wind, rain, thunder, and lightning, twisting the young and tender twigs about in every direction; which was followed the next day by a clear sky and very warm sunshine. Within three days I noticed the first attack of blight, by the drying up of the last year's growth.

Yours, truly,

T. DUDLEY.

JACKSONVILLE, MORGAN COUNTY, ILLINOIS,
November 23, 1851.

DEAR SIR: I perceive by your Circular that you desire information on all topics pertaining to the interests of agriculture from those who may possess practical information relative thereto. There are two subjects which have engrossed more of my time, thought, and means, since I came to this State, about 20 years ago, than all other subjects combined. The *first* is, the best mode of fencing our vast western prairies; and, *second*, the best mode of giving a practical and appropriate education to the people destined to inhabit them. I have ever considered the vital interests of the West to lie in these two points alone; and as my mind is now fully made up on both of them, I propose to give to the public an outline of the results, for their consideration, through your Annual Report, should it meet your approbation.

I shall make a few remarks on the former topic in this paper; and as we are now about making a movement in our State on the latter subject, on which I am preparing a report for the convention, I will forward the report as soon as it comes from the press, if desired.

The plan contemplates a systematic course for the liberal and practical education of the *industrial classes*, especially farmers, horticulturists, and mechanics, and should be adopted by all the States in the Union simultaneously, if approved by them.

In respect to the topic of fencing the prairies, and other lands destitute of timber, I commenced a course of experiments some 15 years since; and I believe I have personally tried every mode of fencing, and every plant, tree, or shrub, that has ever been recommended for a hedge in the western country. Of course I failed with nearly all of them; indeed, I may with safety set them all down as utterly hopeless and worthless in this climate, except two or three varieties of native thorn and the Osage orange.

The latter has now become the favorite hedge plant with all our people. It has a fine bright, glossy leaf, with a long, sharp thorn under every leaf from top to bottom. It is exceedingly beautiful in the hedge-row; will bear clipping at any season, and to any extent; is entirely free from all sorts of insects at all seasons of the year, and from all blight and mildews; is very long-lived; stands uninjured by all sorts of stock; and with good care will make on our soil as firm a hedge in 3 or 4 years as the various species of thorn will in 8 or 10.

How far north its culture may be extended I cannot say; but I saw it in my travels last fall, in northern Illinois and Ohio, around Bunker Hill monument, in Massachusetts, and in various other places in the northern and eastern States, in tolerable good condition, though by no means as vigorous as in its native prairie home. It is said, also, to exhaust the soil much more at the North and East than it appears to do in the West and South.

The favor with which it is now regarded by our practical farmers may be inferred from the following facts: I commenced my experiments on this hedge plant some 10 or 12 years ago, not knowing at that time that it had ever been used for the purpose. Plants were then sold in our western nurseries, for ornamental shrubs, at $1 each, or $500 by the thousand. Several years elapsed before it could be properly tested as regards climate, soil, thickening, shearing, &c., &c., and then several more before any quantity of seeds or plants could be procured; and when at first a few plants were offered for trial, it was only with great difficulty that a few personal friends could be induced to take them entirely at my own risk.

The articles written for the papers were regarded as chimerical and visionary by sensible and judicious friends; while strangers almost uniformly pronounced it a "humbug," and an attempt at another "Morus Multicaulis speculation." It was in all quarters met with skeptical doubt, or frivolous sneering and derision.

But times have changed; the plants already set continued to grow and assert and maintain their own merits, year by year making surprising advances in the farmers' favor, until last year hundreds of bushels of seed, at from $20 to $30 per bushel, were consumed in the culture in our State alone; and the entire crop for next spring, amounting, by the estimate of some of the largest growers, to 25,000,000 of plants, in our vicinity was all engaged a month since, and orders for hundreds of thousands have been sent in, which cannot be filled for a year to come. Preparations for raising plants for the next season are immense; and probably there will be more than a full supply produced, and a temporary loss sustained by the growers; but if so, it will only be a customary transient evil, affecting comparatively few persons, and will soon right itself.

The mode of culture is to sow the seed in drills in the nursery after it has been carefully sprouted, and cultivate it with care till the plants are of suitable size for the hedge-row; then they are taken up by the nurserymen, and sold to the farmers, and often forwarded to all parts of the country with entire safety. I have myself forwarded them to orders presented from almost every State in the Union—from Vermont to Georgia and southern Texas, on the east and south, and to upper Missouri and Wisconsin, on the west and north.

The plants have always grown and done well, except in the few cases where accidents of heat or frost befel them in their passage, or where the extreme rigor of the northern winters proved too severe for them. It is a rule in our climate that they will grow on any ground which remains dry enough for three months in the year to bear corn, though covered with water all the rest of the year. Hence on our river hollows and ravines we throw up a ridge, if the ground is swampy, high enough to raise them above water in the dry months, and leave them to overflow the rest of the year as they please. At first, as the seed was costly and precarious, the plants sold high, and many intelligent men supposed it would be impracticable ever to reduce the price so as to render them accessible to all the farming classes. But a better knowledge of their nature, and increaseof skill in their culture, have already reduced it from $5 to $2 50 per thousand, delivered at the door of the purchaser; which brings the usual cost of the outlay for a hedge at from 6¼ to 12½ cents per rod, as the plants with us are usually set about one foot apart in the row; though some prefer six inches for small stock and speedy use.

The hedge row is set, cultivated, and trimmed, from year to year, on the same principle as when made of any other plant; only that, from its vigorous growth for the first few years, it needs a much more vigorous and efficient dwarfing, by pruning, than any other plant in my knowledge.

Here is the great trouble with our nurserymen: they cannot persuade the farmers to cut down, and *keep down*, their plants till a sufficient bottom is found for the hedge. Many let their plants grow up: it seems to them such a waste of time to follow the directions always given them by the growers of plants, and those experienced in hedges; and consequently their plants grow too high and rank, and open at the bottom, so as to allow the passage of pigs and fowls, &c.; and after two or three years they are forced to cut their hedges quite down to the ground again and begin anew. Fortunately for them, the plant will bear to be cut or even burnt quite down to the ground year after year without impairing its vitality, so that the heedlessness of one series of years may, in this respect, be repaired by the care and skill of another.

As particular directions for culture and trimming, &c., are always forwarded by the growers with every lot of plants sold, and as the information is now already widely diffused through the periodical press, it probably would not be desirable to cumber your pages with a repetition of it.

These are the general facts connected with this vast interest of enclosing our timberless lands. If latent errors or causes of fear lie concealed, I am at a loss to conjecture, after a wide correspondence with hundreds and thousands of practical men on the subject, what they are. And when I state to you that my present recorded list of personal correspondents amounts to over fifteen hundred, in all parts of the Union, you will perhaps readily see why I have not written more for the press, and more promptly answered the annual inquiries of your Department, and why I so briefly and hastily submit the present paper. I will enter upon no argument in defence of hedging. I have several miles of it out on my own grounds, and am well pleased with it. Several hundred miles have been put out under my direction the past few years. More is wanted the next spring than can be supplied; so that, if I am deceived, I am surely now not alone in the matter, as it was a few years ago, at least in our State.

Nor will I attempt any comparison of the merits of hedging with other fence. The facts with us have for twenty years been perfectly apparent to me. We have vast regions of the richest land in the world, where there is neither stone nor timber, which must either forever lie waste or be enclosed with a hedge of some sort, or be submitted to open culture. The latter our people do not like, and of course the hedge is their only practicable resource. I believe it both a cheap and a good one; they now believe so too; and there is no occasion for argument with those differently situated and of a different opinion. Should you have the goodness to publish this hasty sketch, I hope it will save me the trouble of writing many letters for the year to come, and thereby lay me under peculiar obligation to your courtesy. I also prosecuted a series of experiments on the apple, pear, and quince blight, last season, with some satisfactory results; but I cannot now possibly find time to subjoin my report of progress. The solar microscope aided me much in the process.

Most respectfully submitted by your obedient servant,

J. B. TURNER.

Hon. Thomas Ewbank,
Commissioner of Patents.

DECATUR, MARION COUNTY, ILLINOIS,
October 10, 1851.

SIR: In answer to a few of the questions proposed in the Circular of the Commissioner of Patents for 1851, I offer the following:

Wheat.—We use no guano, nor any other manure, in its production; nine-tenths of us never *heard of guano*, and not one in five hundred ever *saw* any. Our average crop of winter wheat is perhaps 15 or 20 bushels to the acre. We seed from the last of August to the first of November; though early sowing is general when the Hessian fly is not troublesome. Four or five pecks is the usual quantity sown to the acre. It has been suggested to sow some five or six pecks of oats with this amount of wheat, especially in the case of early sowing; as, by this means, the ground is protected from high winds during dry frosts; the dead tops of the oats during the most severe weather, in the absence of snow, answer as an excellent protection to the otherwise naked wheat. We plough our ground but once for the crop, and then harrow or brush sometimes, but not always. Crops are not so good on ground six, eight, or more years old; hence, we may say they diminish. We have no particular *system* of rotation, though we generally follow a crop of wheat by Indian corn; seldom growing two crops of the same kind in immediate succession, except Indian corn, which is our chief crop. We often follow oats with wheat; as, by this means, the green oats are had to protect the wheat without the cost of seed. The best remedy I know of for Hessian fly is late sowing; or to sow *very* early, and then let calves, sheep, and other light stock eat the green wheat close to the ground during winter. Formerly, my father did this as a matter of pasture, and never had any trouble with the fly; raising very good crops. Our medium price at Springfield is from 50 to 60 cents per bushel.

Oats are raised in abundance. Eight or ten pecks are sown to the acre; and the yield, we suppose, is from 30 to 50 bushels. They do not exhaust land much.

Rye is most frequently sown early in August for winter pasture, and the crop the next summer is pastured down by hogs. It is sown one bushel to the acre; and often among corn and thick weeds, (the earth beneath the shade of these being rather damp and mellow,) without any culture whatever, with the greatest success. We cultivate no renovating crops particularly.

Clover and *timothy* are our best haying grasses. *Red-top* for low-lands, and *blue-grass* for high-lands, are the best for grazing.

Cattle are little improved, though the raising of them *pays well*. Most of our steers go to the Ohio and eastern markets. At three years old, the average price is about $20. To break young steers, we often yoke them up in couples, and let them remain so a few days, until they learn to walk and feed; then put them in a team of two or three pairs of broken cattle; they generally walk quietly along, and in a few days, as their necks become toughened, they learn to pull. This is the best way, we think; though single pairs may be broken by first driving to a light log, a very strong cart, or something they cannot injure, in case they should run against trees, stumps, &c., as they are almost sure to do. Their going in the yoke a few days before working is *very important*, and often prevents sullenness. Should steers be obstinately sullen, it is far the best plan to turn them loose in most cases. None but the most skilful and *patient* drivers will break them without injury.

Horses and Mules.—The raising of horses and mules is very profitable. These, with *cattle*, are our *chief staples*. Too much gentleness cannot be used in breaking horses, and *especially* mules, to the harness, generally; though sometimes it becomes necessary to "make them know their masters." Good mules, at six months old, are worth $25; and afterwards the price may be much enhanced by judicious breaking and matching. They should be handled young.

Veal is of late years grown pretty extensively, with good profits. No statistics worth noting.

Hogs pay well *sometimes*—serve as our scavengers to follow the cattle, &c., themselves receiving but little attention for the most part.

Root Crops are not much cultivated.

Fruit would, and does pay well, when attended to.

Forest Culture should be more attended to in our Prairie State. I think our timber lands should be replanted with black locust, and other quick-growing trees, different from those last on the soil. Who will suggest a list of kinds? Timber can quite quickly be raised on the prairie from cotton wood, sycamore, black locust, &c. The former two burn well, and the latter is valuable as an enduring timber. We propose to settle our prairies by hedging with the *Osage orange*, and raising fire-wood from *peach* trees or cotton wood. The matter will, without doubt, succeed. From three to five years answer for these things to be of service.

Yours, cordially,

JOHN DAVIS.

MISSOURI.

BRUNSWICK, MISSOURI,
December 1, 1851.

SIR: Your Agricultural Circular of last August has been placed before me, with a request to furnish such information as may be useful for your forthcoming Patent Office Report.

Brunswick, in Chariton county, Missouri, is on a direct line west of Baltimore, Maryland, and is situated at the mouth of Grand river, at its junction with the Missouri; and the Grand river country, on which we are dependent, in a great measure, for our produce, is a large body of alluvial timber-land, interspersed with rich upland prairie, extending widely on both sides of the river, from which it has its name. Northward, into the State of Iowa, the settlements are new; but the population is very fast increasing, especially since it is apparent that the Hannibal and St. Joseph railroad will be built and pass directly across this fertile region.

The principal staple productions are tobacco, hemp, wheat, corn, hogs, and beef-cattle. Of these it may be proper to say a few words in their order.

Tobacco is not raised far off the Missouri river, at present, owing to the cost of transportation. The growth is larger than in the eastern

States, and the average yield may be set down at 1,000 pounds an acre; but instances frequently occur of raising 2,000 pounds. The soil is scarcely, if ever, manured, even by the most common products of the barn-yard; and several tobacco crops are raised in succession on the same spot of ground, with very little attention to rotation of products, or thought of exhausting the deep soil.

The *Hemp* crop, like the culture of tobacco, is on the increase. Every year new hemp-lands are opened. The average yield per acre is about 1,000 pounds, and the height of the stalk 10 feet. The Kentuckians, who emigrate here to raise hemp, say that we have the best hemp-lands in this State which they have ever seen. I cannot properly estimate the relative cost of tobacco and hemp culture; but as a general thing, hemp neighborhoods are the most prosperous in the country.

Wheat grows to great perfection in the counties north of us, when it is properly in, and sown early enough in the fall to take deep root; but it does not bear transportation well over our bad roads to the river. Manufacturing mills are yet very scarce; and we present the singular anomaly of being in a good wheat country, into which we *import flour* from other quarters. Spring wheat is not sown. Seeding-drills and reaping-machines are yet unknown among us.

Indian Corn grows in the greatest abundance everywhere. The average crop is about 10 barrels (50 bushels) to the acre; but sometimes it reaches much more. The prevalent kind of corn raised is the large white, dented gourd-seed grain; and the stalks frequently reach a height of sixteen or seventeen feet. I have known the same field cultivated ten or fifteen times in succession with tolerable crops; but evidently showing that the top-surface was exhausting.

Hogs.—The best breeds of hogs are the Berkshire, or a cross between the black Berkshire and white Irish. The system of fattening pork-hogs here is to let them run and feed on hazel, hickory, or oak mast till late in the fall, and then finish the process with a few weeks of corn feeding. Even without mast, it is calculated that two barrels of corn will fatten a hog; and the growth of the animal, while thus fed, will average from three to five pounds a day. The method of preparing bacon is, by rubbing ground alum salt on the pieces, as they are put down in bulk, before the meat has time to freeze; it is again resalted, after a while, or dipped into brine, and then hung up to smoke with hickory wood. Hams have to be covered with canvas and whitewashed, to keep in this climate. Mast-fed pork is equally as sweet and palatable as the corn-fed; but it is too soft and oily for summer bacon.

Barley, *Rye*, and *Peas* are scarcely cultivated at all, because there is no demand.

Oats are grown abundantly for home consumption only, and sold at from 15 to 20 cents a dozen bundles.

Beans of all kinds thrive well, but are seldom raised for market.

Flax is very much neglected, as the price of it seldom reaches $1 per bushel in this market; and there is scarcely any use made of the stalk. But should *flax-cotton* come into vogue, this will be a fine region for the cultivation of raw material.

Grasses.—This part of Missouri is probably superior to any of the western States in the excellency of its native and cultivated grasses; the blue-grass, growth of the Grand river counties, is the finest in the world;

the grass being hardy, vigorous, and luscious. The same may be said of the timothy and herdsgrass meadows. Cattle killed from our grass pastures are very fat and tender. Missouri beef has a good name abroad. The raising of neat cattle is an increasing business. Three and four-year-old steers are estimated, especially, at $12 and $16.

Wool-growing is not considered as profitable as cattle or hog raising, and has not yet excited much attention; though there is no doubt that it can be made much more profitable than in the eastern States, as the lands are cheaper and sheep grow fine and healthy.

Potatoes.—We hear very little of the potato-rot here; and potatoes, both Irish and sweet, grow to great perfection; though they are not cultivated for exportation. The same may be said of all esculent crops—such as cabbage, turnips, beets, and all that class of articles requiring a light, deep soil.

Fruit Culture is beginning to excite much attention, and the trees grow very fine and vigorous. Apples are a very sure crop. Peaches are frequently killed by the spring frosts; but are excellent when they come to perfection. Native grape-vines abound on the bluffs around Brunswick; and the grapes which grow wild among the bushes are a remarkably sure crop, and grow as large as rifle-balls. They are used for culinary purposes, and undoubtedly could be improved by cultivation. Foreign grapes have not yet excited much attention; but from their success at many points on the Missouri river, where the Germans have settled, we may yet expect our noble river to rival the Rhine in its vine-clad scenery.

Meteorology.—I have never kept a meteorological journal in this county but one year, (1845;) which, however, may serve as an approximation to other years.

The observations on the thermometer were made at 8 a. m. and 2 p. m. of each day; and months are summed up thus, in their medium temperature:

	8 o'clock.	2 o'clock.
January	34°	46½°
February	35½	49½
March	41	53
April	56	71
May	61	74
June	68½	77½
July	75½	86½
August	71	84
September	66	74
October	51	60
November	34½	48
December	20	25½

The coldest day in the year was December 1; the warmest day was July 19. The greatest variation in the temperature of any day was 34°, between 8 o'clock and 2 o'clock on the 19th February.

There was more or less rain on sixty-four days, and snow on eleven days. The deepest snow was not 6 inches; but we frequently do have deeper snows. The extremes of temperature—6° below zero, as in December; and 98° above, as in July—are not generally approached, and very seldom exceeded, by a fair exposure of the thermometer. It does, however, seem singular that *December* was so much colder than the previous *January;* and I am not sure but that other years would change or reverse the result.

Very respectfully,

JOHN H. BLUE.

Hon. THOS. EWBANK,
Commissioner of Patents.

MARTHASVILLE, WARREN COUNTY, MO.,
October 15, 1851.

SIR: Always willing to make such a use of the little knowledge and experience I possess as to benefit the public, I the more readily comply with your request for information on agricultural subjects, as, among the States from which reports are sent in, Missouri is, as yet, very poorly represented. I must, notwithstanding, for this time, confine myself to some remarks on *grape-growing and wine-making*, leaving other questions to other hands.

I might write a dissertation on the importance of that new branch of agriculture for our country in many respects, but will give only a few hints:

1st. If native wine could be brought into common use in this country, we would have a beverage by far superior to all in which people now take refuge for recreation's sake—a beverage healthy, because of being (as it ought to be) unadulterated by spirits and all other admixtures—really refreshing, strengthening, exhilirating, &c.; contributing to subdue the somewhat spleenish, choleric, and vindictive propensities of this nation; and replacing them by a serene, jovial, harmless, friendly, and sociable national character—at the same time a cheap drink, not denied even to the poor, provided that we can raise it in sufficient quantities.

2d. We will annually save millions to our own country by substituting our native wines, which, in my judgment, and according to my experience, can, by proper management, be raised to a high degree of perfection, for the produce of foreign nations.

3d. We may procure a pleasant, healthy, and profitable employment to thousands even of the poorer class, who now toil and pant under less appropriate occupations.

4th. We shall make highly valuable millions of acres of land now not worth the tax to be paid on it, and render large sections of the country, now desert, flourishing and prosperous.

For these reasons, I would venture to express the wish that this entirely new branch of domestic industry should receive, also, at the hands of Congress all possible protection and furtherance.

The Catawba grape, extensively cultivated in Ohio, and already also in Missouri, Illinois, &c., yields, under proper management, a wine that leaves nothing to desire; but, being a native of the Atlantic seacoast, and delicate by its nature, it seems not fully adapted to the sometimes damp and sultry summer weather of the Mississippi valley, the greater portion of which (being, at the same time, an extensive inland country) rises little above four or five hundred feet over the level of the ocean. By such weather ruinous mildews are engendered, of the effects of which the Catawba is highly susceptible: the whole growth of the plant is then interrupted, its health injured, the leaves turned brown, and the circulation of the sap, and the necessary evaporation, stopped; the consequence of all which is, the rotting of the berries, beginning at the time they have attained half their growth, and ending only at the time of their full maturity. There are more or less favorable years, situations, soils, &c., and the amount of damage done varies greatly; but, on the whole, it must be confessed, *the Catawba is too much liable to the rot.* The years 1850 and 1851 were especially remarkable for the extensive effects of those mildews. So far as my observation reaches, from the end of June the leaves of the *white oak* had a brownish, unhealthy appearance all over the country. Other vegetables suffered more or less, but none so much as the Catawba vine; and there is no remedy for that within human power, albeit something may be done to alleviate the detrimental effects. It has, therefore, long been my conviction that we must not merely, perhaps not chiefly, depend on the otherwise noble Catawba, but turn our minds to the culture and improvement of the native grapes of the Mississippi valley, the number of which is legion, but greatly differing in their adaptation to culture and fitness for wine-making, and in other properties. At all events, however, they must be deemed to be, by nature itself, best accommodated to our peculiar western climate.

According to my own experience, (may others communicate theirs,) the following sorts stand our climate well, being little, or not at all, susceptible of the rot: the *Halifax*, (wine mild and spicy,) *Norton's Virginia seedling*, (difficult to propagate, wine fiery and aromatic,) the *Rock-house Indian*, (first cultivated by Dr. Bock, near Waterloo, Illinois; wine not inferior to the best Burgundy wine, and similar to it,) and the *Wine-home* grape, a native of Warren county, Missouri, of which I have just, for the first time, pressed about half a bushel of berries, promising well. According, however, to the best information I was as yet able to get, the most delicious varieties of wild grapes are found on the southern declivities of the Ozark mountains, near the boundary of Missouri and Arkansas, to which region I intend to travel this fall, in order to make further experiments with their cultivation, anticipating great results therefrom. I have also a beautiful Scuppernong growing in my vineyard, which will probably bear next year. As to the treatment of the vines I must, in general, agree with the report of Mr. R. Buchanan, page 314 of the "Annual Report of the Commissioner of Patents" for 1848; with reference to which I will, for this time, restrict myself to the following remarks:

1st. Planting three by six feet, or four by four or five, as they do in Ohio, would not do in Missouri, as with us the growth of the vines is too rank for such small dimensions. The least, in Missouri, seems to be five by six. With good success, I have planted six by seven in the Roman *quincunx* order; or, for espaliers, eight by eight, or ten by seven.

2d. I do not like to tie my vines to single stakes for more than one season. By our way of planting, we either tie to espaliers, bending the vines over the laths, or put for each stock three stakes into the ground, they being, on the ground, three feet apart, (triangular.) At the height of five or six feet all three are tied together, with the three horns standing out about two feet. This is the pyramidal way of tying up, already in practice with the old Romans, and offering great facilities. The vines are serpent-like, tied up around the pyramid. The grapes will hang inside, and be well sheltered. No gale of wind will break down the firm frame.

3d. Of course we leave more fruit-bearing vines, and cut down the same to the double amount of joints, being always careful to raise fresh vines from down below, in order to have our stocks constantly renewed and the older vines removed.

4th. The proper time for pruning is from the end of October to early in March; prune, if possible, in November.

5th. Put your slips into the ground just when you perceive that the buds are swelling—late in April, or early in May.

6th. A very simple rule for pruning is this: take away about half the wood of the whole stock, leaving one-half; thus your vines will be strong enough to grow and bear.

7th. Hoe your vineyard over twice every month, from April to September, (it will save you trouble); but let it rather be a scratching than a hoeing.

8th. In the place of putting "the bung loosely" on your casks during fermentation, put on the bung-hole, first, a grape leaf, and upon that a small bag filled with fine, and not quite dry, sand. In good cellars, and large casks, your wine will, and must not clear in less than six or eight weeks. Rack off in March, then again in midsummer, and then again just before the time of the next harvest. Before every racking, have your casks well sulphurated. Then, first, your juice is real wine, and may be bottled; it will keep—unless drunk—as long as you please, and improve considerably for a series of years.

This year and the last I have failed in the quantity of wine raised; but as to the quality, I pretend to say that my product is "hard to beat."

Agriculture, on the whole, has, in Missouri, advanced not far beyond its infancy. The people are generally following the *exhausting system*. Everything is wasted—timber, soil, and all. A farm improved 30 years since is deemed to be an old place. A field that has yielded 20 crops is, as a matter of course, worn out. The weight pressing on our agriculture—as, indeed, on everything else—is the *system of involuntary labor*. I could adduce many instances of old settlers being compelled to leave their places because they could no more on them "raise bread enough to feed their niggers." Their only shift is, then, "to sell out and move." Perhaps an industrious German will buy the ruined place, restore it to fertility, pay off the purchase money in five years, and be independent and "very well off" in 10 years. I do not deny that there are careful husbandmen among the old as well as new settlers; but the prevailing rule is to waste and move. Latterly wheat-growing has vastly extended in Missouri, and our wheat commands a good market. I hope we may look for a new and better era, a new stimulus being discernible among the people all over the State.

Accept the assurance of my high esteem,

FREDERICK MUNCH.

Hon. Thomas Ewbank,
Commissioner of Patents.

IOWA.

Near Fort Madison, Lee County, Iowa,
December, 1851.

Sir: I have received your Agricultural Circular, and herewith furnish some answers to your queries.

Wheat.—The varieties used for fall sowing are, the old red-chaff bearded, velvet, smooth red-chaff, and smooth white wheat.

The first-named variety is the favorite, although the velvet wheat will occasionally outyield it; still it is the surest crop. There is no guano used here. Our country is new, and farmers have not used manure; but I think clover sod would produce better crops of wheat than we now raise. The average product per acre this season would not exceed 15 bushels. From the accompanying record, (see Sec. vii.,) you will see we have had a very wet spring. This injured our wheat crop very materially. Time of seeding, the month of September; of harvesting, from the 5th to the 12th of July. Seed is not prepared, but sown as it is, generally. Quantity sown, from one to one and a half bushel per acre. Oat stubble is ploughed twice; the first ploughing shallow. The object is to turn under the shattered oats that are on the ground. After the grain has sprouted and come up, then we plough 6 or 7 inches deep, and harrow our wheat in good order. The yield is decreasing. All the system of rotation of crops is to follow corn with small grain.

Hessian fly we have no remedy for. In the fall of 1850 a young farmer, living in the bottom lands of the Mississippi, had a good prospect of early-sown wheat, but found that the Hessian fly was injuring it very much. He turned on it calves and sheep; pastured it bare; then rolled it with a heavy roller, and again rolled it in the spring. The wheat produced well—better than any of his neighbors.' There is no weevil here; but the Mormon bug is an enemy to the wheat crop in the fall season. It is not as bad as formerly. Price, from 50 to 60 cents at Fort Madison.

I have no doubt but the roller is a great benefit to the wheat crops. Some of our farmers are beginning to use the drill in seeding.

I have received the package of Troy wheat which you were so kind as to send me, for which I return you my thanks. In consequence of its coming to hand so late, I did not get it in the ground until the 17th of last month, (November.) I drilled it in with the hoe on an excellent lot of ground; and, should the rust not take it, as it does generally our late sowing, I will have a good start from it.

Corn.—This year nearly a total failure, from the wet weather in the spring; not more than ten per cent. raised this season. Our customary average is 50 bushels per acre. Cost of production about 8 cents per bushel. The system of culture—first harrow, then plough three or four times; no hoe used. This is almost the only system of culture.

The grain is fed raw. We have corn and cob-crushers; but have not had experience enough to tell their advantage. Fall ploughing is best for corn. It pulverizes, and, to some extent, fertilizes the soil, and increases the product from ten to twenty per cent.; and the crop is easier cultivated, or tended, as we call it, in our vernacular tongue.

Oats.—This crop generally follows corn, and succeeds better in fall ploughing. Seed per acre, from 2 to 3 bushels; produce, from 30 to 50 bushels per acre. Harvest, about 5th August. Barley is the least exhausting as a crop, and is the best stubble for wheat; but is not much sown.

Rye, Peas, and Beans.—Not much cultivated. Peas and beans only in gardens.

Clover and Grasses.—Timothy and red clover are sown on our prairies when the sod is completely rotten, and the soil in a good state of cultivation. Quantity sown, about a peck of timothy and some clover seed in the chaff per acre. When manured with stable manure—the only kind used—produces two tons and upwards per acre. Our prairies have no means of irrigation, and meadows soon run out. Wheat on timothy sod has always been a failure.

Dairy Husbandry.—Average product of a good cow, about 200 pounds of butter, or from 200 to 300 pounds of cheese, per annum. Average price of butter in 1851, 10 cents per pound; cheese, 7 cents. Old-fashioned churns still used.

Neat Cattle are raised with but little cost—salt in the summer, and the range of the woods or prairies; and in the winter, a little corn, salt, and straw. Price of native animal, $10 to $15; good milch cows, from $12 to $20. Very few Durhams. It is thought that a given amount of food will yield more meat in a Durham than in a native.

Steers, when yoked first, are put on the tongue of a wagon, or the hindermost yoke in a prairie plough; then put on an old yoke before them, and they generally soon give up.

Horses and Mules.—The growing of both profitable. Cost of raising horses to three years old, about $20; mules, about $12. We work our brood mares two weeks after foaling, and raise good colts. We have no good stallions here. The best way to break a colt is to put him with a steady horse to the tongue of a two-horse wagon, and treat him gently. Forcible, cruel usage in breaking ruins many a good horse. Mules require more harsh usage.

Sheep.—Wool-growing is profitable. Large sheep are more profitable for mutton or for their fleece. A merino sheep will not produce more than half as much wool as a native sheep, but the difference in the price will make up the loss. We feed generally on sheaf-oats, and our sheep do very well.

Hogs.—Best breed, China and Byfield crossed; Berkshires are not much esteemed of late. The only method of raising hogs here is by feeding corn to them in pens or small fields. There is no doubt that the clover-lot, or the orchard, will soon succeed the present mode of raising hogs.

Cotton, Sugar-Cane, and Rice.—Not raised here.

Tobacco.—Only in gardens, to a small extent.

Hemp.—Some raised.

Root Crops.—Only raised in gardens.

Potatoes, (Irish.)—A failure this season; the rot was bad. Meshannocks the favorites; yield from 200 to 300 bushels to the acre, in a good season. Cultivation: plough the ground in the fall; plant in hills; plough and hoe twice. Cost of production, in a good season, about 6 cents per bushel.

Sweet Potatoes.—The yam is the most productive. Plant, after sprouting, in hills; tend with the hoe. Manure is but little used; but, when used, it increases the product very materially.

Fruit is receiving increased attention. As yet, there are not enough apples raised for home consumption; consequently we cannot tell their value for the purpose of feeding hogs or cattle; but there is no doubt that the sweet apple would be profitable. Rawle's Janet, Rhode Island greenings, and pippins, are among the best of our keeping apples for winter use.

The best and only remedy for blight on pear and apple-trees is a full and unsparing use of the knife. Cut below the blight some distance; if you lose the limb, you save the tree.

There are some of our farmers advocating budding or grafting of the peach and nectarine on an almond stock. This would prevent the grub that works in the root, and perhaps would be a remedy for the yellows. I have not had experience enough to give any directions as to transplanting, budding, or grafting, but would always prefer the spring as the time for transplanting. Pulverize the ground well by ploughing and harrowing; dig large holes; mark your trees in the nursery, and plant in the same position that they stand in the orchard. I have seen hardy apple-trees grafted on the black locust, that did well; they are in Clarke county, Indiana, 4 miles southwest of Charlestown, in the orchard of Mr. John Blizzard.

Will Mr. Neff, near Cincinnati, Ohio, please to give us his experience with the Osage orange in hedging? We understand that he first planted it in 1837. Should this meet his eye, or any other farmer that has that or a longer experience, they will confer a particular favor on us, inhabitants of the prairies, by giving us all the information they can about planting, cultivating, and trimming, in the Report of 1852.

You will find the meteorological record accompanying this.

Respectfully, yours,

D. McCREADY.

Hon. Thomas Ewbank,
Commissioner of Patents.

WISCONSIN.

Sharon, Walworth County, Wisconsin,
November 20, 1851.

Sir: Your Agricultural Circular of August was duly received and noted. I reply as follows:

Wheat.—The average production the present year, for winter, is twenty bushels, and spring, twenty to thirty bushels per acre. Time of seeding, winter, from the 1st of September to the 15th. Spring, from the 1st of April to the 20th. Seed, two bushels per acre. Time of harvesting, from 20th of July to 15th of August. Ploughing our land, twice for winter, once for spring wheat.

The crop is decreasing one-eighth. Our markets are Racine, Southport, and Milwaukie. Average price, 55 cents for winter, and 35 to 45 cents per bushel for spring.

Corn.—We plant from 20th April to 15th May. Seed mostly yellow; the yield, from thirty to fifty bushels per acre. Manuring would increase the product from ten to twelve bushels per acre.

Oats and Barley.—Will yield from forty to sixty bushels to the acre, requires 2½ bushels, per acre, of seed, and are less exhausting to land than other grains.

Peas.—Are considered a renovating crop; not grown here to much extent, but generally approved for preparing land for wheat.

Grasses.—Timothy will cut two or three tons per acre; clover, about the same. Blue grass makes fine hay, and will yield from 2½ to 4 tons per acre. Our lands best adapted to meadows are alluvial and moist; and, next, burr-oak land, seeded with six quarts per acre.

Dairy.—A good milker will make 8 pounds of butter per week for five months in a year. Average price, ten cents per pound.

Cattle.—Cost of rearing, until three years old, $9; usual price about $12 per head.

Horses.—The growing of these animals is profitable. Expense of rearing, till three years old, about $30; worth from $40 to $100. Brood mares should be used carefully on a farm; ploughing, dragging, &c., will not hurt them. They should not be over-heated or driven hard.

Sheep and Wool-growing.—Wool-growing is profitable. Cost of growing fine, 15 to 25 cents per pound; coarse wool, from 10 to 15 cents per pound. One ton of hay will winter five sheep, which will shear from three to four pounds of wool each. It is safe to calculate two lambs to three ewes, although they frequently double the flocks every year. The large Bakewell sheep are best adapted to this climate; the mutton being the most desirable.

Hogs.—Best breeds, a cross of Berkshire and Liecestershire. The latter makes the heaviest pork. Ground grain is the most desirable for fattening, making one-fifth difference in the expense.

Roots.—All esculent roots grow well here as field or garden crops. Beets, turnips, and carrots will yield 150 to 200 bushels per acre. Common barn manure is sometimes used.

Potatoes are decreasing. The rot has injured one-half to two-thirds for two years past.

Fruit.—Fruit culture is in its infancy in this vicinity. Apple and cherry trees are beginning to bear. I think it will not be a good fruit country.

Meteorological.—Extreme heat at meridian, from 86 to 100 deg. Fahrenheit. Cold, from 15 above to 26 deg. below zero.

Having lived South most of my life, I am not as well informed as I would like to be on the agricultural productions of this country.

With profound respect, I remain yours, sincerely,

H. S. YOUNG.

Hon. Thomas Ewbank,
Commissioner of Patents.

Allen's Grove, Walworth County, Wisconsin,
January, 1852.

Sir: Having been requested by the Commissioner of Patents to give a short history of the habits of the buffalo, elk, and moose, I will attempt to do so, as far as my knowledge extends:

The *buffalo* is an animal little known now, in the wild state, within the borders of the white settlements. They have been driven back to the Rocky mountains, or nearly so; still, hundreds, if not thousands, are annually taken and killed for their robes, and a small portion of their meat and their tongues, which are the only parts that many hunters save when they are plenty. If they were permitted to live and increase, and no more were killed than what are wanted for food, there would be a full supply for many years to come for the poor Indians. The buffalo resembles the ox and the cow, as to what they subsist on, their size, and common habits.

I have seen them running with the common cattle on the plains, in Wisconsin, perfectly domesticated. I have seen them mixed with other cattle, and a calf from a common cow not more than six weeks old, that appeared as tame, or nearly so, as common calves of the same age. I have seen the buffalo yoked with the ox, and they have both worked together. As I am credibly informed, they were found all over the prairie States in former days, west of the lakes; and I learn some have been seen lately in the western parts of Iowa. A few are quite large, with short, large horns, standing very straight out each side. Some people are very fond of their buffaloes.

The *elk* is an animal about the size of a slim, two-year old colt. Some are much taller; their horns are very large; they have been known to be five feet long, and almost as far from tip to tip. Their color is a deer or mouse-color; the body is rather slim and light for its height, and they run fast when they have a clear track; but I have seen those who said they had known of their being caught in a thicket by their horns, and could be taken without difficulty. When they run, they throw their horns on the back of their neck; their nose sticking straight out before.

The *moose* is not so large as the elk; still they resemble each other very much. Their color and habits are much the same. They can both be tamed and domesticated, and worked like horses.

I have seen a number of each in a yard together, and seen them handled, rode, and harnessed; some of these have their horns sawed off, that they may not be as likely to hurt their owner or themselves. They are not as wild as many other animals; they can be taken and domesticated much easier. They live upon grass and shrubs, preferring small bushes, on account of their short necks and long legs. They are good for venison, and their horns are very valuable; they are hunted very frequently in winter for their horns and robes. They are both found in the West in great numbers; many in Iowa and Minnesota.

I have seen the moose in Vermont, and think that they have both been found in most parts of the United States. The old ones shed their horns in the winter, but the young ones in the spring, annually. They can both be taken easily in the time of shedding their horns, as they appear dumpish, and indisposed to roam about. Their hides make good leather; and, taken in proper season, make good robes. Their feet are slitted like the deer, and all of course are of the same species.

P. S.—I would say a few more words respecting the buffalo. He is built largest forward; his fore-quarters being one-third heavier at least than his hind ones; and the hair or fur on the shoulders and neck is much longer than behind, giving him a lion-like appearance; his tail is long and slender, without much hair, except at the lower end, which is very long and bushy.

When frightened, in large droves, they have been known to run over teams, wagons, or whatever came in their way, those following behind pressing them on.

The *badger* is an animal inhabiting our State. They are a little larger in size than a large coon, and resemble it very much. Their face is very handsome, and appears intelligent; their fur is very thick, coated with long hair of a reddish, brindle color, except underneath, which is white; they have long claws and sharp teeth; there are but few dogs that can kill them. They live in the ground in the day time; dig very fast, often digging a hole when morning overtakes them. They live upon such animals and birds as they can catch, and upon vegetables. I believe they burrow up in the winter. They are thought by some to be very good eating, and their skins are much sought after. They are slow in their movements, like a wood-chuck or ground-hog; but, when approached in their dens, they are a powerful enemy to conquer.

H. ALLEN.

Hon. Thomas Ewbank,
Commissioner of Patents.

Heart Prairie, Walworth Co., Wisconsin,
January 26, 1851.

Sir: Your Circular was duly received. On looking over your list of inquiries, and your Report of '49 and '50, I find little or nothing said on the subject of *harvesting grain in the West*. I will, therefore, with your permission, say something in regard to the various modes in which it is done, and the relative cost to the prairie farmer.

Wheat being a staple crop in the northwestern States, it is a matter of interest to us farmers to be well posted up on that subject, as it constitutes the major part of the expense in growing wheat, oats, and barley. It will not be necessary to say anything about reaping with the hand-sickle, as that has been laid aside many years.

The common modes of harvesting are with the cradle, reaping machine, and harvesting or heading machine. We will begin with the cradle, which is still used to a greater or less extent in all the wheat-growing States of the Northwest.

Cost of harvesting 16 acres of wheat, that will average 20 bushels per acre. An average day's work, cradling, is about 2 acres. Average wages, including board, $1 38.

To cut 16 acres would require 8 days, at $1 38 per day	$11 00
Raking and binding, the same as cradling	11 00
To shock, 1½ day	2 06
Stacking, 2 hands and 1 team, 3 days	9 00
Average cost of threshing, per bushel, 10 cents, or $2 per acre, 16 acres	32 00
	65 06
Cost per acre	4 07

2d. Cost of harvesting 16 acres by the use of *the reaper*.—It is claimed by good farmers, who own them, that they will cut, with the requisite force, 16 acres per day, and by some, under favorable circumstances, much more. We will, however, call it 16 acres, which is probably high enough. For a general average, to work a reaper requires 2 men and 4 horses.

2 men, at the same price as with the cradle	$2 75
2 pairs of horses, at $1 per pair	2 00
6 hands to bind, the same as with the cradle, at $1 38	8 25
1 hand, 1½ day, to shock	2 06
Stacking, the same as with the cradle	9 00
Threshing the same	32 00
Interest, wear, and tear of reaper	3 00
Total cost of 16 acres	59 06
Cost per acre	3 69

This shows a saving in favor of the reaper over the cradle of 38 cents per acre. It is claimed by some that five hands are sufficient to bind; which would make a still greater difference in favor of the reaper; and it is further claimed for the reaper that it does its work better than is usually done by the cradle. The principal advantage, however, derived from the use of the reaper, is, that the farmer has greater command over his harvest, and is, therefore, enabled to secure it with much less force, as it saves half the hands up to the time the grain is bound. According to the estimates, with the cradle it takes 16 hands to cut and bind 16 acres a day, while the reaper requires only eight; making a saving thus far of 50 per cent of manual labor; which, at a time when labor is in great demand, and wages high, is quite an item to the farmer.

3d. Cost of harvesting 16 acres by the use of the *harvester* or *heading machine*.—It is claimed by good practical farmers, who own these machines, that they will cut more acres per day than the common reaper, as they cut a much wider swath. We will, however, call a day's work the same as the reaper.

To manage the machine, requires one man and four horses; which, at the same price per day as the above estimates, would be	$3 38
To take care of the grain as it is cut, requires four men and two teams—one hand to each team, one hand to load for both teams, and one to stack	7 50
Heading can be threshed one-third cheaper than bound grain, which leaves the cost of threshing	21 34
Interest, wear, and tear of machine	3 00
Total cost of 16 acres	35 22
Cost per acre	2 20

Showing a saving by the use of the heading machine of $1 87 per acre. Notwithstanding this decided advantage, they have not met with as general favor as the reaping machine. They, however, have many friends, and also many enemies—for which, there are many reasons: first, many of the machines were not well made, and, consequently, liable to get out of repair; and some fell into the hands of men not sufficiently acquainted with machinery to run them, as the machines first made were somewhat complicated. The machine, however, (as before constructed,) is not well calculated for this region of the country, for the following reasons, viz: the growing of winter wheat in the northern portions of Illinois, and in the States of Wisconsin and Iowa, has, to a great extent, been abandoned, and spring wheat substituted, which is very apt to lodge or crinkle down before being harvested. Even if it stands up when harvest commences, it is probable that it will be down before it is secured; so that it will be difficult to harvest it with a heading machine. In sections of country where winter wheat is principally raised, they are decidedly the best machine in use, as winter wheat usually stands up sufficiently well to be harvested by them; which is done at a very great saving of expense—even more than the above estimate.

The machine, however, in my opinion, to take the preference of all others now in use is one that will work well as a *header*, *reaper*, and *mower*. All those machines are needed by the grain-growing farmer. If his grain is in a condition to cut with a header, he will never think of using a reaper after having used a header, (if a good one;) but if his grain is down, so that it is not advisable to use a header, he then wants a reaper; and he also wants a mowing-machine to cut his grass. I have seen all these machines combined in a very simple, compact, and durable form: it performed its work decidedly better, as a header, than any machine that I have heretofore seen; it is by far the best reaper, so far as I can judge from its operations, with which I am acquainted; and it works equally well as a mower. It requires only about fifteen minutes to change or alter it from a header to a reaper, and about ten minutes to change it from a reaper to a mower. The machines cost less than the large heading-machines.

Yours truly, and in haste,

GEORGE ESTERLY.

Hon. Thomas Ewbank,
Commissioner of Patents.

Prairie La Crosse,
December 8, 1851.

Sir: Owing to my absence, the most of the last three months, from home, it was not till within a very short time that I received the Circular of interrogatories from your useful Agricultural Department.

La Crosse county, you are probably aware, is a new, and quite lately an uncivilized, region of country. Its beautiful and fertile valleys were but recently the camping and hunting-ground of the *Winnebagoes*, who will in families, steal back from the Northwest, at this season of the year, almost daily, to visit this (to them) most charming spot, rendered sacred as their birth-place and the homes and the graves of their forefathers. Its resources, as yet, are but partially known, and much less cultivated. The northern part of this country, and along the banks of Black river, (which river empties into the Mississippi at the village of La Crosse,) is a dense pinery. Some twenty-four saw-mills are now in successful operation on and near this stream, which is capable, at all stages, to float its own lumber to the Mississippi; upon which latter river lumber is always in good demand at high prices. Vast quantities of lumber are rafted in this pinery every season, and floated down to St. Louis, and sold at from $15 to $20 per thousand. This, of course, is an important item in the resources of the county; while the large number engaged in lumbering create a ready market for the home consumption of the productions of the farmers. From four to eight years these lumbermen have been engaged on Black river; and, about the same length of time, a few farmers have been located in different sections of the county, some of whom have tilled the soil extensively and successfully.

Winter-Wheat, I am informed, has never yet failed since its cultivation was commenced in this region, averaging from 35 to 40 bushels per acre of more than standard weight.

Our soil is a black loam, intermixed with more or less limestone, and is believed, by experienced farmers, to be well adapted to the growth of wheat, especially with the right kind of fertilizing material; experiments in which will most likely be tried the approaching season, when more accurate information can be given as to what kind of fertilizers will be required.

The other staples of the country are produced here in abundance with as little labor as in any portion of the West. In fact there can be but little doubt that the soil north and west of the Wisconsin river, in the State of Wisconsin, is better adapted to the raising of grain than the southern portion of this State and northern Illinois. The result of the last three years has clearly satisfied me of the truth of this remark.

Minerals.—It is believed by some that this county abounds in lead mines, as well as the southwestern counties of the State; which belief is induced from its similarity in geological appearance; but, as yet, no substantial indications have been discovered, except small particles of ore on the surface.

Quite an extensive iron-mine has been discovered in the northern part of this county, and preparations are now being perfected to work it.

You will not, of course, expect from a county just settling very much real practical agricultural information; therefore I will cut short this desultory reply to your Circular, and ask you to wait until we can acquire another year's experience upon our lands, when we shall be more capable of judging of its capabilities and necessities.

Wool-growing will, no doubt, enter largely into the business of the farmers in this section.

Very respectfully, yours,

A. D. LABUE.

Hon. Thomas Ewbank,
Commissioner of Patents.

Oshkosh, Wisconsin, *December* 15, 1851.

Sir: The average product of *wheat* in the vicinity of this place is 20 bushels per acre. The best time for sowing is the last week in August and the first week in September. Wheat, in any of the northern or, western States, should be sown as early as above. It then has time to become firmly rooted, so that the frost will not heave it out, and is ready for harvesting about the middle of July.

The quantity of seed always depends on the soil. Black muck requires the least seed of any land. One bushel per acre is sufficient, if sown by the 1st of September. Sandy soil will require a half bushel more, if sown the same time. Wheat is better ploughed in than any other way. Plough the ground, and drag down; sow on the seed, and plough the same as before. This leaves the ground in the best possible shape for winter.

Peas should always be sown in the spring, on ground that is intended for wheat. This crop leaves the ground in the best condition for wheat; and peas are the best grain for fattening hogs I have ever used. I think one bushel of peas fully equal to two bushels of corn. If dry, soak them. For fattening hogs, peas should always be ploughed in, and two bushels sown per acre.

The average yield of peas is about 20 bushels per acre. And I venture to say that one acre of peas will make more pork than two acres of any other kind of grain.*

Respectfully, yours,

H. A. GALLUP.

Hon. THOMAS EWBANK,
Commissioner of Patents.

KOSSUTH, KENOSHA COUNTY, WISCONSIN,
December 10, 1851.

SIR: In communicating to you the result of the trial of a package of seeds you sent me last spring, I regret to state that two or three varieties of clover proved entire failures, especially the kind I was most anxious to have secured—namely, Chilian clover, of which not a single seed germinated. It was put into the ground in a careful manner about the 1st of April, in rich prairie soil. A continual succession of rains and cold weather might have been the cause. I found, upon examining the seeds, about three weeks after sowing, that they were being devoured by small worms, scarcely visible to the naked eye. The oats produced abundantly; also the spring wheat produced well, and escaped the prevalent disease in this section, (the rot or blast;) an indication of its being a hardy variety, as all other kinds of spring wheat were more or less injured by this disease. We have many fields of the variety called wedge—none proved entire failures.

Tobacco is beginning to engage the attention of the farmers in this section of the country, and sufficient has been raised this season, although very unfavorable to its production, to place the question of its successful cultivation beyond a reasonable doubt. The parcels you sent me were distributed, and were cultivated with a view to be prepared for seed for another season, in which it has produced ample returns.

[*The remarks in favor of peas for making pork are too strongly expressed. There is no satisfactory evidence that 100 pounds of peas will make more meat than a like weight of corn. And while an acre of peas gave only 20 bushels, two acres of corn might yield 100 bushels.]

Wheat has been the talismanic word here for the last twelve years, (I state only since my experience in this State,) as though there was no way to make a purchase or to pay a debt without a wheat crop; consequently, the wheat culture has been fairly run out of the ground. I think I am safe in saying that, for the last twelve years, so far as my observation has extended, more than two-thirds of all the land cultivated has been cultivated in wheat. The consequence is, that for the last two or three years the best fields have produced but about half a crop, and from that down to a total failure, the quality of wheat deteriorating with every succeeding crop. With many it has proved a disastrous experiment. With those who have pursued a varied system of farming, not so bad. This dear-bought experience will work a revolution. Comparatively little wheat will be sown another year.

Wool-growing and Stock-raising, and to some extent *Tobacco cultivation*, will engage the attention of the farmers. Spring wheat will be discarded more, and there will be a return to the cultivation of winter wheat in a more limited and particular manner. In this county about 12 or 15 acres of tobacco have been cultivated with good success this season. It was the first trial, and under favorable circumstances. In a few years I anticipate it will be one of the staple productions of the county, and perhaps of the State.

Average per acre of wheat in this county, not more than 10 bushels; of potatoes, not more than 30—many fields a total failure. Oats good, 40 bushels; corn, half a crop; hay, very good; flax, good for the amount cultivated, which is very limited, but growing more into favor.

Very respectfully, &c.,

PHILANDER JUDSON.

Hon. THOMAS EWBANK,
Commissioner of Patents.

MINNESOTA.

ST. PAUL, MINNESOTA,
October 31, 1851.

SIR: I am anxious that our new Territory should not be without representation in your very valuable Annual; and, therefore, continue my effort to furnish material for the Report until some more worthy candidate presents himself.

The past year has been unusually wet, which has been unfavorable to many of our new farms; but to others, and particularly to esculents, it has been advantageous.

In a new country it is not to be expected that much will be done in the way of experimental farming—the extraordinary richness of the virgin soil rendering unnecessary all artificial methods of increasing the fertility. This is very much the case in Minnesota; for an experience of 15 years shows little exhaustion of the soil.

Two of my neighbors have favored me with communications. As one relates to old ploughing, and the other to an entirely new breaking, I offer them to you to show the strength of our land when thrown into arable.

Mr. J. Brewer, of St. Peter's, writes me on the 10th November: "In answer to your inquiries, I have to certify that I have assisted during the summer of 1851 in raising the following vegetables:

"1 acre of onions (black seed) yielded	550	bushels.
1 do cabbage	1,200	heads
½ do blood beets	300	bushels.
¼ do carrots	200	do

"The cabbages average 12 pounds each; some weighed 24 pounds after the outside leaves were stripped off preparatory to cooking. Six of the onions weighed eight pounds.

"This land has been cultivated 15 years, and has been manured about every second year with 12 cart-loads to the acre, of long and short manure; ploughed once in the spring, and not well weeded."

Mr. J. H. Stevens writes from All Saints, St. Anthony's Falls, 21st November, 1851: "My land was ploughed for the first time late in April last, and, of course, all my crop was raised on the sod. I had 45 bushels of oats and over 50 bushels of corn per acre.

"Of 2,000 cabbage plants, the average was 13 pounds. My carrots came to great perfection. I had them 23 inches long, and 12 inches in circumference. From three ounces of onion seed, sown broadcast, I harvested 13 bushels.

"All my crops, of course, were raised without manure, and, in fact, I do not believe our rich soil will require manure for years to come. One of my neighbors raised beets weighing 19 pounds each, and A. Godfrey, esq., had about 30 acres in oats, fifty miles north of this place, from which he has cleaned up 1,000 bushels, which, in that location, will bring him 75 cents per bushel during this winter."

All the ordinary crops of a farm have been raised with the same success as in former years, with the exception of the potatoes, which have been much destroyed by the rot. I think the extent of the injury has been about one-half.

There have been several experiments with apples, but hitherto with indifferent success, not from any difficulty in raising the trees, or their growing well, but in consequence of the ravages of an animal, common throughout the country, called the *Gopher*.

It burrows under ground, feeding on roots, and appears to have a great fondness for the root of the apple tree. This it entirely devours, beginning at the smaller fibres and eating to the surface, until the tree is destroyed. I have not found this animal well described in any natural history. It is about seven to ten inches long, of a mouse color, with teeth much resembling the musk rat; the fore legs and shoulders singularly strong for its size. It lives entirely under ground, being seldom discovered on the surface. But its great peculiarity consists in the pouch on each side of the head. When digging, this pouch is filled with earth, with which it proceeds to an opening on the surface, and, when there, by a sudden muscular contraction, (much like blowing,) the contents are ejected and form a mound. Many attempts have been made to destroy them with poison, but this method appears to me very objectionable, and I have found abundant success with traps.

With a spade you open the ground at one of their mounds, place a small trap (one with a single spring being the best for the purpose) low down in the passage; no bait is necessary. The Gopher appears to dislike the light, and very speedily comes laden with a supply of earth to close the hole. In doing this, he must pass the trap, and so gets caught. We shall find it necessary to exterminate this little creature, for they are seriously destructive to gardens. It will burrow along a ridge of potatoes, eating or carrying off the whole. Their voraciousness is surprising. A large cabbage will be eaten up by a Gopher in about three days. He begins at the root, drawing the cabbage down as he devours it, and you see it gradually disappear, as it were, under ground. With two traps, I suppose ten acres might be kept entirely clear.

At the risk of being tiresome, I must speak of the *potato rot*:

For the last four years I have watched the progress of the disease with great anxiety, to find out its cause; and I have sought some explanation of it in the various publications that have fallen into my hands; but I still remain much in the dark.

This year I had half an acre of potatoes planted on a very dry, sandy loam; and having read that the disease was attributed to a want of alkali, and that a plentiful supply of manure was the remedy, I applied 20 cart-loads of long manure, mostly from the horse stable. In some parts it lay nearly four inches thick on the ground. At the distance of two miles, I planted four acres on new prairie, broken in the spring. The soil, a rich, dark loam.

The disease attacked both patches about equally. Half the produce was destroyed. The remainder, carefully selected, looks well, has been placed in a roof house, and I have every hope of its continuing good through the winter.

These potatoes grew well, and were fine, healthy-looking plants until the middle of August. About this time we had cold rains for two or three days; after which the weather cleared, and we had three nights so cold as nearly to produce frost. These nights were accompanied by a heavy dew, by some called a honey-dew.

The weather then moderated and became very warm. In four or five days, black spots appeared on the leaves, and about ten days after, the tubers were affected, the first symptoms being a yellowish rust on the coat.

Many persons hereabouts name this "potato rust." Now, I have ascertained by observation, that for the last four years the disease has always commenced as I have described. In one instance, I knew the hauling of a whole field of the black or purple potato killed in this way in one night, having the appearance of being destroyed by a hard frost, when I am positive no frost occurred, only one of the cold, heavy dews. The potatoes stopped growing, but did not rot, and were used all winter.

I am therefore led to the conclusion, that this dreadful disease is caused by the state of the atmosphere, and that some powerful agent, being deposited on the potato, checks the current of alkali then in its progress through the plant, and causes the decay.

I believe that the disease is not so virulent on dry soils as on cold, wet land. I have positive evidence that the disease is not confined to the potato, for the same dews produced the same rust of the leaves on my tomatoes, cabbages, and rutabagas. The rutabagas all rotted. I have not harvested one. The effect of the dew was most apparent on the tomatoes; the under side, where the dew collected heaviest, being soonest turned black.

I am unable to suggest a remedy; I fear we must wait patiently until a healthy state of the atmosphere permits the dew, supplied to invigorate the vegetable kingdom, to be deposited free from poison.

Some doubt had been expressed as to our growing winter-wheat here; but the past season has removed all question on this head. Crops of it have been raised in several parts of the Territory, and, in all cases that I have heard of, successfully. I have seen very beautiful samples of the grain.

Mr. Eli Pettijohn, on his farm near St. Paul, sowed two bushels of buckwheat, and has cleaned up of the produce one hundred bushels by measure.

We have to acknowledge the receipt, the past season, of a package of garden seeds; from some cause, few of them vegetated. The flower-beans and early emperor peas grew well with me. I divided the whole package, and distributed it in the neighborhood, but have not heard anything further of it.

In my former letter I have spoken of the very favorable nature of the St. Peter's country for a sheep-farmer.

A treaty has been made with the Indians for the purchase of this tract, and it will probably be open to settlement the ensuing spring.

If this communication should meet the eye of any one desirous of raising sheep here, I would suggest that a breed known in the Old Country as the improved Teeswater would be most likely to be profitable and suited to our climate.

Your most obedient servant,

P. PRESCOTT,

Superintendent of Farming for Sioux.

HON. THOS. EWBANK,

Commissioner of Patents.

OREGON.

UMPQUA VALLEY, OREGON,

December 28, 1851.

SIR: In attempting a reply to your Agricultural Circular for the year 1851, from a land but just emerging from a state of barbarism, where, in the settled portions, the recently and rudely constructed log cabin of the emigrant stands beside the ruder wigwam of the aborigines, it is not expected that a single item will be added to the vast amount of agricultural knowledge collected and disseminated by your Office. But as a sketch of the agriculture of a "new country" may be useful to the farmers of the old and highly cultivated portion of the Union, the better by contrast to appreciate the blessings they derive from civilization, established communities, and the labor of the generations that have preceded them, and also to those who, in disregard of these blessings, desire to make their homes in this far-off country, these remarks are submitted, to be used as you think proper.

As, besides the permanent control which the surface, soil, and climate of a country exercise over its agriculture, other causes—such as markets, means of transportation, and the prices of labor, though in their nature temporary and local—have, while they exist, little less influence, I shall endeavor briefly to show how far they direct the present labors of the farmers of Umpqua.

The basin drained by the Umpqua river lies between $42\frac{1}{2}$ and $43\frac{1}{2}$ degrees of north latitude, is separated from the Pacific ocean and surrounded on all other sides by a high wall of mountains. These mountains are wooded with dense and continuous forests of the evergreen, fir, pine, and cedar; their lofty peaks, steep and narrow ridges, and deep dark chasms, will perhaps forever defy the art of man to bring them into a state of cultivation.

To a person accustomed to the level or gently undulating surface of the western States, the term "valley" appears wholly misapplied to the Umpqua country, as the broad plains and gently-swelling hills associated in their minds with that term are nowhere to be seen. The basin, being very broken, (the narrow valleys lying between ranges of high hills,) appears, when viewed from the mountains that enclose it, to be merely a mass of hills and mountains, differing from its rim in being of less elevation, bald or timbered with oak, the evergreens only appearing in clumps on the loftiest summits or lining the deep ravines.

There are no lakes nor marshes; the waters of the surrounding mountains rush from their dark chasms in many streams that, meandering through the valley, collect at its northwest corner, where the Umpqua river pierces the coast mountains, and finds its way to the ocean.

The soil is lively and rich; that of the valleys, being alluvial deposits from the hills, is a dark, deep loam, in places sandy, and based upon a red clay; the soil on the hills is dark, or light-brown, according to its depth, it being lightest where most elevated or exposed to the action of the water.

Owing to the vicinity of the Pacific ocean, and the prevailing winds along the coast, the winters are warmer and the summers cooler than in corresponding latitudes on the Atlantic side of the continent. While the wind blows from a southerly quarter, which it generally does in winter, the weather is warm and damp, the ground seldom, if ever, freezing hard enough to kill peas or oats, or check the growth of cabbages, turnips, or other hardy plants. The mildness of the winters has a most important bearing upon the agriculture of the country. As an illustration of this fact, I herewith enclose some flowers* which have grown in the open air, and were this day (28th December) plucked from plants common to all parts of the Union, and familiarly known as the hollyhock, marigold, morning bride, sweet William, and grasspink. You will perceive some of them are full-blown, and others just opening, which will show that these plants continue to produce flowers even in midwinter.

But as the winds in summer blow from the opposite quarter, frosts frequently occur, late in the spring and early in the autumn, sufficiently severe to cut down beans, melons, and other plants of that description.

About the 1st June rain generally ceases to fall in sufficient quantities much to benefit a growing crop; and, if it fail to rain about the autumnal

[* The flowers referred to arrived in Washington at a time when the thermometer indicated 20 degrees below the freezing point, or 12 degrees above zero.]

equinox, the drought will continue until about the 1st of November. Though the climate of Oregon is, in this particular, more uniform than that of the western States, it has also its variations; the winter sometimes being, for two or three weeks together, clear and frosty, and cloudy weather and rain sometimes occurring in summer; the present year agrees with the exception nearer than the general rule.

Markets.—Scottsburg, at the head of tide water on the Umpqua river, and twenty-five miles from the ocean, is near the southwest angle, and the shipping point for the valley; above this point the river is not navigable, and as yet there is no road leading to it passable except with horses. But the principal market for the products of the farm is found in the gold mines of the Klamath and Rogue rivers. These mines lie between the 41st and 43d degrees of north latitude, and are principally supplied from Oregon.

Wagons are sometimes used as a means of transportation as far as Shasta city; but, owing to the badness of the roads, pack animals are mainly employed.

Labor, for the summer, is worth from three to five dollars per day, and but few laborers are to be had at these prices. These circumstances, together with its recent and very rapid settlement, controlling the farming operations of this country, rude and primitive as they may appear to farmers in a more advanced condition, are yet in accordance with sound judgment and good policy, and go to show that many of the practices of our ancestors were not so much the results of ignorance as of necessity.

The immigrant arrives late in autumn at the end of an exhausting journey in a wilderness. He has first to direct his attention to the comforts of his family; their subsistence is to be procured, perhaps, from a distance, and they are to be protected from the inclemencies of winter, which is now fast approaching. Whatever his knowledge of architecture, or his ability to avail himself of the labor of others, there are no quarries of stone or kilns of brick ready to furnish material for his walls, nor machinery to prepare the wood for the completion of the edifice. Wealth cannot call these things into existence, nor here secure the services of mechanics to use them, were they to be had; and if without it, which is too often the case, so much heavier is the iron hand of necessity upon him.

Like circumstances, at all times and places, produce like results, and the pioneer here, as elsewhere, erects a log cabin as his first edifice.

The same necessity governs his first efforts in agriculture, and for one or two years there is little attention paid to the culture of anything not needed for his own subsistence. And it must be borne in mind that but few of the settlers are yet prepared to avail themselves of the natural advantages of the country, or to turn their attention exclusively to those branches of agriculture that the markets and means of transportation make most profitable; which subjects I shall now proceed to notice.

Grasses of nutritious quality cover the whole country; that of the hills being varieties of the buck-grass, or festuca, common to all the elevated regions of Oregon. The valleys produce a ranker growth and greater variety, among which may be mentioned a valuable clover. The excellence and abundance of these grasses, which, from the mildness of the climate, continue their growth through the winter, make the country, to all grazing animals, a natural home.

Horses, Cattle, Sheep, and Hogs are free from disease—always in good condition; and beef, mutton, and pork of superior quality are at all seasons slaughtered that never received either food or shelter at the hand of man.

Besides the surface and climate, which must ever mark it as a grazing country, there are many temporary and local causes to encourage the raising of animals at present.

Horses and Mules.—As horses and mules are extensively used in the carrying business, they are in good demand; $100 being about the average price of Indian and Mexican breeds, fit for service; and those of the United States rate much higher—good horses and mules bringing double that rate.

Cattle are also in good demand, as bullocks can carry themselves to market, and gather their food by the way; and butter and cheese are articles in which, with Oregon, no country can compete.

Bullocks, on foot, rate from six to ten cents per pound, the price depending on the tractability of the animal in being herded and driven. Spanish stock, $15 to $25 per head, according to training. Tame cows, with calves, $50 to $100. Butter, 75 cents; cheese, 50 cents per pound.

Sheep are not valued for their wool, though there are now in the country some of the best wool-bearing breeds. The short, sweet grass and pure air of the mountain pastures encourage a remarkable fecundity and fatness in the animal. Young lambs are being added to the flock in every month of the year, and it is not uncommon for a mutton to yield 20 pounds of tallow, while the flesh, for fineness of flavor and texture, is nowhere exceeded. Mutton is a convenient article of food at home, as well as in the mines. Salt provisions being little used, an ordinary family, even in summer, will consume a mutton while it is still sweet and fresh.

Hogs, as yet, succeed well, but it is probable their food will first cease to be produced spontaneously. The mast-bearing trees are few in number and variety; black oak, white oak, and hazel comprising the whole. The clover and nutritious roots of the valleys being their principal dependence, besides their own tendency to destroy, each field put in cultivation directly diminishes their pastures. Their flesh being not much eaten at home, they are mostly made into bacon, and, in that shape, are a valuable item in the trade to the mines. Stock hogs, 8 to 10 cents per pound; pork, fresh, 10 to 12, and bacon, 25 to 50 cents per pound.

Hereafter, when the number of grazing animals approaches more nearly to the capacity of the country to maintain them, the danger which may be apprehended to this branch of business is, that the grasses starting up with the first rains of autumn continue their growth through the winter, and ripen about midsummer, and, except on damp places, remain dry until rain in sufficient quantity again falls to renew its growth. In the dry, or hay state, it is equally nutritious as, perhaps more fattening than, when green, but it is liable to be burnt off; and when such an accident happens, and the rains are late in falling, and are followed, as is sometimes the case, with cold, rainy weather, and even snow, the scarcity produced by the fire will be prolonged through the winter, which must result in a ruinous loss to such farmers as are unprepared to meet it with food for their animals. Such was the case in Willamette in the winters of 1846-'47 and 1848-'49, in which hundreds of animals perished of starvation.

Crops.—On the dry lands any crop ripening by midsummer succeeds well. Wheat, peas, oats, barley, &c., are cultivated for home consumption; the want of mills and labor-saving machines, and the price of labor, discourage their cultivation as articles of export.

Vegetables—such as maize, potatoes, cabbages, &c., requiring the whole summer to perfect them—will some seasons succeed without irrigation; but, as the crop is liable to be cut short by drought, usually a spot naturally damp, or that can be easily irrigated, is selected for the kitchen garden.

The mode of culture is simple and primitive. The emigrant, who has arrived too late for fall-ploughing, in early spring turns over the green sward of the prairie with a huge, clumsy plough, drawn by oxen. On this he sows his crop of spring wheat, peas, or oats, and harrows it in with a wooden harrow or a scragged tree-top; the first, if a spring crop, yields from 10 to 25 bushels per acre, being varied by the manner and time of setting the crop, and the continuance of the rains. If sufficient rain falls about the autumnal equinox, which is generally the case, fall wheat is sown; but if this should not happen, it creates no uneasiness, as the crop may be set at any time until March without any perceivable difference in the yield, and but little in the time of ripening. It is common, however, to sow more seed on late sowings.

The yield of the fall crop, though affected by the same causes, is more uniform and abundant than that of the spring, and from 20 even to 50 bushels of wheat are harvested per acre. The rotation of crops, though doubtless here of as much advantage as elsewhere, is attended with one serious inconvenience, the frosts of winter being insufficient to destroy peas or oats. Wheat, if following a crop of either, is frequently choked and intermixed with their voluntary growth; and oats particularly are very injurious. The same result also follows in sowing in fall after a spring crop—the two kinds of wheat become intermixed to the injury of both. At the time of harvest, the weather is usually dry and pleasant. Wheat and oats are cut with a cradle, and peas pulled by hand. There being no barns, a clayey spot is made smooth and hard by being dampened and beaten with mauls, or tramped with animals. Around it a high, strong fence is made, and over it those fond of the shade throw a few bushes. On this "floor," the grain is laid regularly, the heads pointing obliquely upward. A wild, skittish band of horses are turned in and driven against the bristling heads of the grain, and, by their scampering, in a very short time the wheat is threshed from the straw, and much of the straw itself broken to pieces, much more time being required to separate and remove it from the grain than is occupied in threshing. Leaving the bottom undisturbed to the last, as it is sometimes dirty, the threshed grain is pushed to the centre, and another floor laid down; and so on until the crop is threshed.

Formerly we depended upon the sea-breeze, which springs up each evening, to separate the wheat from the chaff; but now, as we can obtain fanning-mills at $100 each, most of the farmers are providing themselves with these modern inventions.

Of the whole list of vegetables and fruits found in the temperate zone, there is scarcely one that may not here find its favorite soil, and, with a little attention, be adapted to the climate; and in the vegetable market, having no foreign competition, the farmers have the greatest encouragement to engage.

In the culture of vegetables, besides damp land or irrigation being necessary for complete success, much advantage is gained by the use of stable manure, not so much to give strength to the soil as to counteract, by its warmth, the cold rains and chill weather of spring. Plants requiring a warm climate do not grow rapidly or have a healthy, thrifty appearance until late in spring; and such tender ones as pepper, beans, melons, &c., are liable to be cut down by frost. But when the sun's rays have overcome the chill, northwest wind, in no country is vegetation more luxuriant or do plants advance more rapidly to maturity or (such as are best adapted to the climate) attain greater size; but, as I have already greatly exceeded the limits I first intended to occupy, I must briefly notice a few only of such vegetables as are in common use.

Potatoes.—Are subject to no disease; grow well both from the potato and the seed of the ball—the growth from the seed requiring a longer time to mature. The yield of the present year was large. My largest potato, from the planting of the root, weighed 5¼ pounds; from the seed, 3¼ pounds. Price, $1 50 per bushel.

Beets, Parsnips, and Carrots.—A fine growth; 4 cents per pound.

Cabbages and Turnips should be sown late, as both mature early, and, if not used, run to seed. Turnips, not being needed for stock, grow too large and pithy for house use. Both vegetables, when the growth of the fall and winter, are much better than the produce of warmer weather. Weight of largest cabbage head, 25 pounds; price, 4 cents per pound. Turnips not sold.

Onions are a most valuable vegetable, as they are in great demand in the mines, and here appear perfectly at home. A damp plat, manured from the cow lot and sown early, is sure to yield a rich return; from the seed, largest weighed two pounds. Price, 10 cents per pound.

Indian Corn and Tobacco do not succeed here as in the southwestern States, owing, I think, to the coolness of the nights. Both are cultivated—tobacco for domestic use, and Indian corn more from attachment to the plant than its value.

Sweet Potatoes have not been introduced, but a suitable kind will, no doubt, succeed. *Squashes* are cultivated as a substitute; the larger kinds sometimes weighing 40 or 50 pounds.

Having shown the adaptation of the Umpqua valley to the purposes of agriculture, and the great encouragement at present given to it by the high price of produce, it may be interesting to farmers of the United States to know the circumstances producing present prices, and the prospect of their continuance.

In regard to present prices, it must be borne in mind that three-fourths of the inhabitants of Umpqua are immigrants of the present year, who must be fed, and furnished with seed—that, within the same time, the newly-discovered mines of the north have attracted between ten and twenty thousand persons, whose supplies are drawn from Oregon principally; and as the roads are bad and transportation expensive, Umpqua, being the nearest farming district to the mines, has had a decided advantage over other parts of the country.

But the very means which have given the farmers of Umpqua great advantages in the market will tend to make them of short duration; because a portion of the country embraced in the northern mines is well adapted to the purposes of cultivation, and much more of it affords fine pasturage.

The grazing in the neighborhood of Shasta city is excellent, and a fine yield of both potatoes and gold may be dug from the same plat of ground; and, as the price for which vegetables, butter, and cheese are sold in the mines, must be enormous, it is a profitable business to pay high prices for them here and carry them 200 or 300 miles on the backs of animals. Many have exchanged the pick and shovel of the miner for the implements of husbandry, and farms and dairies are being established in the very heart of the mines themselves.

The peaceful relations which have at last been established with the Indians of Rogue river will also have their influence, as they have opened to the farmer a valley surrounded by mountains rich in gold, remarkable for its health, beauty, and agricultural capacities; and as the distance from the ports of the Pacific, and the extremely rough and mountainous country lying between, will make transportation always difficult and expensive, the northern mines may shortly be independent of commerce, except for groceries and manufactured articles. When the mines cease to consume the agricultural products of Umpqua, it is difficult to foresee what other market will be found, or what will be the effect upon the pursuits of the inhabitants. The great natural advantages of the country, and the nearness of the market, are overbalanced by the high price of labor, difficulties of transportation, and want of machinery; and, until great changes in the prices of labor and improvements take place in the other obstacles, we cannot compete with Chili and the Atlantic States in the provision trade of the Pacific. These things considered, though there is perhaps not one farmer in a hundred discontented or desirous to exchange his home in Oregon for the one he left in the States, I do not think a greater proportion of the prudent would advise their friends who are well and comfortably settled in the States to exchange the many comforts and advantages they now enjoy, and perform the arduous and dangerous journey over the plains, for the certain privations and uncertain advantages of a home in the wilderness.

Very respectfully, your obedient servant,

JESSE APPLEGATE.

Hon. THOMAS EWBANK,
Commissioner of Patents.

CALIFORNIA.

OPHIR, PLACER COUNTY, CALIFORNIA,
December 3, 1851.

SIR: Having been presented with a copy of the Patent Office Report for 1850 by the Hon. Dr. Gwin, previous to his leaving California for Washington, and as the evenings are now quite lengthy, affording me time to write, read, and reflect, I have just laid aside the aforesaid Report to put on paper a few ideas suggested on reading some of the agricultural letters contained therein; and which, although brief, will convey a pretty good idea of the manner *we* "do things up" here in this land of gold.

The principal product of this State is *gold*—the grand object for which most of mankind are toiling. I have been in California nearly two years, and am more fully convinced, the longer I stay, that its auriferous resources are inexhaustible. I say it as my honest conviction, that the gold, which is interspersed through the soil, hills, mountains, valleys, rivers, and quartz veins, will never be exhausted. It will afford employment for many thousands of people so long as "man exists." Although the spots where the richest deposits are may be worked and worked ten times over, gold will still remain and attract the labor and attention of its seeker.

Let no one be deceived as to the real character of the gold mines of California, nor of the climate, nor of its agricultural advantages.

I observe, in the copy of the Report before me, quite a number of articles on dairies, &c., and the amounts realized from milk, butter, cheese, fowls, eggs, &c. I will state what I have done with two cows and three hens in eight weeks time:

About the 1st of last October, I bought two American cows from a dairyman near Sacramento city—they were fresh, with young calves—for which I paid him, in "gold coin," *four hundred dollars.* (Rather a high price, I think I hear some of your farmer-readers say.) But, now, mark to what account I turned my $400. The cows have averaged 12 quarts of milk, each, per day, which would be 24 quarts. Now, every quart of the milk sold for 50 cents, which in two months would make $720. The cost of keeping the animals for the above time, on hay, corn-meal, and potatoes, (hay selling at $80 per ton, meal $8 per hundred pounds, and potatoes $4 per hundred,) did not exceed $100. I also have some hens, for which I paid $4 each; the eggs of which have averaged $5 for every dozen. I have seen laying-fowls sold within a few weeks at the rate of *seventy-two dollars* per dozen. I was one of a party who dined, on thanksgiving day, (November 27th,) on three common turkeys, for which were paid *thirty-six dollars.* The above are facts, and I think will somewhat astonish many of your readers. One thousand dollars could not buy my two cows, or ten dollars either of my hens.

By the aid of irrigation, the man who has served me with vegetables this season cleared, from about eight acres, not less than $3,000. What think ye, tillers of the soil, of this? Not a pound (for, mark ye, everything is sold by *ounces* and *pounds* here) of all his truck sold for less than 12 cents, and early in the season it brought as high as 30 cents.

For barley, oats, cabbages, pumpkins, radishes, tomatoes, and every variety of vegetables, I think California cannot be excelled by any State in the Union. I have lived on the borders of the Atlantic (being from Philadelphia) and the Pacific, and never saw a parallel. A few specimens from here would make a nice array in some of your horticultural and agricultural exhibitions. As yet, however, comparatively few among our population have turned their attention to agricultural pursuits and the development of our natural resources, except in digging for gold.

But the real advantages are here, and have been lying dormant for ages, and will most assuredly be brought into requisition by the indomitable energy of the American emigrant in a very few years. Let the farmer from the eastern, middle, and western States immigrate to California. Let him bring along his family, (for this is no place for a man without a helpmate,) and *determine* to make this his home, and he will find this country far better than he even could have pictured it in his imagination; and under his own "vine and fig-tree," and the protection of the "glorious stars and stripes," he will realize his fondest hopes of life, health, fortune, and happiness.

A mighty empire is about to be reared on the shores of the Pacific, and to all who would be its builders I would say, "Now is the appointed hour, and now is the accepted time."

With high consideration, I am, respectfully, yours, &c.,

PHILIP LYNCH.

Hon. Thomas Ewbank,
Commissioner of Patents.

Mokelumne Hill, Calaveras County, California,
December 16, 1851.

Sir: Mr. J. B. McKennie, postmaster at this place, has put into my hands a Circular from your Office, with a request that I reply to the points named in it.

My observation does not extend far beyond the mineral portion of the country, and in the mineral region but little has been done to develop the agricultural resources which that particular portion of California may possess. Among the hills which constitute the lower range of the Sierra Nevada, are many valleys, through which run streams of water. Those valleys are well adapted to agricultural purposes, and the soil is invariably very productive of grasses and flowers. A few of these valleys have been under cultivation during the past two years, and, at the present time, persons who intend to remain permanently in California are giving much attention to them.

Oats and Barley.—Of grains, oats and barley are the only kinds cultivated, and experiments have been so successful as to render it certain that the soil is well adapted to the production of them.

Clover and Wild Grasses, resembling the "red-top" and "blue-joint" of the Atlantic States, are abundant in all the mountain valleys, and are gathered in such quantities as are required for the use of the cattle employed upon the roads to the mines. Those grasses are heavily seeded, and, when gathered at the proper time, make excellent hay. I have no means of knowing the quantity usually gathered from an acre of ground, but judge it to be equal to the product of well cultivated fields in the Atlantic States. The cost of growing is, of course, nothing. Native hay, in bales, in most of the mining towns, sells from $60 to $100 per ton.

Dairy Husbandry is not pursued as a business in this part of the State.

Neat Cattle, Sheep, and Hogs are raised on the larger farms for the purpose of supplying the miners. They invariably feed upon wild grasses and acorns, no attention being paid to them other than is necessary to prevent their straying.

Horses and Mules, though employed in large numbers, are always brought from the southern part of the State. None are raised in the mining region.

Cotton, Sugar-cane, Rice, Tobacco, and Hemp have never been planted here.

Turnips, Carrots, Beets, &c., are cultivated to considerable extent, the ground receiving no other attention than simple ploughing. The average product of this rude cultivation is, so far as my observation extends, considerably greater than that of the careful cultivation in the States east of the Mississippi river.

Irish Potatoes grow here more luxuriantly than in any of the States east of the Mississippi. No manure is used. No attention is paid to the different varieties, but all grow with thriftiness. The "potato rot" does not affect the crop in California.

Sweet Potatoes grow as thriftily as the Irish potatoes, but they are not much cultivated—the prevailing taste being in favor of the Irish sort.

Fruit.—Nothing has been done in the way of fruit cultivation. The climate and soil are admirably adapted to the raising of grapes, peaches, pears, plums, &c.; but it is not probable that apples would flourish as well as in a colder climate.

Manures.—No fertilizing agents have ever been used on any of the lands cultivated, so far as my observation extends.

Meteorology.—I am not aware that any record of the range of the thermometer has ever been kept here, but have observed in midsummer—say in July and August—a temperature of more than 100 degrees; and should say 96 degrees a fair average for the months of June, July, and August. The 12 hours of night, during those months, are cooler than the hours of day-time by 15 or 20 degrees. For the winter months, 65 degrees would probably be near the average of the day hours, and 55 degrees of the night hours.

During the "dry season," which commences in April or May, and closes in October or November, it is seldom that any rain falls. In the summer of 1849 we had slight showers in August; in 1850, a drizzly rain in September, which continued three days; and in 1851, two slight showers in September—no other rains falling during the last three dry seasons. During the month of January, 1850, J. E. P. Weeks, a resident of this place, kept a record of the number of rainy days in the month. This record he compared with a similar one kept at Boston, and found that in the month of January about as much rain fell here as in June in Boston during the same year. That year much less rain fell than the year before; and up to the present time this year, we have had less rainy weather than last.

General Remarks.—About a sixteenth or twentieth part of all the land, from the foot-hills of the Sierra Nevada to a range 20 miles nearer the summit, can be cultivated to good advantage, and will produce, without irrigation, one crop a year of small grains or roots. The character of the arable land is alluvial, being the earthy and vegetable matter that is washed from the neighboring hills. It is covered, during the rainy season, with rank grasses and wild flowers, which ripen as the dry season approaches. As no rain falls after the dry season has once commenced, the vegetation becomes parched; the different seeds fall to the ground; and thus are reproduced those flowers and weeds which grow from seeds. Much of the vegetation, thus ripened and dried, affords good food for neat cattle and horses; so that, though no grass grows in summer, cattle will thrive through the year in the open field.

The mines in the neighborhood of the valleys afford a ready market for the products of the soil, at prices ranging much higher than are obtained in the Atlantic States. The yearly crops, when irrigation is not used, should be raised in winter; but when there are facilities for moistening the lands by artificial means, a crop may be raised at any season.

I have the honor to be, most respectfully, your obedient servant,

GEORGE H. CAMPBELL.

NEW MEXICO.

EXECUTIVE DEPARTMENT, SANTA FE, NEW MEXICO, *January* 30, 1852.

SIR: I have the honor to enclose to you a communication from Dr. J. F. Hammond, of the United States army, in reply to your "Agricultural Circular." Although quite a young man, Dr. Hammond is favorably distinguished by those who know him of riper years.

With great respect, I am your obedient servant,

J. S. CALHOUN.

Hon. THOMAS EWBANK,
Commissioner of Patents.

FORT FILLMORE, NEW MEXICO, *October* 16, 1851.

SIR: The following replies to the questions in the "Agricultural Circular" of the United States Commissioner of Patents in August last, and forwarded to me by yourself, apply to Socorro, in north latitude 34° 2' 39", and longitude 7h. 7m. 54s. west from Greenwich, and less than 4,500 feet in altitude above the sea, and to Doña Ana, in north latitude 32° 23' 61", longitude 107° 1' 55" west from Greenwich, and about 3,000 feet above the level of the sea.

The land is river-bottom on the Rio Grande del Norte, with very little vegetation upon it, and containing a very large proportion of chloride of sodium, nitrate of potassa, and sulphate and carbonate of lime.

Wheat.—Guano is unknown here. The product is never estimated by the acre, but by the quantity of seed sown. The average product to the bushel planted is 75 to 100 bushels. It is planted generally at Socorro, about the middle of January; though it is better when planted in the fall—is more hardy, fills better, and matures earlier. The depredations of the animals prevent the latter season being universally chosen. There are no fences nor ditches for protection, and the animals, though under the care of a herder, stray at liberty during the winter. At neither place is there any preparation of the seed for planting, and the quantity used per acre is about half that used in the United States. The land is broken, and the seed planted at the same time by drilling, and is never ploughed a second time. Time of harvesting is August. The plough used is the conical-pointed Mexican plough, generally pointed with iron.

It runs about three inches deep. The American plough is found to yield more, but its costliness prevents its being adopted. The yield is neither increasing nor diminishing. The land is watered by irrigation, which renews it. There is no system of rotation of crops; no Hessian flies nor weevils. The average price is $2 per bushel.

Corn.—The manure employed is ordure from goats, sheep, horses, and cattle. At Socorro from five to twenty-five bushels per acre are scattered over the field in February. The ground, for corn, is broken at the same time. They sow wheat in January, and early in April furrows are run, all in the same direction, and about six feet apart, and the corn is dropped, by the eye, at intervals of about six feet. Five or six grains are put in a hill, and give 15 or 16 stalks. It is never *suckered*, and the suckers yield as well as the main stalk. The corn is usually ploughed once, and hoed twice. The land is irrigated just before running the rows for planting, and the corn is watered from one to four or five times, according to necessity and the general demand for water. The average product is 45 to 75 bushels to the acre. At Doña Ana manure is not used. The corn is dropped, or drilled, and hoed out to 15 stalks in the hill; the hills six by six feet apart. It is rarely ploughed even once after planting, at either place, and never in more than one direction. The average product is 75 to 100 bushels to the acre. The greatest labor expended on the crop is in irrigating, exclusive of the expense of digging the *acequias*, or aqueducts. Numerous small dams are thrown up over the fields, furrowing little squares, and all connected to retain and guide the water in its flow. Land rents at Socorro for $5 per acre. The wages of a peon are $4 per month and his provisions; clothing, housing, and doctor's bills not furnished; and the days he does not work are deducted. From the system of planting by irrigation, four peons are required to do the work of one negro in the United States. The farmers commence to gather their corn, by order of the alcalde, all on the same day, and gather day and night; and, by a similar order, the animals are turned upon the fields all the same day. Corn is never fed to animals. Manure from hogs is never employed.

Oats, Barley, Rye, Peas, and Beans.—The two first yield largely; they have been planted only in small quantities, from want of seed. No rye or peas, except the English garden pea. The garden or English pea is sown broadcast, and yields much less than in the gardens of the United States. Beans (*frijoles*) yield 35 to 45 bushels to the acre; they are, in planting, dropped irregularly, about the same proportion to the acre as in the United States; are planted alone in the ground, or with corn half way between the hills. The land is renewed by the sediment deposited from the water of irrigation. Peas are never planted as a renovating crop.

Clover and Grasses.—Clover has been planted in but one instance, probably, in the Territory; the yield was enormous. Of the grasses all are wild; one ton may be cut to the acre in the bottoms. All the meadows are natural; none laid down. The grass upon the hills is preferred; it is called *grama* by the natives, and remains green during the winter. The stock all subsist upon it during the winter, and chiefly in the summer. It yields much less to the acre.

Dairy Husbandry.—Butter is not made nor used by the natives. The yield from the cow's milk is large. The milk of the goat, cow, and sheep is equally in use for drinking and for making cheese. That of the cow and sheep is equally esteemed for drinking; that of the goat less, and is prepared by salting and boiling, and is eaten with mush. The cheese is precipitated from the milk by means of the stomach of the sheep. The stomach is prepared by covering it with whey, to which is added a handful of common salt. After this has remained together in a vessel for a day, the milk is added; the casein (curd) is precipitated immediately; is removed and pressed between small boards; and is offered for sale in circular cakes, 4 inches in diameter, and from 1 to 2½ inches thick. It is made for immediate use, and is rarely seen more than a few days old. It is eaten with sugar.

Neat Cattle.—Cost of rearing until 3 years old is not over half per cent. per annum on the value of the animal; at that age they are worth $20 to $25 per head. Cows for the dairy are worth $40, but may be hired for the year at $1 per month. Varieties in the breeds are never heard of. Steers are broken for the yoke by lashing the yoke to the horns behind them, by means of a rawhide thong; from the yoke trails down between the steers and upon the ground a long, heavy log; and they are goaded by a long, sharp-pointed stick, until they are accustomed to the yoke, and learn the words of command. Like all the other domestic animals, they are bred as tame as dogs.

Horses and Mules.—The growing of them would be profitable, if it were not for the Indians; the expense of raising them is not one per cent. The brood mares are used, with foal or not, the same as other horses. They are taught to bear burdens (children) from the earliest age.

Sheep and Wool.—There is little or no demand for wool, and it is coarse; it is worth 4 to 10 cents per pound; is used for making a coarse kind of blanket called *serape*, and of carpeting called *jerga*, and for mattresses and pillows. The materials for clothing are now obtained from the United States. There is but one variety of sheep observed; it is small, and the meat of fine flavor. The average yield by lambs is 100 per cent.; the cost of raising sheep two per cent. per annum; and their yield 80 per cent.

Hogs are rarely seen; of a small variety, and worth from $15 to $50. The absence of mast prevents their being raised for market, or to obtain bacon. Bacon and hams are almost entirely unknown by the natives; a little is brought from Mexico, and never cured among them.

Cotton is never seen here.

Sugar-cane is unknown here; yet at Socorro, molasses is made from the green stalks of the maize, common in the country.

Rice is not planted. It might be raised on the damp bottoms. Upland is too dry and stiff for it.

Tobacco.—A species of tobacco, with a round leaf, five inches in diameter, and the stalk rising to the height of six feet, is raised. The seed is planted in a small spot of ground; the plants are set about two feet apart; the leaves are picked off when green, before the plant goes to seed, and dried and formed into small bundles. It is called *punche*; is mild, and has a pleasant flavor; raised chiefly for family use. Cannot estimate the production. Is never planted in reference to any other crop.

Hemp is unknown.

Root Crops.—Turnips, carrots, beets, onions, and garlic yield enormously. The onions are the large white onions, and cannot be excelled.

The other roots have been planted in such small quantities that the yield and cost of production cannot be estimated. The beet grows to a very large size at Doña Ana, and at San Elizario, 60 miles further south.

Potatoes.—The Irish yields nothing but weeds, which are very luxuriant. The sweet potato is never planted.

Fruit Culture.—Very little attention is given to the cultivation of fruit, other than the grape. Peach and apple trees are planted or set out, with intervals between them of 15 or 20 feet, forming small orchards; but the trees are never trimmed, and the fruit is rarely allowed to remain on the trees until it is ripe. Apple trees, however, are not found below Limitar, nor above El Paso del Norte. The apples brought from them are small and sweet, and may be kept fresh, it is said, all the year. The trees yield well, and it might be made a profitable crop. No disease of any fruit tree is observed. Budding and grafting are unknown; and I have never heard of any instance of transplanting except of the grape. The grape-vine grows in the form of a bush; is bare of branches for two to two and a half feet, and rarely attains a height above three and a half to four feet. It is propagated by transplanting roots, and by cuttings. Either is buried in the ground six feet apart. At the end of two years the first bears grapes; the second at the end of three years. In October, at Socorro, the dirt is drawn up on the roots, and against the main stem, until it nearly reaches the branches. About the 1st of March it is drawn away from the roots—not baring them—and formed into drains from 15 to 20 feet in length, for irrigation. As soon as this is accomplished, the vines are pruned; removing all the dead branches, and, cutting off all the young branches of the preceding year a few inches from their origin, the vines have no other support than the main stem. One bush will yield annually about half a gallon of brandy—*aguardiente.* Two years ago a vineyard could be bought for 50 cents per bush; now they are worth $1. The removal of the dirt from the roots may be so timed as to delay the budding of the crop, and thus save it from the late frosts. They are never embanked at Doña Ana. At Socorro the bunches of grapes are picked, about the middle of September, for brandy; they are placed in the shade for four days, then tread and pressed by the bare feet upon a leathern sieve; the juice and skins run into a raw-hide vat, where they remain for 18 to 25 days, when the brandy is distilled and put away, uncolored, in earthen jars. The grapes for wine are allowed to remain on the vines until fully ripe, when they are picked, put away for four days in the shade, and tread out in the same manner by the feet; the husks are separated from the must, and the last is boiled, placed in rawhide vats, the mouths of which are closed by dirt, supported on strips of wood. When fermentation ceases, the wine is drawn off and stored away in casks or porous earthen jars. The brandy, or *aguardiente*, is colorless. The wines are red, sweet, and acidulous. The former is called *vino arropado*, the last *vino blanco*. There are two varieties of grape—the muscatel and the black grape. The first is white, and is esteemed the most. The finest wine is made by selecting the best bunches of muscatel, and picking from them the finest and ripest grapes, which are pressed without the stems.

Forest Culture is unheard of, though they are careful of the few sparse groves of cotton-wood that skirt the river, and use it for all mechanical purposes, as well as for fuel.

Manures.—Lime and plaster are never used for manure; the soil is full of salts, and requires vegetable matter.

Meteorology.—At Socorro, 1850, thermometer, F., max. 104°, June 20; min. 1°, December 6.

	Max.	Min.	Mean.		Max.	Min.	Mean.		Max.	Min.	Mean.		Max.	Min.	Mean.
Dec.	62	1	30.29	Mar.	76	22	49.20	June	104	45	73.23	Sep.	99	53	75.8
Jan.	62	12	42.3	Apr.	85	32	56.8	July	102	59	81.7	Oct.	89	30	65.5
Feb.	68	13	43.7	May	95	30	63.10	Aug.	103	63	67.20	Nov.	69	21	44.13

Winter.			Spring.			Summer.			Autumn.		
Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
64	8	38	85.1	28	56.1	103	55.2	77	85.2	37.2	61.1

Annual.—Maximum, 59.1; minimum, 32.1; mean, 64.2.

Fall of rain or snow.

Dec.	.44	.96	Mar.	.06	.60	June	.17	2	Sept.	.24	2.97
Jan.	.00		Apr.	.42		July	1.29		Oct.	1.81	
Feb.	.52		May	.12		Aug.	.54		Nov.	.92	

Annual.—6.53 inches.

More has fallen in 1851, but not double the quantity.

The following vegetables are dried here; and, when cooked a year after, are as fresh as when they were picked:

Tomato, picked ripe, split open, and dried in the sun.

English Pea, picked green, placed on dirt floors, dried in the shade.

Snap Bean, picked green, steeped in warm water, placed on planks in the sun to dry.

Squash, picked green, cut in slices, dried on planks in the sun.

Parsley, picked green, steeped in warm water, hung up and dried in the sun.

Very good raisins, though small, are made by drying the grapes on the bunches hung up in the house.

This is a sketch of the customs of the farmers in this country, in an agricultural point of view, and can give to the Commissioner very little information valuable to agriculture. This is peculiarly a grazing country, and one of the finest perhaps in the world. The natives, until the United States troops came here, planted barely sufficient for their individual use, and they plant very little more now, though the love of silver has induced them to afford sufficient to subsist the troops. Yet the lands are rich, and, could they be irrigated so as not to require the working of the crop to be suspended, would yield extraordinarily. It will show, however, in a slight degree, that the people are primitive and ignorant; and anything that will tend to throw influence in the way to give them

intelligence, will tend to improve agriculture and every other art here. They need first to be taught to read and write, and then the free circulation of every means of conveying intelligence, especially newspapers and journals.

Very respectfully, your obedient servant,

J. F. HAMMOND.

His Excellency J. S. CALHOUN,
Santa Fé, New Mexico.

EXECUTIVE DEPARTMENT, SANTE FE, NEW MEXICO,
January 30, 1852.

SIR: I have the honor to enclose to you the accompanying communication in response to a Circular of yours, asking for useful information. General Baird, the writer of the communication, is one of the most useful, intelligent, and reliable men in the Territory.

With great respect, your obedient servant,

J. S. CALHOUN.

Hon. THOMAS EWBANK,
Commissioner of Patents.

ALBUQUERQUE, NEW MEXICO,
November 10, 1851.

SIR: I had the honor to receive your letter of the 6th October, enclosing a Circular from the Commissioner of Patents, requesting information on a variety of points connected with the interesting and important subject of agriculture. I must plead a press of business in getting in the present crop, and other affairs, as an excuse for this long delay in answering you.

You are aware that we have none but mud fences in this country, and but few of those; so that we have to labor without ceasing, when the alcalde gives the order to gather corn, lest we be left behind and have our corn destroyed by the stock, when turned loose without tenders. Next year some of us, I trust, will be relieved from this inconvenience, as we intend to have our lands enclosed by means of ditches and walls, (timber, you know, in the Rio Abajo, is quite out of the question.) I have never seen a field of corn in this Territory well matured before it was gathered. This results from two faults: in the first place, we are compelled (at least, find it preferable) to wait until the strong winds of the spring cease before we plant corn, as they are extremely detrimental to vegetation; and, in the second place, we are always hurried in gathering in the fall. You are aware of the fact that we are dependent upon irrigation; for which purpose, however, the Del Norte, with proper industry, affords every facility. This would seem, at the first view, to render all seasons for cropping equal; but such is not the case. I find, even with my short experience in this country, that irrigation but partially supplies the place of rain. When showers fall copiously during the time that wheat and corn are growing, they afford a much better yield, notwithstanding abundant irrigation. I was at a loss to account for this, until I examined an excellent treatise on agricultural chemistry, in which I found that the food of plants derived from the atmosphere is, perhaps, greater than that derived from the soil, and that the fall of rain is necessary to bring down those chemical ingredients that enter so largely into the composition of vegetation, both by the root and the foliage. The last four years, I am informed by the citizens, have been excessively dry during the farming season. The close of the present season, about the time corn was filling, was more favorable; we had an abundance of rain; corn-crops were fine. I must further premise that my experience in this country is quite limited, having spent but one entire year here, and that I labor under many inconveniences, such as the want of implements of husbandry, and a variety of seeds of approved classes. The corn of this country seems to be of a primitive character, and the ploughs equally so. My own actual operations have been confined to a garden and vineyard. I find that all vegetables adapted to the climate grow well; and have succeeded in saving a tolerable variety of seeds for the next year, which (being fresh) will be more likely to germinate than those procured from seed-stores in the States, as they generally send us those the sprouting of which has been for some years barred by the statute of limitations; hence I promise you for the next year a more satisfactory account. Again, lands here are not measured with even an attempt at accuracy. They sometimes buy and sell merely the privilege of the water for a certain number of hours in the day, or days in the week, as the case may be, without much regard to the quality of the land. When they measure at all, it is done merely by a certain number of *varas* fronting the *acequia* (or ditch) for watering, and may run back *ad infinitum;* hence I can give no data better than guesswork, for the present, as to the yield per acre. Agriculture here is confined to wheat, corn, beans, some inferior classes of peas, pepper, onions, and grapes. There is nothing raised for export.

I will now cease rambling over this subject, and answer such questions contained in the Circular as may have any application to this country, further apprizing you that my farm lands, this year, have been rented and cultivated after the manner of the country.

Wheat.—Guano is not used here at all. The only means used for fertilizing is that of irrigation, and answers a valuable purpose. I do not know whether or not gypsum would be beneficial to this soil. If it would, and I so find it in experiments that I intend to make, it will well nigh supersede the use of all other means of fertilization, except irrigation, as there is, quite convenient, an inexhaustible abundance, the use of which is unknown. I am, however, of opinion, that decayed vegetable mould is more wanting than anything else. Crops are always gathered very clean, and the land pastured until it is bare, and never fallowed. But the greatest difficulty we have to contend with is what is here called the *salita*, which seems to be a compound of earthy salts. If some practicable means of destroying or neutralizing these salts could be devised, thousands of acres of land would be reclaimed and brought into cultivation. The average product per acre I cannot give, as lands are not measured by the acre; but wheat, taking the two extremes dependent on the manner of cultivation, will produce from thirty-six to fifty-fold. The time of sowing is February and March; and the time of harvesting, the latter part of July and first of August. There is no preparation of the seed more than threshing and cleaning in the wind. Our wheat is not mixed with cockle, cheat, rape, tares, or any other noxious weed bearing grain. They generally sow wheat here much thinner than in other parts of the State—I would say something less than a bushel to the acre. Many plough but once; others twice. The ordinary ploughing is a mere scratching of the surface with the rude plough of the country. The yield, I presume, has been stationary from the earliest settlement of the country. The rotation in crops is corn and wheat alternately. I have seen no Hessian fly or weevils in this country, and perhaps the fly might be gotten rid of in the States by the general introduction of seed from this country, as there is no fly here, and as the straw is much harder than any known in the States, being so brittle that we cannot bind our wheat with it. The average price of wheat is $4 per *fanega*, ($1\frac{1}{2}$ bushel.)

Corn.—I can give nothing definite as to the product per acre, but suppose it will range between 30 and 50 bushels. The cost of production I cannot give. Labor by the day can be had at 3 or 4 bits; by the month at from $4 to $20. There is but one system known to this country—that is by means of the rude plough alluded to, the hoe, and irrigation. With good turning-ploughs for the purpose of fallowing, common shovel-ploughs for stirring the earth, and cultivating harrows to place the surface in a condition for irrigation, the tillage of corn would be much improved. By fallowing after harvest, decomposed vegetable matter would be supplied, and the land would be left in a good condition for planting in the spring, without rebreaking. We would first water in the spring, then run deep furrows and plant, cultivate with shovel-ploughs until the corn is about half-leg high, harrow down the surface, and irrigate; and so on in rotation.

Oats, Barley, and Rye, are not cultivated here to any extent. *Peas and beans* are cultivated to a considerable extent; but of the yield per acre I am ignorant. Peas are not cultivated as a renovating crop.

Clover and Grasses.—There is no grass cultivated here. I am of opinion that Lucern and herdsgrass, or red-top, would be the best for this country for meadow.

Dairy Husbandry.—This is a term unknown among us. There is some cheese made from goat milk; butter, none. I have but few milch cows, and they yield but little milk, owing to the unnutritious character of the grass in the river bottom.

Neat Cattle.—The depredations of the surrounding Indians have nearly drained the country of all kinds of cattle, and stopped the rearing of others. If we had efficient protection from Indians, the rearing of cattle and animals of any graminivorous kind would cost comparatively nothing. This is really the natural resource of the country; and the salubrity of the atmosphere, with the rich pasturage that can be had at all seasons, if it were safe, renders this country capable of producing and sustaining animal life and health to an extent perhaps unknown to any other land. And a little aid from agriculture, and from the Patent Office, in the supply of suggestions in the Annual Reports, and choice seeds, which could be sent by mail or by the quartermaster's department, would soon make New Mexico the Goshen of North America. Native cattle stand the winters here much better than those brought in; and hence we should improve the native stock by introducing breeders for the purpose of crossing, not superseding. The mode of breaking oxen and horses, though different in detail, is the same in principle; that is, first to break the animal's spirit or neck. But with regard to oxen: The rope, or lariat, is thrown over the animal's head, horns, or neck. He is made fast, and then the yoke, with tugs of raw hide, is bound to the horns, the usual way of yoking; and then a log is connected with the yoke. The breakers, then, with goads, (poles some ten feet long,) commence torturing and goading the animals until they are run down and their spirits broken. This operation is accompanied by whoops and yells of a hideous character, resembling the wild Indian war-whoop, the barking of dogs, the shouting of women, and the bellowing of the tortured animals; every period being wound up by the household word *carajo*. I have never heard of a failure in breaking oxen in this country. Oxen are worth from $40 to $50 per yoke.

Horses and Mules.—The growing of these animals would be very profitable if we had protection against Indians. The expense of rearing a colt to three years old would be trifling. Brood mares and colts should be treated to good pasture without corn, and permitted to run loose. The Navajo horses are the best in the world, which I presume is the result of their fine pasturage, healthy and temperate climate, and the general treatment they receive, similar to that of the Arabs. The best method of gentling a horse is by means of kind treatment, with a sufficiency of force at all times to let him know you are master. The method used in this country is exclusively force. By this means an animal may be subdued, but he can never be made your friend. The Spanish bit and Spanish saddle are great improvements on the American patterns; and, with them, it is next to impossible for the horse or mule to throw his rider. For the harness, gentle means should be used, and great precaution that the animal receives no fright from his trappings, for it will last him through life; and wherever the same thing happens to him again, he will again be frightened; and if he succeeded in running away the first time, he will try it the second. A team once ran away with me, and forever afterwards one of the horses, notorious for his tricks, tried to do the same thing over when he passed that place; which is proof conclusive that he had memory. I once knew a dog that was caught, when young, in a steel-trap by the toe; and forever afterwards he would become furious when you would show him the steel-trap. Hence, animals can recollect and reward kindness as well as avenge their wrongs. One thing is certain, that no animal should ever be struck for any purpose other than to put it in motion; and then never forward of the shoulder. By a judicious, kind course of treatment, all domestic animals, of ordinary disposition, will soon become pets, and really conceive an affection for their masters, and will do anything for them that they can be made to understand as being their master's desire. We should, at all events, recollect that animals were given to us through kindness, and we should cause them no more pain than is absolutely necessary. The suffering of domestic animals in the California emigration has been immense, and has created a moral accountability that the gold recovered will never answer.

Sheep and Wool.—Wool-growing is not regarded as profitable here; but a small proportion of sheep are ever shorn of their fleeces, for these reasons: the wool is very coarse; the domestic consumption does not bear the proportion of one-tenth to the amount produced; and the high cost of transportation does not seem to justify the exportation; at least people act as though they thought so. Wool-growing, then, may be said to cost nothing here but the shearing, as the sheep are raised for food, and the wool follows as a matter of course. The price of wool here is from three to five cents per pound. Transportation, as back freight, might be had perhaps at five cents—making ten cents. I suppose it might be sold in the States for twenty cents—making a profit over all cost of 100 per cent. Then, if this be correct, wool-growing would be profitable here. There is no doubt but that the climate, soil, pasturage, and surface of the country are as well adapted to sheep and wool-growing as any on the globe; and by introducing choice breeds of sheep, wool might soon be made the staple of the country. I believe the calculation here is, that, counting all contingencies with good shepherds, (except Indian robberies,) the stock of sheep will double every year.

Hogs.—This animal is not raised here to any extent.

Cotton not cultivated.

Sugar-cane not cultivated.

Rice not cultivated.

Tobacco not cultivated.

Hemp not cultivated.

Root Crops.—Turnips, carrots, beets, &c., not known to the natives. But, from limited experiments, I am satisfied they will all grow well—better than ordinary.

Potatoes, (Irish and Sweet.)—The former cultivated to a limited extent, and in some parts, and in some seasons, produce well; but for the last two years there seem to have been failures throughout the Territory; which, I am inclined to think, is for the want of a renewal in the seed. The Irish potato grows in many places in its native wildness; but it is small. No doubt some excellent kinds could be produced by cultivation. The sweet potato is not raised here—for what cause I know not; it is said to grow finely at El Paso; but it is not cultivated there, because the people invariably rob the hills before the potatoes are matured. Whether any such reason originally discouraged the cultivation of that fine esculent in these parts, tradition does not say; but it is left as a case of "*quizas, quien sabe?*"

Fruit Culture.—There is, comparatively, but little fruit raised here. We have but one kind of apples—a small, white, sweet apple. There are peaches of an excellent quality; and these fruits might be raised with great success. The grape-vine is cultivated here to some extent, and a good quantity of wine made; but not enough to supply the demand, as they are constantly bringing wine from El Paso and the States. The climate, I apprehend, is unsurpassed for the cultivation of the vine. I have never heard of a failure in the crop. But the cultivation of the vine, as well as the making of wine, are in their primitive state.

Manures.—This is a thing but little thought of; and perhaps irrigation has rendered it, to a great extent, useless. Manures are very hard to make, in consequence of the aridity of the atmosphere, and it cannot be done successfully without pits.

Meteorology.—I have made no observations of this character, more than, in the spring there are terrible winds, and in the summer terrible hails, and during the winter, in the mountains, terrible snows; and, take it altogether, it is a terribly dry country.

I have, no doubt, wearied your Excellency, if you have read this all through; but that was not my object, I assure you: it was to call some attention from some quarter to the state of agriculture in this country; and for that purpose, I have endeavored to be somewhat explicit on all points having any application to this region; in order that it might be generally known how we live, and what we live upon. I am of opinion, however, if the government will either whip the Indians, or send us arms and ammunition, and a license permitting us to do it ourselves, that every other good thing of which the country is capable will follow. We are also laboring at present under that depression of morality and industry that a war always leaves in its wake; but we are gradually improving.

I am, with sentiments of high consideration, yours, &c.,

S. M. BAIRD.

Hon. J. S. Calhoun,
Governor of New Mexico.

Executive Department, Santa Fe, New Mexico,
January 30, 1852.

Sir: At my request my friend, General Manual Alvarez, prepared the accompanying letter in response to your "Agricultural Circular." General Alvarez is a native of Spain, and has been a resident of this Territory for nearly thirty years, and no one here or elsewhere has a higher repute for probity and general intelligence; and if any useful information can go from this Territory upon the subject on which he has written, I am inclined to the opinion you will find it in the letter which I now forward to you.

With great respect, your obedient servant,

J. S. CALHOUN.

Hon. Thomas Ewbank,
Commissioner of Patents.

Santa Fe, *October* 22, 1841.

Sir: In obedience to the note of your excellency, of the present month, relative to the answers that you desire me to give to the Agricultural Circular of the Commissioner of Patents of the United States, I subjoin, in conformity therewith, what I myself know respecting the same particulars, and the facts that I have been able to ascertain since the receipt of your said very valuable note.

With which I remain, most respectfully, your very obedient and sincere servant,

MAN'L ALVAREZ.

His Excellency J. S. Calhoun,
Governor of New Mexico.

Santa Fe, New Mexico,
October, 1851.

Sir: Before answering any of the questions contained in your Circular on Agriculture, I have thought proper to preface:

That New Mexico, being in one of the highest portions of North America, enjoys an atmosphere of which the air is sufficiently rarified to absorb quickly the humidity which is found on its surface; and that, owing to this circumstance, and to its soil being generally stony and sandy, the waters that flow from its mountains sink at a short distance from their entrance into the valleys and banks of the rivers.

That to these same causes is to be ascribed the fact that the grass which grows and is found during the whole year on its mountains and level plains (*and which is always in proportion to the quantity of snow which falls in winter and to the spring rains*) constantly seasons itself, and that it preserves from one season to another the nutritive substance which nourishes wild and domestic animals throughout the whole Territory all the year round.

That it is also owing to these circumstances that all plants cultivated by man in this Territory ought to be grown where running water reaches, as only irrigated land preserves its fertility.

To all this is ascribed the belief that New Mexico will never be an important country for the production of cereals for exportation, even supposing that easy and cheap means could be found for conveying them to foreign parts.

So also, it is believed, for the reasons already stated, that, as soon as some security can be given here to property and estates, these will increase in great number, and produce not only articles of sustenance for the country, but also for exportation, as some have always been, and increase their wealth by diminishing the expense of their maintenance in all seasons of the year.

Guano is not known in this country.

Wheat.—Wheat is sown during the month of April, and is harvested from the end of July to the end of August. One fanega (a hundred weight measure) is allotted to every acre, and this quantity of seed and land yields, one year with another, 20 fanegas.

No preparation is here made for sowing. The plough only penetrates from two-and-a-half to three inches. As the lands only yield when irrigated, this, often repeated, and performed frequently by careless persons, causes the soil to become impoverished and lessens the crops.

To sow wheat, the earth is first irrigated, after which, when it has taken root, it is again watered; this is further repeated in 15 days, and also as soon as it appears in flower. It is the custom here to sow wheat and corn alternately. These are the only important facts of what can be here called general crops. It is thought that irrigation in the autumn is one of the best remedies against most of the insects that injure cultivation; however, this is little practised.

The price of grain and flour this year (1851) has been higher than at any time these 30 years, in this part. In Santa Fé, wheat flour sold by the hundred weight for $12, and the fanega of corn the same. Previous to the arrival of General Kearney, the price of these articles had only varied from 3 to 6 per cent. the *fanega*.

It must be observed that wheat, whether measured by the *half fanega* or the *almud*, is in either case measured even; whereas, corn, in the same measures, is heaped up; and that the flour of both grains is always measured heaping.

The weight of an almud of wheat flour rarely exceeds 11 pounds, or at the rate of 132 pounds the fanega. Although in commerce the almud of wheat flour and of cornmeal is now received at the rate of 12 pounds, or 144 pounds the fanega, the fact is that wheat seldom weighs *more* than 132 pounds the fanega, and corn seldom *less* than 164 pounds. The fanega of wheat gives little more than 10 almuds of corn heaping, while that of corn gives sometimes 15, or about that.

Corn, or Maize.—Every almud of this seed is sown in the same space of ground that a fanega of sown wheat would require—say an acre; and this generally yields about 21 fanegas.

To sow maize, the soil is watered in the beginning of May; afterwards, it is stirred up when the plant has three or four ears; then it is watered towards the 20th of June, for turning it up with oxen; and is again watered when the sprigs begin to loosen the ear.

Maize is usually employed as flour for human food and as raw grain for animals. The manuring of land is not much practised; and, when it is, it is done with the droppings of goats, neat cattle, and horses, which are taken from the yards where they are enclosed at night. Always, or nearly always, the land is manured a short time before sowing in the spring; however, as manuring is little attended to here, no one can give, at present, the result of increased production from this cause.

Beans and Peas.—These two seeds are cultivated, to some extent, in some parts of the Territory, after a crop of maize or wheat, as much for a change of soil as because they are both articles of consumption for general use. It has not been observed that the soil thus varied deteriorates faster than with other seeds. These two seeds are sown and cultivated both in the same way; and, in former years, I have known two almuds of beans, (*frijoles*,) sown in about one-half an acre of good soil, to produce two and a half *fanegas* when gathered.

Barley.—This is treated here like wheat, and is cultivated in the same way; but oats and rye are scarcely known to us.

Grass.—The only grass known in this country is that which grows spontaneously, and which the poor are wont to bring down in carts from the mountains and marshes to sell to travellers, &c. Neat cattle, and horses that are kept in barns, are fed with wheat and corn-stalks.

Neat Cattle.—These are raised with no further expense than the wages of the herdsman who takes care of them, and his board. The pay of a herdsman is now $6 per month.

Farmers generally prefer the breed imported by the Spaniards, as more vigorous and better able to withstand the severities of the winter. Their price, after they become three years old, varies at the present time from $25 to $30.

The raising of cattle would be very profitable were it not for the continual robberies committed by the Indian hordes that infest the Territory.

Horses and Mules.—The only cost of rearing horses and mules is the services of a man to look after them in the fields where they run loose, once in a fortnight, or oftener, according to circumstances.

The raising of these animals would be very profitable were it not for their being so much exposed to be stolen by savages, as well as domestic enemies. The price of working creole mules varies now from $40 to $50.

Sheep.—The raising of sheep would be perhaps the most lucrative speculation in the country were it not for the danger of savage enemies; because, as I said above respecting other animals, they sustain themselves on what grows spontaneously from the soil.

This country enjoys a variety of temperature very convenient for summering and wintering them; and if the breed of merino sheep were introduced, it is thought that it would not only be preserved pure, but even improved, being productive for its wool, as well as for its meat, which is much esteemed where it is found. They should be managed as is done in Spain, where they are driven to pasture every spring and fall.

The net weight of the breed of sheep that we now have, when 12 or 15 months old, is about 30 pounds. The fleece is then estimated to weigh some 14 ounces. The sheep, at that age, are now valued at $2; and the wool, at the time of shearing, at 6 cents the pound.

Hogs.—The swine that are found here are not of the first quality, as they are a mixture of those possessed by creoles and of those brought from Missouri 12 years ago. From the month of April until towards the end of October they are kept enclosed and fed; after which they are turned loose, and live on what they find. When they are about a year old, they are fattened, which is done by giving them three fanegas of maize. They usually weigh 150 pounds, and upwards.

Cotton, Sugar-cane, Rice, and Hemp.—These are not cultivated in this country; nor is it thought that they would prove profitable, even if nature allowed it.

Tobacco.—A species of tobacco of an inferior quality is cultivated. Missouri tobacco seed has been sown here; but in a couple of years it becomes like the native seed of the soil. This is considered an unprofitable crop, and is little cultivated.

Carrots, Beets, &c.—These grow here very well, but their culture is so recent that it cannot yet be determined whether it would be profitable or not to grow them on a large scale.

Potatoes.—The so-called "Irish" potatoes were introduced by the undersigned several times during the last 15 years; but I only succeeded in acclimating one seed, presented to me by the late Governor Bent, which was grown on his place, on the Arkansas, about 10 years ago. The experience had of the culture of this plant is, so far, very slight. Some years it has succeeded as well as in the best climates in the world; and others, the seed that did not perish yielded but a very slight return. What is hitherto known here of this plant does not authorize our establishing any data concerning it. However, it is supposed that if the seed which is produced in the ball of the potato were planted several times, it would easily acclimate itself; and it is believed that planting it for many successive years from the eyes of the potato itself finally exhausts its fruitfulness. It is by no means considered impossible to acclimate this plant, since small wild potatoes are found in many parts of the surrounding mountain ranges; and it is believed that this is the true seed of the potato, although it requires two years to reach the state of perfection in which it is known in some parts of the world.

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Fruit Trees.—The fruits known in this country are the apple, pear, peach grafted on quince, apricot, grape, and plum. Of these, only the plum is indigenous to this climate; for although wild grapes are found, the shoots of the vine now cultivated were brought from Spain, the same as the seeds of other fruits. All these are of a small size and of an agreeable flavor; still the grape is, perhaps, the best of its class, and of better quality than any to be found on this continent, north of this latitude.

All these fruits have, as yet, been cultivated on so small a scale, and merely for consumption at dessert and between meals, that no estimate can be made of their profitableness. Still the culture of the vine is extending somewhat; wines and brandies, of good quality, are manufactured; and it is believed that the soil planted with vines yields as much or more profit than that sown with wheat or maize.

Manure.—The only manure known here consists of the droppings of domestic animals; and even that is little used.

Meteorology.—The thermometer varied this year from 10° to 88°. I have no monthly returns. Some years the cold and heat are nearly as extreme as in Russia and Africa. The spring rains come on in the months of April or May, and usually continue, twice or oftener, from 15 to 20 days. The autumn rains, as they are called, commence in July, and last, altogether, from 20 to 25 days.

Very respectfully,

MANUEL ALVAREZ.

Hon. Thomas Ewbank,
Commissioner of Patents.

UTAH.

Washington City, *January* 25, 1852.

Sir: Your Agricultural Circular, requesting information on the subject of the agricultural products of Utah, is before me. Utah is a new country, and hence has not had the advantage of a culture to which the old States have been subjected; but it is in the hands of industrious cultivators, who are reaping the fruit of their honest toil.

The valley of Great Salt Lake has come more immediately under my observation. The character of its best soil is, in one portion a vegetable loam, in another a marly loam, and a third a gravelly stratum, containing some silica. The latitude of Great Salt Lake city is 40° 45′ 44″ north. Its altitude is 4,300 feet. The climate is milder and drier in general than it is in the same parallel on the Atlantic coast. The temperature in the Salt Lake valley in the winter season is more uniform than that of the Atlantic States at the same season, the thermometer rarely descending to zero. There is but little rain, except on the mountains, between the 1st of May and the 1st of October; and hence the necessity of artificial irrigation in most places which are susceptible of it. Wheat, rye, barley, buckwheat, oats, and Indian corn are its chief agricultural products, and all the garden vegetables peculiar to the middle and western States of this Union are produced in great perfection. Cotton, sugar, and

rice are not susceptible of cultivation in the region described. Tobacco and sweet potatoes can be produced in limited quantities.

As to the necessities of a new settlement, so remote from market, and where everything produced isconsumed by new settlers and emigrants on their route to California and Oegon, I am unable to give your interrogatories any definite answer, as the statistical information is not before me; and not being a practical agriculturist, I must content myself with a brief, and very general and imperfect, statement touching the interrogatories referred to, without reference to their form or order.

Wheat.—The Taos, club-headed, and seven-headed wheat frequently yield from 60 to 70 bushels to the acre, but the average product is from 35 to 40 bushels per acre. The soil is first ploughed from 8 to 10 inches deep, and harrowed two or three times. Seeding, any time from September to the 1st of May. The quantity of seed used per acre varies from 3 pecks to a bushel and a half; and the harvest is from June until the month of September.

Maize, or Indian Corn, produces from 20 to 50 bushels to the acre. The best and usual system of culture, is ploughing, harrowing, and irrigating from 3 to 5 times.

Oats yield from 25 to 50 bushels per acre from 2 bushels of seed.

Barley.—Average yield about 35 bushels per acre.

Rye, Peas, and Beans are but little cultivated.

Grasses.—Of the several kinds, the best for hay are the Deseret clover and the muskeet grass. The average yield is about 2 tons per acre, and the price is usually about $10 per ton.

Turnips, Beets, &c.—The cultivation of these roots, as a field crop, is on the increase. The sugar beet is grown in great abundance. The average yield is from 200 to 300 bushels per acre.

Dairy.—The average yearly produce of butter and cheese per cow will not exceed 75 pounds. After June the grasses dry up, the cows become fat, and give but little milk. The average price of butter and cheese is 25 cents per pound. The value of good milch cows in spring and fall is from $25 to $30.

Horses.—The rearing of horses and mules is profitable.

Sheep and Wool.—Wool-growing is very profitable. Price per pound, from 50 to 75 cents. The price of sheep is from $3 to $5. Large breeds of sheep are more profitable, either for wool or mutton, than the small breeds. It costs no more to produce a pound of fine merino than of ordinary coarse wool.

Hogs.—There are but few raised, and the price of pork is consequently dear.

With great respect, your obedient servant,

JOHN M. BERNHISEL,
Delegate from Utah.

Hon. Thos. Ewbank.

VI.

AGRICULTURAL, COMMERCIAL, AND MANUFACTURING STATISTICS.

AGRICULTURAL PRODUCTIONS OF THE UNITED STATES, SEVENTH CENSUS, 1850.

States.	Acres of land improved.	Acres of land unimproved.	Cash value of farms.	Value of farming implements and machinery.	Horses.
Maine	2,039,596	2,515,797	$54,861,748	$2,284,554	41,721
New Hampshire	2,251,488	1,140,926	55,245,997	2,314,125	34,233
Vermont	2,591,379	1,525,368	59,727,731	2,790,237	61,057
Massachusetts	2,133,436	1,222,576	109,076,347	3,209,584	42,216
Rhode Island	356,487	197,451	17,070,802	497,201	6,168
Connecticut	1,768,178	615,701	72,726,422	1,892,541	26,879
New York	12,408,968	6,710,020	554,546,642	22,084,926	447,014
New Jersey	1,767,991	984,955	120,237,511	4,425,503	63,955
Pennsylvania	8,628,619	6,294,728	407,876,099	14,722,541	350,398
Delaware	580,862	375,282	18,880,031	510,279	13,852
Maryland	2,797,905	1,836,445	87,178,545	2,463,443	75,684
District of Columbia	16,267	11,187	1,730,460	40,220	824
Virginia	10,361,155	15,792,176	216,401,441	7,021,772	272,403
North Carolina	5,453,977	15,543,010	67,891,766	3,931,532	148,693
South Carolina	4,072,651	12,145,049	82,431,684	4,136,354	97,171
Georgia	6,378,479	16,442,900	95,753,445	5,894,150	151,331
Florida	349,049	1,246,240	6,323,109	658,795	10,848
Alabama	4,435,614	7,702,067	64,323,224	5,125,663	128,001
Mississippi	3,444,358	7,046,061	54,738,634	5,762,927	115,460
Louisiana	1,590,025	3,989,018	75,814,398	11,576,938	89,514
Texas	639,107	14,454,669	16,398,768	2,133,781	75,419
Arkansas	781,531	1,816,684	15,265,245	1,601,296	60,197
Tennessee	5,175,173	13,808,849	97,851,212	5,360,210	270,636
Kentucky	11,368,270	10,972,478	154,330,262	5,169,037	315,682
Ohio	9,851,493	8,146,000	358,758,603	12,750,585	463,397
Michigan	1,929,110	2,454,780	51,872,446	2,891,371	58,506
Indiana	5,046,543	7,746,879	136,385,173	6,704,444	314,299
Illinois	5,039,545	6,997,867	96,133,290	6,405,561	267,653
Missouri	2,924,991	6,767,937	63,057,482	3,965,945	223,593
Iowa	824,682	1,911,382	16,657,567	1,172,869	38,536
Wisconsin	1,045,499	1,931,159	28,528,563	1,641,568	30,179
California	62,324	3,831,571	3,874,041	103,483	21,719
TERRITORIES.					
Minnesota	5,035	23,346	161,948	15,981	860
Oregon	132,857	299,951	2,849,170	183,423	8,046
Utah	16,333	30,516	311,799	84,288	2,429
New Mexico	166,201	124,370	1,653,952	77,960	5,079
	118,435,176	184,596,025	3,266,925,537	151,605,147	4,325,652

Agricultural Productions of the United States—Continued.

STATES.	Asses and Mules.	Milch Cows.	Working Oxen.	Other Cattle.	Sheep.
Maine	55	133,556	83,893	125,890	451,577
New Hampshire	19	94,277	59,027	114,606	384,756
Vermont	218	146,146	48,497	154,025	919,992
Massachusetts	34	130,099	46,611	83,284	188,651
Rhode Island	1	28,698	8,189	9,375	44,296
Connecticut	49	85,461	46,988	80,226	174,181
New York	963	931,324	178,909	767,406	3,453,241
New Jersey	4,089	118,736	12,070	80,455	160,488
Pennsylvania	2,259	530,224	61,527	562,195	1,822,357
Delaware	791	19,248	9,797	24,166	27,503
Maryland	5,644	86,859	34,135	98,595	177,902
District of Columbia	57	813	104	123	150
Virginia	21,480	317,619	89,513	669,137	1,310,004
North Carolina	25,259	221,799	37,309	434,402	595,249
South Carolina	37,483	193,244	20,507	563,935	285,551
Georgia	57,379	324,223	73,286	690,019	560,435
Florida	5,002	72,876	5,794	182,415	23,311
Alabama	59,895	227,791	66,961	433,263	371,880
Mississippi	54,547	214,231	83,485	436,254	304,929
Louisiana	44,849	105,576	54,968	414,798	110,333
Texas	12,364	214,758	49,982	636,805	99,098
Arkansas	11,559	98,151	34,239	165,320	91,256
Tennessee	75,303	250,459	86,255	414,051	811,591
Kentucky	65,609	247,475	62,074	443,763	1,102,121
Ohio	3,423	544,499	65,381	749,067	3,942,929
Michigan	70	99,676	55,350	119,471	746,435
Indiana	6,599	284,554	40,221	389,891	1,122,493
Illinois	10,573	294,671	76,156	541,209	[illegible],043
Missouri	41,508	[illegible],563	111,[illegible]	44[illegible],[illegible]	[illegible],309
Iowa	754	45,704	[illegible]	[illegible]	1[illegible],960
Wisconsin	156	64,339	4[illegible],[illegible]01	76,[illegible]3	1[illegible],892
California	1,666	4,280	4,780	253,[illegible]	17,574
TERRITORIES.					
Minnesota	14	607	655	740	80
Oregon	420	9,427	8,114	24,188	15,382
Utah	325	4,861	5,266	2,489	3,262
New Mexico	8,654	10,635	12,257	10,085	377,271
	559,070	6,391,946	1,698,261	10,265,180	21,620,482

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Agricultural Productions of the United States—Continued.

States.	Swine.	Value of live stock.	Wheat, bushels of.	Rye, bushels of.	Indian corn, bushels of.
Maine	54,598	$9,705,726	296,259	102,916	1,750,056
New Hampshire	63,487	8,871,901	185,658	183,117	1,573,670
Vermont	66,278	12,640,248	525,925	176,207	2,032,016
Massachusetts	81,119	9,649,710	31,221	481,021	2,345,490
Rhode Island	19,509	1,532,637	49	26,409	539,201
Connecticut	76,472	7,467,490	41,762	600,893	1,935,043
New York	1,018,252	73,570,499	13,121,498	4,148,182	17,858,400
New Jersey	250,370	10,679,291	1,601,190	1,255,578	8,759,704
Pennsylvania	1,040,366	41,500,053	15,367,691	4,805,160	19,835,214
Delaware	56,261	1,849,281	482,511	8,066	3,145,533
Maryland	352,911	7,997,634	4,494,680	226,014	11,104,631
District of Columbia	1,635	71,643	17,370	5,509	65,230
Virginia	1,830,743	33,636,659	11,232,616	458,930	35,254,319
North Carolina	1,812,813	17,717,647	2,130,102	229,563	27,941,051
South Carolina	1,065,503	15,060,015	1,066,277	43,790	16,271,454
Georgia	2,168,617	25,728,416	1,088,534	53,750	30,080,099
Florida	209,453	2,880,058	1,027	1,152	1,996,809
Alabama	1,904,540	21,690,112	294,044	17,261	28,754,048
Mississippi	1,582,734	19,403,662	137,990	9,606	22,446,552
Louisiana	597,301	11,152,275	417	475	10,226,373
Texas	683,914	10,266,880	41,689	3,106	5,926,611
Arkansas	836,727	6,647,969	199,639	8,047	8,893,939
Tennessee	3,114,111	29,978,016	1,619,386	89,163	52,276,223
Kentucky	2,861,163	29,591,387	2,1[illegible]	415,073	58,675,291
Ohio	1,964,770	44,121,741	14,487,351	[illegible],718	59,078,695
Michigan	205,847	8,008,734	4,925,889	105,871	5,641,420
Indiana	2,263,776	22,478,555	6,214,458	78,792	52,964,363
Illinois	1,915,910	24,209,258	9,414,575	83,364	57,646,984
Missouri	1,692,043	19,776,851	2,9[illegible]	44,112	36,069,543
Iowa	323,247	3,689,275	1,530,581	19,916	8,656,799
Wisconsin	159,276	4,879,385	4,286,131	81,253	1,988,979
California	2,776	3,351,058	17,328	- -	12,236
TERRITORIES.					
Minnesota	734	92,859	1,401	125	16,725
Oregon	30,325	1,876,189	211,943	106	2,918
Utah	914	546,968	107,702	210	9,899
New Mexico	7,314	1,494,629	196,516	- -	365,411
	30,315,719	543,822,711	100,479,150	14,188,457	592,141,230

Agricultural Productions of the United States—Continued.

STATES.	Oats, bushels of.	Rice, pounds of.	Tobacco, pounds of.	Ginned cotton, bales, of 400 pounds each.	Wool, pounds of.
Maine	2,181,037	- -	- -	- -	1,364,034
New Hampshire	973,381	- -	50	- -	1,108,476
Vermont	2,307,714	- -	- -	- -	3,410,993
Massachusetts	1,165,106	- -	138,346	- -	585,136
Rhode Island	215,232	- -	- -	- -	129,692
Connecticut	1,255,738	- -	1,267,624	- -	497,454
New York	26,552,814	- -	83,189	- -	10,071,301
New Jersey	3,378,063	- -	310	- -	375,396
Pennsylvania	21,538,156	- -	912,651	- -	4,481,570
Delaware	604,518	-	- -	- -	57,768
Maryland	2,242,151	-	21,407,497	- -	480,226
District of Columbia	8,134	-	7,800	- -	525
Virginia	10,179,045	17,154	56,803,218	3,947	2,860,765
North Carolina	4,052,078	5,465,868	11,984,786	73,849	970,738
South Carolina	2,322,155	159,930,613	74,285	300,901	487,233
Georgia	3,820,044	38,950,691	423,924	499,091	990,019
Florida	66,586	1,075,090	998,614	45,131	23,247
Alabama	2,965,697	2,311,252	164,990	564,429	657,118
Mississippi	1,503,288	2,719,856	49,960	484,293	559,619
Louisiana	89,637	4,425,349	26,878	178,737	199,897
Texas	178,883	87,916	66,897	57,596	131,374
Arkansas	656,183	63,179	218,936	65,346	182,595
Tennessee	7,703,086	258,854	20,148,932	194,532	1,364,378
Kentucky	8,201,311	5,688	55,501,196	758	2,297,403
Ohio	13,472,742	- -	10,454,449	- -	10,196,371
Michigan	2,866,056	- -	1,245	- -	2,043,283
Indiana	5,655,014	- -	1,044,620	- -	2,610,287
Illinois	10,087,241	- -	841,394	14	2,150,113
Missouri	5,243,476	700	17,100,884	- -	1,615,860
Iowa	1,524,345	500	6,041	- -	373,898
Wisconsin	3,414,672	- -	1,268	- -	253,963
California	- -	- -	1,000	- -	5,520
TERRITORIES.					
Minnesota	30,582	- -	- -	- -	85
Oregon	65,146	- -	325	- -	29,686
Utah	10,900	- -	70	- -	9,222
New Mexico	5	- -	8,467	- -	32,901
	146,533,216	215,312,710	199,739,746	2,468,625	52,518,143

Agricultural Productions of the United States—Continued.

States.	Peas and beans, bushels of.	Irish potatoes, bushels of.	Sweet potatoes, bushels of.	Barley, bushels of.	Buckwheat, bushels of.
Maine	205,541	3,436,040	- -	151,731	104,523
New Hampshire	70,856	4,304,919	- -	70,256	65,265
Vermont	101,859	4,947,351	- -	42,157	208,699
Massachusetts	43,709	3,585,384	- -	112,385	106,095
Rhode Island	6,346	651,029	- -	18,875	1,245
Connecticut	19,090	2,689,725	80	19,099	229,297
New York	741,636	15,398,362	5,622	3,585,059	3,183,955
New Jersey	14,174	3,207,236	508,015	6,492	878,934
Pennsylvania	55,231	5,980,732	52,172	165,584	2,193,692
Delaware	4,120	240,542	65,443	56	8,615
Maryland	12,816	764,939	208,993	745	103,671
District of Columbia	7,754	28,292	3,497	75	378
Virginia	521,581	1,316,933	1,813,671	25,437	214,898
North Carolina	1,584,252	620,318	5,095,709	2,735	16,704
South Carolina	1,026,900	136,494	4,337,469	4,583	283
Georgia	1,142,011	227,379	6,986,428	11,501	250
Florida	135,359	7,828	757,226	- -	55
Alabama	892,701	246,201	5,475,204	3,958	348
Mississippi	1,072,757	261,482	4,741,795	229	1,121
Louisiana	161,732	95,632	1,428,453	- -	3
Texas	179,332	93,548	1,323,170	4,776	59
Arkansas	285,738	193,832	788,149	177	175
Tennessee	369,321	1,060,844	2,777,716	2,737	19,427
Kentucky	262,574	1,492,487	998,184	95,343	16,097
Ohio	60,168	5,057,769	187,991	354,358	638,064
Michigan	74,254	2,359,897	1,177	75,249	472,917
Indiana	35,773	2,083,337	201,711	45,483	149,740
Illinois	82,814	2,514,861	157,433	110,795	184,504
Missouri	45,974	934,627	332,120	9,631	23,590
Iowa	4,775	276,120	6,243	25,093	52,516
Wisconsin	20,657	1,402,077	879	209,602	79,876
California	2,292	9,292	1,000	9,712	
TERRITORIES.					
Minnesota	10,002	21,145	200	1,316	515
Oregon	6,566	91,326			
Utah	289	43,968	60	1,799	332
New Mexico	15,688	3	- -	5	100
	9,219,642	65,781,751	38,255,811	5,167,213	8,955,945

Agricultural Productions of the United States—Continued.

STATES.	Value of orchards, product in dollars.	Wine, gallons of.	Value of produce, market gardens.	Butter, pounds of.	Cheese, pounds of.
Maine	342,865	724	$122,387	9,243,811	2,434,454
New Hampshire	248,563	344	56,810	6,977,056	3,196,563
Vermont	315,045	659	18,853	11,871,451	8,729,834
Massachusetts	463,995	4,688	600,020	8,071,370	7,088,142
Rhode Island	63,994	1,013	98,298	995,670	316,508
Connecticut	175,118	4,269	196,874	6,498,119	5,363,277
New York	1,761,950	9,172	912,047	79,766,094	49,741,413
New Jersey	607,268	1,811	475,242	9,487,210	365,756
Pennsylvania	723,389	25,590	688,714	39,878,418	2,505,034
Delaware	46,574	145	12,714	1,055,308	3,187
Maryland	164,051	1,431	200,869	3,806,160	3,975
District of Columbia	14,843	863	67,222	14,872	1,500
Virginia	177,137	5,408	183,047	11,089,359	436,298
North Carolina	34,348	11,058	39,462	4,146,290	95,921
South Carolina	35,108	5,880	47,286	2,981,850	4,970
Georgia	92,776	796	75,500	4,640,559	46,976
Florida	1,280	10	8,721	371,498	18,015
Alabama	15,408	220	84,821	4,008,811	31,412
Mississippi	50,405	407	46,250	4,346,234	21,191
Louisiana	22,359	15	148,329	683,069	1,957
Texas	12,605	99	12,254	2,326,556	91,619
Arkansas	40,141	35	17,150	1,854,239	30,088
Tennessee	52,894	93	97,183	8,139,585	177,681
Kentucky	106,160	8,093	293,120	9,877,868	213,954
Ohio	695,921	48,207	214,204	34,449,379	20,819,542
Michigan	132,650	1,654	14,738	7,065,878	1,011,492
Indiana	324,940	14,055	72,864	12,881,539	624,564
Illinois	446,089	2,997	127,494	12,526,543	1,278,225
Missouri	512,527	10,563	99,454	7,792,499	202,122
Iowa	8,434	420	8,848	2,171,188	209,840
Wisconsin	4,823	113	32,142	3,633,750	400,283
California	17,700	58,055	75,275	705	150
TERRITORIES.					
Minnesota	- -	- -	150	1,100	
Oregon	1,271	- -	90,241	211,461	36,980
Utah	- -	- -	23,868	83,309	30,988
New Mexico	8,231	2,663	6,679	111	5,848
	7,720,862	221,249	5,270,130	312,948,915	105,539,599

Agricultural Productions of the United States—Continued

States.	Hay, tons of.	Clover seed, bushels of.	Other grass seeds, bushels of.	Hops, pounds of.	Hemp rotted by dew.
Maine	755,889	9,097	9,214	40,120	
New Hampshire	598,854	829	8,071	257,174	
Vermont	866,989	760	14,996	258,513	
Massachusetts	651,807	1,002	5,085	121,595	
Rhode Island	74,818	1,328	3,708	227	
Connecticut	516,131	13,841	16,608	554	
New York	3,728,797	88,222	96,473	2,536,299	1
New Jersey	435,950	28,280	63,051	2,133	
Pennsylvania	1,842,970	125,030	53,913	22,088	282
Delaware	30,159	2,525	1,403	348	
Maryland	157,956	15,217	2,561	1,870	63
District of Columbia	2,279	3	- -	15	
Virginia	369,098	29,727	23,428	11,506	90
North Carolina	145,662	576	1,275	9,246	
South Carolina	20,925	376	30	26	
Georgia	23,449	132	428	261	
Florida	2,510	- -	2	14	
Alabama	32,685	138	547	276	
Mississippi	12,505	84	533	473	7
Louisiana	25,752	2	97	125	
Texas	8,279	10	- -	7	
Arkansas	3,977	90	436	157	
Tennessee	74,092	5,096	9,118	1,032	3,913
Kentucky	113,655	3,230	21,451	5,304	40,936
Ohio	443,142	102,107	37,310	63,731	140
Michigan	404,934	16,989	9,785	10,663	166
Indiana	403,230	18,321	11,951	92,796	341
Illinois	601,952	3,427	14,380	3,551	142
Missouri	116,743	615	4,337	3,130	17,207
Iowa	89,055	342	2,096	8,242	
Wisconsin	275,662	483	342	15,930	300
California	2,038	- -	483		
TERRITORIES.					
Minnesota	2,019				
Oregon	373	4	22	8	
Utah	4,805	2	- -	50	
New Mexico					
	12,839,141	467,983	413,154	3,467,514	63,588

Agricultural Productions of the United States—Continued.

States.	Hemp rotted by water, tons of.	Flax, pounds of.	Flax-seed, bushels of.	Silk cocoons, pounds of.	Maple sugar, pounds of.
Maine	- -	17,081	580	252	93,540
New Hampshire	- -	7,652	189	4,191	1,294,863
Vermont	- -	20,752	939	268	5,980,955
Massachusetts	- -	1,162	72	7	795,525
Rhode Island	- -	85	- -	- -	28
Connecticut	- -	17,928	703	328	50,796
New York	3	940,577	57,963	1,774	10,357,484
New Jersey	- -	182,965	16,525	23	2,197
Pennsylvania	2,006	528,079	41,650	285	2,326,525
Delaware	570	11,050	858		
Maryland	- -	35,686	2,446	39	47,740
District of Columbia					
Virginia	51	999,450	52,318	517	1,227,665
North Carolina	3	593,796	38,196	229	27,932
South Carolina	- -	333	55	123	200
Georgia	73	5,387	622	813	50
Florida	- -	50	- -	6	
Alabama	70	3,841	67	167	643
Mississippi	- -	665	26	2	
Louisiana	- -	- -	- -	29	255
Texas	- -	1,048	26	22	
Arkansas	15	12,291	321	38	9,330
Tennessee	1,183	367,807	18,905	1,923	158,557
Kentucky	14,756	7,793,123	75,579	1,301	437,345
Ohio	50	446,937	118,880	1,552	4,588,209
Michigan	37	6,994	1,421	8	2,438,987
Indiana	1,071	584,469	36,888	387	2,921,642
Illinois	141	160,063	10,785	47	248.904
Missouri	5,351	520,008	13,641	186	178,750
Iowa	- -	62,553	1,959	246	78,407
Wisconsin	2	68,393	1,191	- -	610,976
California					
TERRITORIES.					
Minnesota	- -	- -	- -	- -	2,950
Oregon	- -	640			
Utah	- -	550	5		
New Mexico					
	25,380	13,391,415	562,810	14,763	33,980,457

Agricultural Productions of the United States—Continued.

States.	Cane, sugar, hhds., of 1,000 pounds.	Molasses, galls. of.	Beeswax and honey, pounds of.	Value of home-made manufactures.	Value of animals slaughtered.
Maine	- -	3,167	189,618	$513,599	$1,646,773
New Hampshire	- -	9,811	117,140	393,455	1,522,873
Vermont	- -	5,997	249,432	278,331	1,871,468
Massachusetts	- -	4,693	59,508	205,333	2,500,924
Rhode Island	- -	4	6,347	26,495	667,486
Connecticut	- -	665	93,304	192,252	2,202,266
New York	- -	56,529	1,756,190	1,280,333	13,573,983
New Jersey	- -	934	156,694	112,781	2,638,552
Pennsylvania	- -	50,652	838,509	749,132	8,219,848
Delaware	- -	50	41,248	38,121	373,655
Maryland	- -	1,430	74,802	111,821	1,954,800
District of Columbia	- -	- -	550	2,075	9,038
Virginia	- -	40,322	880,767	2,156,312	7,503,006
North Carolina	- -	704	512,289	2,086,522	5,767,866
South Carolina	671	15,904	216,281	909,525	1,302,637
Georgia	1,644	216,150	732,514	1,838,968	6,339,762
Florida	2,752	352,893	18,971	75,582	514,685
Alabama	8,242	83,428	897,021	1,934,120	4,823,485
Mississippi	388	18,318	397,460	1,164,020	3,636,582
Louisiana	226,001	10,931,177	96,701	139,232	1,458,990
Texas	7,351	441,638	380,532	255,719	1,106,032
Arkansas	- -	18	192,338	638,217	1,162,913
Tennessee	248	7,223	1,036,572	3,137,710	6,401,765
Kentucky	197	40,047	1,156,989	2,456,838	6,459,318
Ohio	--	308,308	804,275	1,712,196	7,439,243
Michigan	- -	19,823	359,232	340,947	1,328,327
Indiana	- -	180,325	935,329	1,631,039	6,567,935
Illinois	- -	8,354	869,444	1,155,902	4,972,286
Missouri	- -	5,636	1,327,812	1,663,016	3,349,517
Iowa	- -	3,162	321,711	221,292	821,164
Wisconsin	- -	9,874	131,005	43,621	920,178
California	- -	- -	- -	7,000	100,173
TERRITORIES.					
Minnesota	- -	- -	80	- -	2,840
Oregon	- -	24	- -	- -	164,530
Utah	- -	58	10	1,392	67,985
New Mexico	- -	4,236	2	6,033	82,125
	247,778	12,821,574	14,850,627	27,478,931	119,475,020

COMMERCE OF THE UNITED STATES.

[From the Courier and Enquirer.]

EXPORTS OF BREADSTUFFS AND PROVISIONS.

Table exhibiting the aggregate value of Breadstuffs and Provisions exported annually from 1821 *to* 1851, *inclusive.*

			Value.
Year ending	September 30,	1821	$12,341,901
Do	do	1822	13,886,855
Do	do	1823	13,767,847
Do	do	1824	15,059,484
Do	do	1825	11,634,449
Do	do	1826	11,302,496
Do	do	1827	11,685,556
Do	do	1828	11,461,144
Do	do	1829	13,131,858
Do	do	1830	12,075,430
Do	do	1831	17,538,227
Do	do	1832	12,424,703
Do	do	1833	14,209,128
Do	do	1834	11,524,024
Do	do	1835	12,009,399
Do	do	1836	10,614,130
Do	do	1837	9,688,359
Do	do	1838	9,636,650
Do	do	1839	14,147,779
Do	do	1840	19,067,535
Do	do	1841	17,196,102
Do	do	1842	16,902,876
9 months ending	June 30,	1843	11,204,123
Year ending	do	1844	17,970,135
Do	do	1845	16,143,421
Do	do	1846	16,143,421
Do	do	1847	27,701,121
Do	do	1848	68,701,921
Do	do	1849	37,472,751
Do	do	1850	38,155,507
Do	do	1851	26,051,373
Total			559,326,573

COTTON EXPORTS.

Statement showing amount, value, and average price per pound of Cotton exported from the United States, from 1821 *to* 1851, *inclusive.*

Years.	Sea Island, pounds.	Other, pounds.	Total, pounds.	Value, dollars.	Average price per lb., cents.
1821	11, 344, 066	113, 549, 339	124, 893, 405	20, 157, 480	16.2
1822	11, 250, 635	133, 424, 460	144, 675, 095	24, 035, 058	16.6
1823	12, 136, 688	161, 586, 582	173, 723, 270	20, 445, 520	11.8
1824	9, 525, 722	132, 843, 941	142, 369, 663	21, 947, 401	15.4
1825	9, 665, 278	166, 784, 629	176, 449, 907	36, 846, 649	20.9
1826	5, 972, 852	198, 562, 563	204, 535, 415	25, 025, 214	12.2
1827	15, 140, 798	279, 169, 317	294, 310, 115	29, 359, 545	10
1828	11, 288, 419	199, 302, 044	210, 590, 463	22, 487, 229	10.7
1829	12, 833, 307	252, 003, 879	264, 837, 186	26, 575, 311	10
1830	8, 147, 165	290, 311, 937	298, 459, 102	29, 674, 883	9.2
1831	8, 311, 762	268, 668, 022	216, 979, 784	25, 289, 492	9.1
1832	8, 743, 373	313, 471, 749	322, 215, 122	31, 724, 682	9.8
1833	11, 142, 987	313, 555, 617	324, 698, 604	36, 191, 105	11.1
1834	8, 085, 937	376, 631, 970	384, 717, 907	49, 448, 402	12.8
1835	7, 752, 736	379, 606, 256	387, 358, 992	64, 961, 302	16.8
1836	7, 849, 597	415, 781, 710	423, 631, 307	71, 284, 925	16.8
1837	5, 286, 971	438, 924, 566	444, 211, 537	63, 240, 102	14.2
1838	7, 286, 340	588, 665, 957	595, 952, 297	61, 556, 811	10.3
1839	5, 107, 404	408, 516, 808	413, 621, 312	61, 238, 982	14.8
1840	8, 779, 609	735, 161, 392	743, 941, 061	63, 870, 307	8.5
1841	6, 257, 424	523, 966, 676	530, 204, 100	54, 330, 341	10.2
1842	7, 254, 099	577, 462, 918	584, 711, 017	47, 593, 464	8.1

Cotton Exports—Continued.

Years.	Sea Island, pounds.	Other, pounds.	Total pounds.	Value, dollars.	Average price per lb., cents.
1843 - - - - - -	7,515,079	784,782,027	792,297,105	49,119,806	6.2
1844 - - - - - -	6,099,076	657,534,379	663,633,455	54,063,501	8.1
1845 - - - - - -	9,389,625	863,515,371	872,905,996	51,739,643	5.92
1846 - - - - - -	9,388,533	538,169,522	547,558,055	42,767,341	7.81
1847 - - - - - -	6,293,973	520,925,985	527,219,958	53,415,848	10.34
1848 - - - - - -	7,724,148	806,550,283	814,274,431	61,998,294	7.61
1849 - - - - - -	11,969,259	1,014,633,010	1,026,602,269	66,396,967	6.4
1850 - - - - - -	8,236,463	627,145,141	635,381,604	71,984,616	11.3
1851 - - - - - -	8,299,655	918,937,433	927,237,089	112,315,317	12.11

GOODS IMPORTED, RE-EXPORTED, AND CONSUMED.

Statement exhibiting the value of Foreign Merchandise imported, re-exported, and consumed annually, from 1821 *to* 1851, *inclusive; and also the estimated Population and Rate of Consumption per capita, during the same period.*

Years ending September 30.	Value of foreign merchandise.			Population.	Consumption per capita.
	Imported.	Re-exported.	Consumed and on hand.		
1821 - - - - - -	$65,585,724	$21,302,488	$41,283,236	9,960,974	4 14
1822 - - - - - -	83,241,511	22,286,202	60,955,309	10,283,757	5 92
1823 - - - - - -	77,579,267	27,543,622	50,035,649	10,606,540	4 71
1824 - - - - - -	80,549,007	25,337,157	55,211,850	10,929,323	5 05
1825 - - - - - -	96,340,075	32,590,643	63,649,432	11,252,106	5 66
1826 - - - - - -	84,974,477	24,539,612	60,434,612	11,574,889	5 22
1827 - - - - - -	79,484,068	23,403,136	56,080,932	11,857,672	4 71
1828 - - - - - -	88,509,824	21,595,017	66,914,807	12,220,455	5 47
1829 - - - - - -	74,492,227	16,657,478	57,834,049	12,543,238	4 61
1830 - - - - - -	70,876,920	14,387,479	56,489,441	12,866,020	4 39
1831 - - - - - -	103,191,124	20,033,526	83,157,598	13,286,364	6 25
1832 - - - - - -	101,029,266	24,036,473	76,989,793	13,706,707	5 61
1833 - - - - - -	108,118,311	19,822,735	88,295,576	14,127,050	6 25
1834 - - - - - -	126,521,332	23,312,811	103,208,521	14,547,393	7 09
1835 - - - - - -	149,895,742	20,504,495	129,391,247	14,967,736	8 64
1836 - - - - - -	189,980,035	21,746,360	168,233,675	15,388,079	10 93
1837 - - - - - -	140,989,217	21,854,963	119,914,255	15,808,422	7 58
1838 - - - - - -	113,117,284	12,452,795	101,264,609	16,228,766	6 23
1839 - - - - - -	162,092,132	17,494,525	144,597,607	16,649,108	8 68
1840 - - - - - -	107,151,619	18,190,312	38,951,287	17,069,453	5 21

Goods imported, &c.—Continued.

Years ending September 30.	Value of foreign merchandise.			Population.	Consumption per capita.
	Imported.	Re-exported.	Consumed and on hand.		
1841 - - - - - - -	$127,956,177	$15,499,081	$112,447,096	17,612,507	$6 38
1842 - - - - - - -	100,162,087	11,721,538	88,440,549	18,155,561	4 87
9 months to June 30, 1843 -	64,755,799	6,552,707	58,201,092	18,698,615	3 11
Year to June 30, 1844 - -	108,435,035	11,484,867	96,950,168	19,241,670	5 03
1845 - -	117,254,564	15,246,830	101,907,735	19,784,725	5 15
1846 - -	121,691,797	11,346,623	110,345,174	20,337,780	5 42
1847 - -	146,545,638	8,011,158	138,534,480	20,870,835	6 60
1848 - -	154,998,928	21,132,315	133,866,603	21,413,890	6 25
1849 - -	147,857,489	13,068,865	134,768,574	21,956,945	6 13
1850 - -	178,136,318	14,951,808	163,184,510	22,500,000	7 25
1851 - -	215,725,995	9,738,695	205,987,300	23,500,000	8 75

VALUE OF IMPORTS CONTINUED.

Statement exhibiting the total value of Imports and the Imports consumed in the United States, and Domestic Exports, exclusive of Specie, during each fiscal year from 1821 *to* 1851.

Year.	Total imports.	Imports consumed, exclusive of specie.	Domestic produce exported, exclusive of specie.
1821 - -	$62, 585, 724	$43, 696, 405	$43, 671, 894
1822 - -	83, 241, 541	68, 367, 425	49, 874, 979
1823 - -	77, 579, 267	51, 308, 936	47, 155, 408
1824 - -	80, 549, 007	53, 846, 567	50, 649, 500
1825 - -	96, 340, 075	66, 395, 722	66, 944, 745
1826 - -	84, 974, 477	57, 652, 577	52, 449, 855
1827 - -	79, 484, 068	54, 991, 108	57, 878, 117
1828 - -	88, 509, 824	66, 975, 472	49, 976, 632
1829 - -	74, 492, 527	54, 741, 571	55, 087, 307
1830 - -	70, 876, 920	49, 575, 099	58, 524, 878
1831 - -	103, 191, 124	82, 808, 110	59, 218, 583
1832 - -	101, 029, 266	75, 327, 688	61, 726, 529
1833 - -	108, 118, 311	83, 470, 067	69, 950, 856
1834 - -	126, 521, 332	86, 973, 147	80, 623, 662
1835 - -	149, 895, 742	122, 007, 974	100, 459, 481
1836 - -	189, 980, 035	158, 811, 392	106, 570, 942
1837 - -	140, 989, 217	113, 310, 571	94, 280, 895
1838 - -	113, 717, 404	86, 552, 598	95, 560, 880
1839 - -	162, 092, 132	145, 870, 816	101, 625, 533
1840 - -	107, 141, 519	86, 250, 335	111, 660, 569
1841 - -	127, 946, 177	114, 776, 309	103, 636, 236
1842 - -	110, 162, 087	87, 996, 318	91, 799, 242
1843* - -	64, 753, 789	37, 294, 128	77, 686, 354
1844 - -	108, 435, 045	97, 390, 548	99, 531, 774
1845 - -	117, 254, 564	105, 599, 541	98, 455, 330
1846 - -	121, 691, 797	110, 048, 859	101, 718, 042
1847 - -	146, 545, 638	116, 257, 595	150, 574, 844
1848 - -	154, 998, 928	140, 651, 902	130, 203, 703
1849 - -	147, 857, 439	132, 565, 108	131, 710, 084
1850 - -	178, 136, 318	164, 032, 033	134, 900, 233
1851 - -	215, 725, 995	201, 019, 390	178, 546, 555

*Nine months ending June 30.

FOREIGN AND DOMESTIC EXPORTS.

Statement exhibiting the value of the Foreign Exports, Total Exports, exclusive of Specie, and the Tonnage employed, during each fiscal year from 1821 *to* 1851.

Year.	Foreign Merchandise exported, exclusive of specie.	Total exports.	Tonnage.
1821 - -	$10,824,429	$64,974,382	1,298,958
1822 - -	11,504,270	72,160,281	1,324,699
1823 - -	21,172,436	74,699,030	1,336,566
1824 - -	18,322,605	75,986,657	1,389,168
1825 - -	23,793,588	99,535,388	1,423,112
1826 - -	20,440,934	77,595,322	1,534,191
1827 - -	16,431,830	82,324,827	1,620,608
1828 - -	14,044,608	72,264,686	1,741,392
1829 - -	12,347,344	72,358,671	1,260,798
1830 - -	13,145,857	73,849,508	1,191,776
1831 - -	13,077,069	81,310,583	1,267,847
1832 - -	19,794,074	87,176,934	1,439,450
1833 - -	17,577,876	90,140,433	1,606,151
1834 - -	21,636,553	104,336,673	1,758,907
1835 - -	14,756,321	121,693,577	1,824,940
1836 - -	17,767,762	128,663,040	1,882,103
1837 - -	17,162,232	117,419,376	1,896,686
1838 - -	9,417,690	108,486,616	1,995,640
1839 - -	10,626,140	121,028,415	2,096,380
1840 - -	12,008,371	132,085,946	2,180,764
1841 - -	8,181,235	121,851,803	2,130,744
1842 - -	8,078,753	104,691,534	1,092,391
1843* - -	5,339,335	84,346,480	2,158,603
1844 - -	6,214,058	111,200,046	2,280,095
1845 - -	7,584,781	114,646,606	2,417,002
1846 - -	8,865,206	113,488,516	2,562,085
1847 - -	6,166,754	158,648,622	3,839,046
1848 - -	7,986,802	154,932,131	3,154,042
1849 - -	8,641,091	145,755,820	3,334,015
1850 - -	9,475,493	151,898,720	3,535,450
1851 - -	9,738,695	217,517,130	

* Nine months ending June 30.

TRADE AND COMMERCE OF THE NEW YORK CANALS.

The *Albany Evening Journal* says: In accordance with our usual custom, soon after the close of canal navigation, we now present our readers with a pretty full account of the amount of property passing through this great artery for the three past seasons.

The canal closed several days earlier than was anticipated, and so suddenly that a large amount of property, consisting principally of flour, wheat, barley, and beef, destined for tide-water, was locked up in the canal between Schenectady and Little Falls; which, had it arrived here, would have materially altered our figures for this year.

Statement showing the total Quantity of each article which came to the Hudson river on all the canals during the years 1849, 1850, *and* 1851.

Articles.	1849.	1850.	1851.
THE FOREST.			
Fur and peltry.....pounds	554,531	656,000	484,160
Product of Wood.			
Boards and scantling ...feet	297,431,140	425,095,442	457,288,982
Shingles............1,000	51,258	1,868,083	57,706
Timber.........cubic feet	1,497,627	1,666,262	3,189,179
Staves.............pounds	154,159,359	202,224,000	157,251,190
Woods and cords	11,977	12,411	12,640
Ashes (pot and pearl).. bbls.	31,289	52,237	28,198
AGRICULTURE.			
Product of Animals.			
Pork..............barrels	73,885	46,618	45,013
Beef.............. do	105,492	97,259	77,798
Bacon............pounds	8,477,754	9,680,000	10,901,923
Cheese............ do	41,097,818	32,584,000	25,598,945
Butter............ do	20,880,409	17,102,000	9,564,268
Lard.............. do	9,083,062	8,278,000	10,814,940
Lard oil..........gallons	....	67,460	240,768
Wool.............pounds	12,731,402	11,988,000	10,517,408
Hides............ do	596,364	458,000	571,743
Tallow............ do	....	578,000	267,310
Vegetable Food.			
Flour.............barrels	3,263,067	3,256,077	3,358,465
Wheat............bushels	2,734,389	3,670,754	3,16[illegible]
Rye.............. do	332,942	472,305	[illegible]

Statement—Continued.

Articles.	1849.	1850.	1851.
Corn ....bushels	5,121,270	3,223,056	7,670,345
Cornmeal.. ....barrels	....	11,983	7,335
Barley ....bushels	1,400,194	1,744,867	1,881,101
Oats .... do	2,407,895	2,469,637	3,634,662
Bran and shipstuffs..pounds	2,022,031	402,464,000	45,476,249
Peas and beans.....bushels	160,234	79,515	129,502
Potatoes ....:	242,211	230,699	600,182
Dried fruit.........pounds	780,369	1,468,000	1,426,350
All other Agricultural Products.			
Cotton ....pounds	316,094	1,114,000	237,339
Unmanufact'd tobacco do	1,896,056	796,000	3,698,690
Hemp.............	....	66,000	1,161,040
Clover & grass seeds do	2,479,098	1,418,000	559,400
Flaxseed	1,081,684	1,146,000	156,500
Hops	1,877,805	860,000	550,886
MANUFACTURES.			
Domestic spirits.....gallons	2,107,595	1,517,095	2,810,498
Beer...............barrels	....	95	63
Linseed oil.........gallons	....	908	100
Oil, meal, and cake.. pounds	....	6,392,000	6,814,000
Starch	....	2,744,000	2,556,932
Leather	5,532,610	7,176,000	8,203,605
Furniture..................	1,116,300	1,102,000	1,056,719
Agricultural implements ...	....	16,000	316,840
Bar and pig lead..........	11,167	88,000	16,400
Pig iron..................	9,636,166	5,276,000	6,756,400
Castings..................	....	1,580,000	2,470,730
Machines and parts thereof.	....	280,000	153,310
Bloom and bar iron........	27,906,016	22,126,000	33,449,234
Iron ware.................	1,737,690	....	3,700
Domestic woollens	1,055,513	1,018,000	824,340
Domestic cottons..........	2,498,425	1,868,000	2,249,835
Domestic salt.............	283,333	3,164,000	12,962,156
Foreign salt..............	....	1,326,000	1,195,600
OTHER ARTICLES.			
Live cattle, hogs, and sheep ....pounds	....	1,578,000	869,250
Stone, lime, and clay. do.	51,323,818	87,916,000	104,167,630
Gypsum	2,551,600	6,950,000	9,660,400
Eggs......................	....	3,280,000	3,678,264

Statement—Continued.

Articles.	1849.	1850.	1851.
Mineral coal..............	25,169,239	32,146,000	40,622,220
Fish	....	458,000	277,515
Copper ore................	....	104,000	417,780
Flint enamelled ware......	....	2,000	....
Sandries..................	110,244,928	94,112,000	111,020,090

Statement showing the aggregate, in tons, under the divisions, as specified in the above table.

Articles.	1849.	1850.	1851.
The forest................	665,547	947,768	921,337
Agriculture...............	796,600	926,048	895,096
Manufactures..............	44,288	39,669	53,553
Merchandise...............	5,873	7,105	5,349
Other articles............	94,638	113,273	135,365
Total tons..............	1,579,936	2,033,863	2,010,700

Statement showing the estimated value of each article which came to the Hudson river, on all the canals, during the years 1849, 1850, 1851.

Articles.	1849.	1850.	1851.
THE FOREST.			
Fur and peltry............	$692,864	$818,845	$605,200
Product of Wood.			
Boards and scantling......	4,459,157	6,365,724	7,226,127
Shingles..................	153,774	202,668	205,399
Timber....................	119,598	440,490	667,465
Staves....................	693,701	908,612	745,482
Wood......................	56,892	60,743	58,855
Ashes, pot and pearl......	1,016,800	1,518,035	841,731

Statement—Continued.

Articles.	1849.	1850.	1851.
AGRICULTURE.			
Product of Animals.			
Pork	$758,421	$512,768	$693,940
Beef	1,244,360	863,789	661,300
Bacon	514,666	580,922	980,956
Cheese	2,736,211	1,955,122	1,663,606
Butter	2,928,832	2,391,863	1,338,997
Lard	635,814	620,868	973,340
Lard oil	....	42,506	168,537
Wool	4,072,358	4,372,578	4,101,416
Hides	59,637	54,891	68,432
Tallow	....	40,524	18,712
Vegetable Food.			
Flour	16,315,435	16,280,425	13,436,542
Wheat	2,993,160	3,937,763	3,051,110
Rye	187,545	315,928	198,099
Corn	2,970,482	2,000,890	4,447,682
Corn meal	....	35,940	20,172
Barley	868,115	1,417,827	1,484,541
Oats	868,084	1,014,678	1,363,352
Bran and ship-stuffs	242,755	927,853	366,691
Peas and beans	160,234	89,382	143,299
Potatoes	117,918	123,269	342,275
Dried fruit	78,007	132,019	114,108
All other Agricult'l Products.			
Cotton	29,240	153,239	25,530
Unmanufactured tobacco	237,007	159,005	813,712
Hemp	....	4,960	75,469
Clover and grass seed	148,746	92,106	41,817
Flaxseed	30,536	27,745	3,130
Hops	262,893	159,647	147,380
MANUFACTURES.			
Domestic spirits	526,938	394,301	632,489
Beer	....	475	315
Linseed oil	....	591	66
Oil meal and cake	....	79,859	86,156
Starch	....	144,054	135,734
Leather	885,060	1,148,068	1,230,572
Furniture	111,631	110,180	105,672

Statement—Continued.

Articles.	1849.	1850.	1851.
Agricultural implements	....	$777	$15,840
Bar and pig lead	$503	4,300	820
Pig iron	96,362	52,769	67,563
Castings	....	47,428	74,350
Machines and parts	....	27,895	15,331
Bloom and bar iron	558,120	442,508	668,985
Iron ware	52,131	....	111
Domestic woollens	895,991	891,204	725,419
Domestic cottons	698,816	558,532	539,312
Domestic salt	73,666	52,612	56,975
Foreign salt	....	5,311	1,196
OTHER ARTICLES.			
Live cattle, hogs, sheep	....	47,349	26,100
Stone, lime, and clay	74,060	118,482	130,882
Gypsum	5,742	14,949	19,339
Eggs	....	197,544	220,945
Mineral coal	56,633	90,951	102,282
Fish	....	14,319	12,547
Copper ore	....	15,747	62,667
Flint enamelled ware	....	240	....
Sundries	2,183,548	1,828,914	2,205,495

Statement showing the aggregate value of the property which came to the Hudson river, on all the canals, during the years 1849, 1850, 1851, *under the divisions, as specified in the above table.*

Articles.	1849.	1850.	1851.
The forest	$7,192,796	$10,315,117	$10,380,259
Agriculture	38,455,456	38,311,546	36,520,296
Manufactures	3,899,238	3,960,864	4,355,907
Merchandise	508,048	563,615	406,711
Other articles	2,319,983	2,323,495	2,789,257
	52,375,521	55,474,637	54,452,430

BUSINESS OF RAILROADS.

Michigan Central Railroad.

The report of the Michigan Central Railroad for the six months ending 30th November, 1851, shows the following table of receipts and expenditures, as well as the present financial condition of the company:

Date.		Receipts.	Expenditures.
June 1..	Balance on hand.............	$76,312 83	
June 30..	For the month..............	101,678 81	$30,912 81
July 31..	Do....do................	82,257 00	29,343 98
Aug. 31..	Do....do................	97,877 75	29,839 09
Sep. 30..	Do....do................	123,199 78	35,753 75
Oct. 31..	Do....do................	197,743 07	32,185 11
Nov. 31..	Do....do................	101,324 47	29,232 85
	Interest and miscellaneous.....	....	131,760 85
	Balance to new account.......	....	461,364 80
	Total......................	780,393,28	780,393 28

This table shows that the gross receipts for the six months were $703,080 45, and the running expenses $187,267 59—leaving a balance of $516,812 86; from which deduct the interest and miscellaneous expenses, and the net income of the company is $385,051 97, against $288,569 65, in the corresponding six months in 1850—being an increase this year of $96,482 32. This gain is entirely in the passenger and miscellaneous receipts—there being a diminution of $9,208 21 in the freight receipts, which is attributed to the low price of breadstuffs; the Western owners of which have preferred holding to forwarding this year. The company, therefore, anticipate a large freight business next year, as the crop of 1851 is the largest ever raised in Michigan and the States of the vicinity.

The assets and liabilities of the company on the 1st December were:

LIABILITIES.

Capital - - - - - - - - - -	$2,886,700 00
Eight per cent. loan convertible - - - - - -	2,459,500 00
Do. do. inconvertible - - - - - -	1,149,950 00
Seven per cent. do. do. - - - - - -	171,809 00
Bills payable - - - - - - - -	260,412 57
Due local treasurer - - - - - - -	1,375 43
Income balance - - - - - - - -	461,364 80
	7,391,102 80

ASSETS.

Purchase road - - - - - - - -	$2,000,000 00
Expenditure since - - - - - - -	5,242,546 59
Superintendent's hands - - - - - -	50,819 47
New Albany and Salem road - - - - -	32,010 00
Cash - - - - - - - - - -	64,72[illegible] 74
	7,391,102 80

As has been previously mentioned, a dividend of 14 per cent. (four in cash and ten in stock) has been made from the income balance. This dividend amounts to $404,138; leaving a standing balance to the credit of the income account of $57,226 80. This large reserve has been deemed expedient on account of the late disaster to the Mayflower.

The road is rapidly approaching Chicago, and will be completed to that city early in the coming season. Cars are now running 30 miles west of Michigan city.

New York and Erie Railroad.

The receipts of this road for the month of December, 1851, were as follow:

From passengers and mail - - - - - - -	$90,830 87
From freight - - - - - - - - - -	205,449 13
Total - - - - - - - - -	296,280 00
Same month, 1850 - - - - - - - -	149,985 15
Increase - - - - - - - - - - -	146,294 85

The following are the gross receipts of this road for each month of the past year:

January - - - - - - - -	$144,909 30
February - - - - - - -	125,105 20
March - - - - - - - -	163,400 99
April - - - - - - - -	189,149 51
May - - - - - - - -	174,345 12
June - - - - - - - -	224,722 44
July - - - - - - - -	228,469 33
August - - - - - - - -	263,964 13
September - - - - - - -	306,888 96
October - - - - - - - -	356,553 21
November - - - - - - -	299,420 40
December - - - - - - -	296,280 00
Total - - - -	2,773,19[illegible]

New York and Harlem Railroad.

The receipts of this road for the month of December, 1850 and 1851, were as follow:

December, 1851	$49,151 60
December, 1850	40,770 92
Increase	8,380 68

The opening of the road to Chatham will give it a much more extended area of traffic; and its extension to Troy will give it a connexion with the northern web of roads, which must prove of great value.

Northern Railroad.

The earnings of this road for the month of December were as follow:

December, 1851	$29,000 00
Earnings in December, 1850	17,000 00
Increase this year	12,000 00

Hudson River Railroad.

The earnings of this road for the month of December were - $112,000

COMMERCE OF NEW YORK.

EXPORTS FROM NEW YORK FOR 1851.

We have compiled from our record, corrected weekly from official entries at the custom-house, says the *Journal of Commerce*, the following statement of the quantity of some of the principal articles of produce exported from New York to foreign ports for the year 1851:

Ashes, pots	barrels	24,628
pearls	-	1,637
Beeswax	barrels	280,820
Wheat flour	do.	1,264,322
Rye flour	-	8,244
Corn meal	-	38,388
Wheat	bushels	1,468,465
Rye	-	13,162
Oats	-	5,282
Corn	-	1,605,674
Mould candles	boxes	37,932
Sperm candles	-	4,173
Coal	tons	11,298
Cotton	bales	280,645
Hay	-	6,775
Hops	-	302
Naval stores	barrels	192,240
Whale oil	gallons	1,122,818
Sperm oil	-	543,555
Lard oil	-	210,402
Linseed oil	-	7,972
Pork	barrels	47,482
Beef	-	40,147
Cut meats	pounds	3,427,104
Butter	-	2,196,538
Cheese	-	7,487,139
Lard	-	5,686,857
Rice	tierces	29,100
Tallow	pounds	2,221,258
Tobacco, crude	pkgs	19,195
manufactured	pounds	3,798,354
Whalebone	-	1,802,526

We also annex a comparison of the exports of a few articles for the past two years:

		1850.	1851.
Ashes, pots	barrels	20,522	24,628
pearls	-	4,619	1,637
Wheat flour	-	1,057,728	1,264,322
Wheat	bushels	690,856	1,468,465
Corn	-	2,471,871	1,605,674
Beef	barrels	47,413	40,147
Pork	-	71,107	47,482
Lard	pounds	6,476,743	5,686,857
Cotton	bales	304,861	289,645

NEW YORK CATTLE TRADE FOR 1851.

We present below, says the *Courier and Enquirer*, our regular annual statement of cattle at this market, by far the most important mart of the kind in this country.

It is proper to state here that it is difficult to ascertain, with precision, the exact amount of cattle sold yearly at the various drove-yards within the limits of the city, but it is believed that the figures, in the main, are essentially correct.

The largest number of beeves are sold at Washington Drove Yard, 44th street and 4th avenue; and next to that, Chamberlain's, down town. "Bull's Head," in Robinson street, does the most extensive business. Independently of these, however, there are large numbers of cattle disposed of elsewhere, throughout the city and at the boats, which are never taken into account. There are also many beeves slaughtered up the North river and brought down dressed to our city markets. A careful estimate, with the data before us, would put down the aggregate number of beef cattle annually consumed in this city at about 120,000 head.

The principal market for the sale of cows and calves, and sheep and lambs, is at George Browning's "Bulls Head," in 6th street, near 3d avenue; and next to that in importance, at the Hudson river (Chamberlain's). Many small sales, however, are made at the wharves, as above, on the North-river side of the city. The market days now are Mondays and Thursdays. About 400 beef cattle, on an average, are driven to the city weekly from Philadelphia. There are also occasional shipments to Bermuda, to supply the British naval contract.

Stock offered monthly.

	Beeves.	Cows and calves.	Sheep and lambs.
January - - - -	6,550	341	26,250
February - - - -	6,600	260	25,550
March - - - -	5,875	485	21,350
April - - - -	5,800	410	10,000
May - - - -	6,850	570	15,100
June - - - -	6,500	600	19,000
July - - - -	7,300	530	18,000
August - - - -	11,000	515	30,650
September - - -	9,000	425	29,600
October - - - -	8,669	490	23,500
November - - -	8,050	375	25,600
December - - -	6,800	453	27,600
	88,994	5,466	264,200

Monthly Average of Prices.

	Beeves.	Cows and calves.	Sheep and lambs.
January - -	$5 50 a 8 00	$20 a 40 00	$2 00 a 5 00
February - -	6 00 a 8 50	22 a 42 00	2 00 a 5 00
March - -	6 00 a 8 50	25 a 40 00	2 25 a 6 50
April - -	6 00 a 9 00	20 a 41 50	3 00 a 7 00
May - -	7 00 a 9 00	20 a 42 00	2 25 a 4 25
June - -	6 00 a 8 00	20 a 45 00	1 64 a 4 00
July - -	6 00 a 8 00	20 a 44 00	1 75 a 4 25
August - -	6 00 a 7 25	20 a 43 00	1 50 a 4 50
September - -	6 00 a 7 50	20 a 40 00	1 59 a 4 00
October - -	6 25 a 7 50	24 a 42 50	1 75 a 5 00
November - -	6 00 a 8 00	20 a 48 00	1 30 a 4 0
December - -	8 00 a 8 25	22 a 35 50	1 50 a 7 0

Statement of Beef Cattle in the yards of the Washington Drove-yard for each month during the year 1850.

January - - - - - - -	7,242
February - - - - - - -	5,630
March - - - - - - -	4,760
April - - - - - - -	6,571
May - - - - - - -	6,689
June - - - - - - -	7,347
July - - - - - - -	7,130
August - - - - - - -	7,295
September - - - - - -	8,270
October - - - - - -	8,380
November - - - - - -	7,775
December - - - - - -	6,745
	83,835

The Washington Drove-yard commenced business on the 8th of May, 1848. The number of cattle offered from that time until

January 1, 1849, was - - - - - -	48,204
" 1850, " - - - - - -	78,200
" 1851, " - - - - - -	83,835
" 1852, " - - - - - -	88,934

From the above statement it will be seen that the cattle trade of this city is steadily and progressively increasing. An immense capital is involved in it, amounting to several millions of dollars annually.

ASHES.

Receipts, exports, stocks, and prices at New York, for fifteen years.

Years.	Receipts.	Exports.			Stock on hand Dec. 31.		Prices per 100 lbs.	
		Pot.	Pearl.	Total.	Pot.	Pearl.	Pot.	Pearl.
1837........bbls........	45,108	25,721	3,959	29,680	....	....	$6 75	$6 75
1838........do........	35,670	23,775	1,126	24,901	....	....	5 62½	6 37½
1839........do........	46,992	21,717	2,244	23,961	3,197	4,964	4 62½	5 12½
1840........do........	34,045	18,033	1,953	19,486	1,576	3,311	5 75	5 75
1841........do........	36,434	21,453	2,973	24,426	2,175	3,838	6 00	5 00
1842........do........	45,036	31,778	3,879	35,657	3,281	1,359	5 37½	6 00
1843........do........	79,000	43,041	2,584	45,625	6,617	7,677	4 62½	5 06¼
1844........do........	77,500	40,532	9,706	50,238	11,250	9,800	3 87½	4 25
1845........do........	69,000	46,724	9,567	56,291	12,295	7,127	3 81¼	4 25
1846........do........	46,500	29,914	4,909	34,823	3,495	2,349	5 12½	5 75
1847........do........	34,586	19,597	890	20,487	3,893	2,093	5 62½	7 50
1848........do........	37,200	18,637	1,576	20,213	2,247	1,489	6 00	6 25
1849........do........	45,786	25,242	3,236	28,478	3,605	5,163	6 56¼ to 6 62½	6 25 to 6 31¼
1850........do........	52,117	30,812	4,451	35,263	5,287	1,987	5 50 to 5 56¼	5 68¾ to 6 68¾
1851........do........	31,287	22,219	2,396	24,615	1,509	313	4 87½ to 5 00	5 68¾

Receipts of Canada ashes for four years.

	bbls.
1848..	6,879
1849..	7,676
1850..	12,369
1851..	956

HIDES.—*Import of Hides into the port of New York from 1st January to 31st December, 1851.*

From—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total number.	Casks and bales.
Africa............	3,250	....	11,821	9,747	9,600	6,116	2,706	7,786	11,636	....	2,244	10,409	75,315	....
Angostura........	28,299	....	8,667	30,961	....	14,279	34,338	36,475	30,372	27,163	26,680	20,313	257,547	....
Buenos Ayres......	31,538	55,091	51,161	13,175	22,745	32,014	24,834	19,380	12,523	36,714	36,208	26,621	362,004	....
Do....kips....	3,485	2,300	....	....	....	....	....	....	....	2,070	481	3,500	11,836	....
Do....salted...	1,783	5,161	1,584	1,977	3,101	4,947	7,295	4,460	2,511	300	7,110	7,510	47,759	....
Do....horse...	2,728	1,500	500	2,206	....	3,588	3,198	711	....	1,254	....	1,447	17,132	....
British provinces.....	....	....	....	....	....	....	21	....	....	....	....	....	21	....
Calcutta, &c........	594	....	344	....	....	....	2,423	....	700	....	600	....	4,738	706
California..........	....	....	....	....	....	1,658	....	....	....	....	....	1,133	2,791	....
Carthagena........	3,195	4,296	1,688	1,360	....	4,710	6,131	....	1,927	3,247	3,301	2,287	[illegible]	....
Central America.......	830	3,548	....	941	5,338	3,206	1,444	846	3,140	2,575	1,452	....	23,328	....
Cork............	....	....	....	....	....	....	....	....	....	....	....	....	....	99
Curacoa..........	6,075	11,076	9,006	10,056	13,117	4,468	7,095	....	2,016	3,846	....	347	67,109	....
Chili............	....	....	....	....	....	....	....	....	....	....	1,558	....	1,558	....
Honduras.........	....	....	5	....	....	....	....	....	....	117	....	....	122	....
Laguayra and Porto Cabello.........	3,926	....	8,071	....	5,413	6,578	1,872	275	886	4,132	....	3,583	34,736	....
Liverpool.........	....	400	690	....	525	....	....	280	200	....	162	....	2,257	272
London..........	....	....	150	....	....	....	....	....	....	....	....	....	150	196
Maracaibo.........	2,084	2,811	277	1,159	2,240	1,601	602	2,419	1,200	3,645	....	7,332	25,370	....
Maranham and Para..	6,172	52	....	....	2,200	....	....	....	4,400	....	....	....	12,824	....
Mexico.........	2,086	455	2,851	1,114	....	....	....	1,761	2,691	3,953	....	278	15,189	....
Rio Grande........	9,629	....	4,791	23,737	17,809	....	....	....	9,100	5,540	10,863	13,482	94,951	....
Do......salted......	....	....	....	1,246	....	....	....	....	1,144	3,146	....	....	5,536	....
Do......horse......	....	....	....	349	70	....	....	....	1,208	....	....	1,379	3,006	....
Rio Janerio.......	....	....	....	328	6,004	400	....	....	2,050	4,014	9,906	4,615	27,317	....
Smyrna..........	....	....	....	....	....	100	....	....	....	....	....	....	100	....
West Indies........	3,748	1,356	2,209	1,499	2,209	1,906	812	317	2,223	713	1,081	267	18,340	....
Coastwise, from neighboring cities........	3,945	....	....	....	....	241	233	2,169	10,152	4,518	3,380	1,022	25,660	....

Import of Hides into New York—Continued.

From—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total number.	Casks and bales.
Dealers, chiefly purchases made in neighboring cities	9,683	10,256	7,647	7,002	1,560	1,753	5,817	6,500	15,003	8,902	6,549	16,343	97,015	303
New Orleans	2,700	1,560	4,183	6,394	5,071	1,841	3,523	929	....	890	3,437	522	31,050	......
Southern States	1,447	3,584	4,438	3,295	2,846	706	241	269	183	980	1,232	2,655	21,876	22
Texas	1,922	1,201	2,416	2,290	5,744	1,817	4,262	1,774	35	1,097	....	1,382	23,946	......
Total in 1851	129,119	104,587	122,499	118,842	105,592	91,931	106,847	86,371	115,306	118,893	116,244	126,367	1,342,598	1,458
Total in 1850	104,280	157,358	56,037	88,558	147,446	147,684	134,786	104,236	168,147	90,490	122,562	113,535	1,435,119	636
Total in 1849	70,969	65,431	112,604	135,448	114,141	70,502	155,260	75,127	46,200	146,584	65,166	170,004	1,227,436	847

COMMERCE OF BOSTON.

[From the New York Shipping List.]

IMPORTS FOR THREE YEARS.

Coffee.

		1851.	1850.	1849.
From—				
Batavia	bags and piculs	61,014	49,774	45,094
Hayti	bags	71,969	59,433	55,823
Rio Janeiro	do	13,343	3,452	22,206
Porto Cabello	do	6,212	3,589	8,154
Manilla	do	1,676	943	4,018
Other foreign ports	do	5,359	6,392	7,853
Coastwise	do	2,795	2,298	2,466
Total bags		162,368	125,881	145,716

Fruit.

		1851.	1850.	1849.
Lemons	boxes	32,570	34,661	45,380
Oranges	do	108,877	65,043	77,500
Figs	drums	325,707	244,793	179,140
Figs	cases	2,114	1,523	906
Raisins	casks	28,374	20,678	13,743
Raisins	drums	5,518	4,883	5,180
Raisins	boxes	180,802	187,679	121,866

Goat Skins.

	Bales.	Number.
1851	6,768	73,116
1850	4,636	48,960
1849	5,751	33,265

Coal.

	Tons.	Chaldrons.
FOREIGN.		
From Great Britain - - - -	8,487	148
Provinces, &c - - - -	—	30,183
Total—1851 - - - - -	8,487	30,330
1850 - - - - -	6,251	32,486
1849 - - - - -	12,062	34,531
COASTWISE.	Tons.	Bushels.
From Philadelphia - - - -	294,667	
Alexandria - - - -	14,290	
Other places - - - -	52,116	
Virginia - - - - -	—	80,880
Total—1851 - - - - -	361,073	80,880
1850 - - - - -	289,571	92,375
1849 - - - - -	261,293	20,800

Fish.

		1851.	1850.
Salmon - - - -	tierces	1,965	1,237
Salmon - - - -	barrels	3,723	2,276
Salmon - - - -	boxes	2,228	300
Herring - - - -	barrels	6,311	7,[illegible]
Alewives - - - -	-	8,308	4,[illegible]
Shad - - - - -	-	127	83
Codfish - - - -	quintals	11,185	1,789
Codfish - - - -	casks	100	31
Codfish - - - -	drums	530	
Pollock - - - -	quintals	629	

		Mackerel.
From the Provinces—		
1851 - - - - - - -	barrels	43,[illegible]
1850 - - - - - - -	-	37,[illegible]
1849 - - - - - - -	-	41,[illegible]

Cocoa.

	Bags.
1851 - - - - - - -	4,131
1850 - - - - - - -	6,084
1849 - - - - - - -	6,036

Cotton.

	Bales.
From—	
New Orleans - - - - - -	102,449
Mobile - - - - - - -	34,030
Charleston - - - - - - -	18,491
Savannah - - - - - - -	20,413
Apalachicola - - - - - -	20,147
Galveston - - - - - - -	5,955
Other places - - - - - -	2,747
Total—1851 - - - - - -	204,232
1850 - - - - - -	195,076
1849 - - - - - -	270,693

Flour.

	Barrels.
From—	
New York - - - - - - -	84,450
Albany - - - - - - -	31,676
Western railroad - - - - - -	242,466
Northern railroad - - - - - -	41,159
Fitchburg railroad - - - - - -	118,159
Boston and Main railroad - - - - -	10,298
New Orleans - - - - - -	77,167
Fredericksburg - - - - - -	34,574
Georgetown - - - - - -	15,365
Alexandria - - - - - - -	7,518
Richmond - - - - - - -	43,968
Other ports in Virginia - - - - -	5,281
Philadelphia - - - - - -	22,391
Baltimore - - - - - - -	26,275
Other places - - - - - -	11,519
Total—1851 - - - - - -	773,512
1850 - - - - - -	761,148
1849 - - - - - -	1,026,309

Grain.

		1851.	1850.	1849.
Corn	bushels	2,175,367	2,116,744	2,789,318
Oats	-	496,911	339,301	449,324
Rye	-	22,833	50,965	40,478
Shorts	-	116,933	48,869	66,258
Wheat	-	405,044	531,047	510,671

Hemp.

	Tons.	Bales.
From New Orleans—1851	–	13,205
1850	–	7,152
1849	–	6,191
From Russia	642½	
Manilla	–	31,271
New Orleans	–	13,205
Other places	172	5,928
Total—1851	814½	50,404
1850	575	34,001
1849	1,419	37,658

Leather, (Sole.)

	Sides.	Bundles.
From—		
New York and Albany	191,502	207
Baltimore	22,294	16,402
Philadelphia	11,250	7,994
Maine	4,383	
Alexandria	–	326
Georgetown	–	271
New Orleans	212	3,849
Liverpool	–	71
London	–	113
Halifax	–	10
Sidney	200	
Western railroad	180,301	26,951
Fitchburg railroad	52,205	13,644
Northern railroad	12,759	4,494
Total—1851	476,036	74,962
1850	478,868	63,676
1849	339,142	41,425

Iron.

		From Russia.	From Sweden.	From Great Britain.	Coastwise.
Bars	No.	2,633	91,219	554,735	42,877
Bars	tons	100	1,260	845	599
Railroad	bars	–	–	16,522	104
Railroad	tons	–	–	2,607	320
Bundles	No.	17,550	11	166,380	25,811
Plates	-	–	–	24,232	9,644
Blooms	tons	–	–	118	122
Boiler	-	–	–	39	
Scrap	-	–	–	2,570	
Pig	-	–	–	17,164	12,887

The total receipts have been—

		1851.	1850.	1849.
Bars	No.	691,469	775,477	775,504
Bars	tons	2,804	2,144	4,039
Railroad	bars	16,626	22,607	78,509
Railroad	tons	2,927	6,360	17,125
Bundles	No.	209,652	141,104	183,974
Plates	-	33,876	19,938	13,479
Blooms	-	–	4,677	4,177
Blooms	tons	240	–	469
Boiler	-	39	50	
Scrap	-	2,570	1,380	2,371
Pig	-	30,051	23,065	34,265

Sugars.

		1851.	1850.
From—			
Foreign ports	boxes	82,906	82,221
Domestic ports	-	1,922	4,369
Foreign ports	hogsheads and casks	11,571	10,486
Domestic ports	-	2,096	5,311
Foreign ports	bags	88,126	52,674
Domestic ports	-	–	638
Foreign ports	barrels	1,223	[illegible]
Domestic ports	-	4,629	7,601

Molasses.

	Hogsheads.	Tierces.	Barrels.
Foreign - - -	55,147	4,226	1,262
Coastwise - - -	26,265	306	2,359
Total—1851 - - -	81,412	4,531	3,621
1850 - - -	73,316	3,800	5,998
1849 - - -	72,545	3,662	3,342

Seeds, (Linseed.)

	1851.	1850.	1849.
From—			
Calcutta - - bags	170,881	97,154	74,737
Russia - - -	603	1,607	6,005
Sicily - - - -	–	3,949	1,236
Other places - - -	500	17	371
Total - - -	171,984	102,727	82,349

Tobacco.

	Hogsheads.	Bales.	Boxes & kegs.
1851 - - - -	2,691	3,663	41,794
1850 - - - -	2,161	4,946	35,179
1849 - - - -	2,691	8,350	27,089

Wool.

	Bales.	Quintals.
DOMESTIC.		
1851 - - - - -	28,535	
1850 - - - - -	26,247	
1849 - - - - -	23,808	
FOREIGN.		
1851 - - - - -	26,656	17,856
1850 - - - - -	18,174	11,621
1849 - - - - -	14,815	6,000

Provisions.

	1851.	1850.
Beef - - - - barrels	32,365	38,042
Pork - - - - "	76,004	146,545
Hams - - - - casks	7,759	12,237
Hams - - - - barrels	3,559	4,841
Lard - - - - "	41,926	51,533
Lard - - - - kegs	21,013	60,915
Cheese - - - - boxes	88,292	88,574
Cheese - - - - casks	8,015	7,052
Cheese - - - - tons	730	749
Butter - - - - tubs	169,113	70,104
Butter - - - - barrels	546	778
Hogs - - - - No.	30,964	36,766

Saltpetre.

(Imported into the United States from Calcutta.)

	At Boston.	Other places.
1851 - - - - -	56,061	10,807
1850 - - - - -	76,839	11,357
1849 - - - - -	70,037	5,774

Lead.

	Pigs.
1851 - - - - - - -	249,088
1850 - - - - - - -	188,891
1849 - - - - - - -	180,365

COMMERCE OF PHILADELPHIA.

EXPORTS OF GRAIN.

We have prepared the following table, showing the exports of wheat and rye flour, cornmeal, wheat, and corn, from this port, annually, for the last twenty years:

Wheat Flour.

Years.	Barrels.	Years.	Barrels.
1831 - - -	259,785	1842 - - -	161,866
1832 - - -	151,917	1843 - - -	128,517
1833 - - -	132,622	1844 - - -	196,433
1834 - - -	87,905	1845 - - -	211,956
1835 - - -	96,098	1846 - - -	366,610
1836 - - -	67,113	1847 - - -	420,684
1837 - - -	33,680	1848 - - -	179,507
1838 - - -	69,622	1849 - - -	228,786
1839 - - -	191,380	1850 - - -	83,024
1840 - - -	284,774	1851 - - -	229,466
1841 - - -	195,555		

Rye Flour.

Years.	Barrels.	Years.	Barrels.
1831 - - -	8,433	1842 - - -	22,530
1832 - - -	13,040	1843 - - -	22,303
1833 - - -	27,939	1844 - - -	21,904
1834 - - -	23,795	1845 - - -	17,098
1835 - - -	21,038	1846 - - -	19,730
1836 - - -	27,429	1847 - - -	20,407
1837 - - -	17,276	1848 - - -	15,537
1838 - - -	14,211	1849 - - -	26,536
1839 - - -	24,527	1850 - - -	25,054
1840 - - -	36,471	1851 - - -	10,505
1841 - - -	26,866		

Cornmeal.

Years.	Barrels.	Years.	Barrels.
1831 - - -	45,432	1842 - - -	97,884
1832 - - -	50,323	1843 - - -	106,484
1833 - - -	51,903	1844 - - -	101,356
1834 - - -	50,018	1845 - - -	115,101
1835 - - -	50,869	1846 - - -	144,857
1836 - - -	42,798	1847 - - -	300,531
1837 - - -	63,803	1848 - - -	140,014
1838 - - -	64,002	1849 - - -	91,349
1839 - - -	73,800	1850 - - -	94,334
1840 - - -	89,486	1851 - - -	65,385
1841 - - -	108,822		

Wheat.

Years.	Bushels.	Years.	Bushels.
1831 - - -	61,282	1844 - - -	23,375
1832 - - -	2,258	1845 - - -	86,089
1835 - - -	2,903	1846 - - -	245,136
1839 - - -	37,831	1847 - - -	523,538
1840 - - -	280,047	1848 - - -	207,092
1841 - - -	56,571	1849 - - -	177,312
1842 - - -	87,953	1850 - - -	205,670
1843 - - -	32,235	1851 - - -	225,201

Corn.

Years.	Bushels.	Years.	Bushels.
1831 - - -	42,293	1842 - - -	83,772
1832 - - -	48,859	1843 - - -	74,613
1833 - - -	66,708	1844 - - -	110,068
1834 - - -	31,526	1845 - - -	129,256
1835 - - -	25,457	1846 - - -	279,820
1836 - - -	19,117	1847 - - -	1,102,210
1837 - - -	21,486	1848 - - -	817,150
1838 - - -	17,067	1849 - - -	906,823
1839 - - -	17,117	1850 - - -	602,680
1840 - - -	76,749	1851 - - -	554,545
1841 - - -	80,266		

THE SUPPLY OF CATTLE AT PHILADELPHIA FOR TEN YEARS.

Years.	Beeves.	Cows.	Swine.	Sheep.	Total.
1851 - - -	69,100	15,400	46,700	83,000	214,200
1850 - - -	68,750	15,120	46,900	82,500	313,270
1849 - - -	68,120	14,320	46,700	77,110	206,250
1848 - - -	67,211	14,108	47,690	76,820	205,829
1847 - - -	50,270	16,700	22,450	57,800	147,220
1846 - - -	47,500	14,480	18,670	55,810	136,460
1845 - - -	51,298	18,805	26,455	56,948	153,506
1844 - - -	45,732	18,519	25,420	51,056	143,727
1843 - - -	37,420	15,121	22,490	91,480	166,511
1842 - - -	34,293	13,270	21,265	89,559	158,385

VALUE OF IMPORTS AND DUTIES.

The following statement shows the value of the Imports annually into the port of Philadelphia, and the duties accruing to the United States from 1850 to 1851, inclusive: carefully prepared from official documents:

Year.	Value of imports.	Duties.
1830 - - - - - -	$9,525,893	$3,537,516 10
1831 - - - - - -	11,673,755	4,372,525 98
1832 - - - - - -	10,048,195	3,500,292 50
1833 - - - - - -	11,153,757	2,985,095 50
1834 - - - - - -	10,686,078	2,110,477 32
1835 - - - - - -	11,868,529	2,501,621 43
1836 - - - - - -	16,116,625	3,146,458 43
1837 - - - - - -	10,130,838	1,820,993 21
1838 - - - - - -	10,417,815	2,109,955 30
1839 - - - - - -	14,753,589	2,884,984 16
1840 - - - - - -	8,624,484	1,517,206 70
1841 - - - - - -	9,948,598	1,983,681 64
1842 - - - - - -	6,201,177	1,812,842 82
1843 - - - - - -	4,916,535	1,437,837 84
1844 - - - - - -	8,410,864	2,981,573 15
1845 - - - - - -	7,491,497	2,370,515 71
1846 - - - - - -	8,308,615	2,608,068 16
1847 - - - - - -	12,153,937	2,904,748 97
1848 - - - - - -	10,700,865	2,767,459 13
1849 - - - - - -	10,160,479	2,694,245 34
1850 - - - - - -	13,381,759	3,412,239 68
1851 [only three-quarters, to Oct. 1]	12,795,440	3,673,123 80

CASH DUTIES.

The following is an official statement of the amount of Cash Duties received at the custom-house at this port during the past three years:

Months.	1851.	1850.	1849.
January - -	$426,233 10	$503,829 45	$210,041 55
February - -	329,056 70	147,484 60	284,924 55
March - -	368,994 90	315,063 92	329,873 60
April - -	277,612 45	222,042 80	149,644 10
May - -	297,988 00	253,940 72	142,413 83
June - -	259,604 50	215,684 30	155,687 76
July - -	506,113 00	452,331 60	311,437 30
August - -	423,487 75	465,679 25	397,702 75
September -	244,698 65	222,214 49	274,197 95
October - -	228,152 60	255,432 30	169,976 95
November -	171,041 25	159,328 35	131 615 45
December -	157,449 45	148,080 40	140,140 90
Total -	2,714,965 24	3,361,112 18	3,673,123 80

Number and class of vessels which have arrived at Port Richmond in the years 1851–'50–'49–'48.

[From the Philadelphia Commercial List.]

Months.		Ships.	Barques.	Brigs.	Schrs.	Sloops.	Boats.	Barges.	Steam'rs.	Total.
1851.	January	......	....	......	122	....	......	....	....	122
	February	......	....	......	146	....	......	....	....	146
	March	......	1	4	436	....	......	55	....	496
	April	......	13	16	450	....	......	91	....	570
	May	......	15	19	467	18	......	92	....	611
	June	......	6	20	464	15	......	128	....	633
	July	......	7	37	605	13	......	221	....	883
	August	......	8	111	713	28	......	284	....	1,144
	September	2	17	92	376	29	......	347	....	863
	October	1	13	103	619	46	......	333	....	1,115
	November	......	5	52	529	40	......	372	....	998
	December	......	7	13	250	13	......	60	....	393
	Total	3	92	467	5,379	202	......	1,983	....	7,924
1850.	January	......	....	1	58	1	......	....	....	60
	February	......	....	2	142	8	......	....	....	152
	March	......	....	3	214	11	......	....	....	228
	April	......	....	12	327	15	......	....	....	354
	May	......	....	17	411	20	......	....	....	448
	June	......	2	21	387	26	......	....	....	436
	July	......	....	30	345	8	......	....	....	383
	August	......	1	46	426	7	......	....	....	480
	September	......	....	36	370	5	......	....	....	411
	October	......	....	33	560	14	......	....	1	608
	November	......	....	22	448	10	......	....	....	480
	December	......	....	5	289	17	......	....	....	311
	Total	......	3	228	3,977	142	......	....	1	4,351
1849.	January	1	....	11	63	....	2	....	....	77
	February	1	4	10	62	5	6	....	....	88
	March	......	3	22	255	39	135	....	....	454
	April	......	3	22	269	41	171	....	....	506
	May	1	2	40	419	61	258	....	....	781
	June	......	....	42	393	6	......	....	....	441
	July	......	1	33	305	7	......	....	....	346
	August	......	1	47	354	5	......	....	....	407
	September	......	3	51	376	17	......	....	....	447
	October	......	....	17	302	33	......	....	....	352
	November	......	1	23	348	40	......	....	....	412
	December	......	....	11	167	7	1	....	....	186
	Total	3	18	329	3,313	361	373	....	....	4,497
1848.	January	......	1	4	83	4	19	....	....	111
	February	......	1	11	98	19	29	....	....	158
	March	......	1	10	236	48	195	....	....	490
	April	......	1	31	458	57	606	....	....	1,153
	May	......	12	79	569	59	659	....	....	1,378
	June	......	8	93	632	39	628	....	....	1,400
	July	......	6	75	482	43	543	....	....	1,149
	August	......	8	71	500	33	565	....	....	1,177
	September	......	5	58	369	37	364	....	....	853
	October	......	4	41	354	49	576	....	....	1,024
	November	......	5	51	283	35	473	....	....	847
	December	......	....	19	116	25	93	....	....	253
	Total	......	51	532	4,191	448	4,750	....	....	9,993

COMMERCE OF CINCINNATI.

[From the Cincinnati Price Current.]

Imports into Cincinnati, commencing September 1, 1851, *and same time in* 1850.

Articles.		Past week.	Total.	Last year.
Apples, green	bbls	208	26,917	8,017
Beef	-	32	876	355
Do.	tcs	–	47	
Bagging	pcs	–	–	
Barley	bush	1,394	111,253	65,673
Beans	-	21	4,097	14,029
Butter	bbls	151	2,866	2,146
Do.	firkins and kegs	178	7,816	6,298
Blooms	tons	62	364	821
Bran, &c.	sks	616	54,001	21,306
Candles	bxs	–	70	117
Corn	bush	10,346	230,831	198,457
Cornmeal	-	126	1,933	1,303
Cider	bbls	4	813	606
Cheese	cks	6	27	4
Do.	bxs	5,037	165,009	109,789
Cotton	bales	8	2,388	1,210
Coffee	sacks	904	23,341	26,584
Codfish	drums	–	15	146
Cooperage	pcs	7,610	63,505	79,681
Eggs	bxs and bbls	5	412	235
Flour	bbls	4,177	151,954	173,736
Feathers	sks	97	2,080	824
Fish, sundry	bbls	18	1,958	486
Do.	kegs and kits	–	58	338
Fruit, dried	bush	122	7,033	4,495
Grease	bbls	–	182	132
Glass	bxs	974	20,767	19,547
Glass ware	pkgs	248	12,194	8,166
Hemp	bdls and bales	33	4,123	4,029
Hides, loose	-	569	6,964	6,760
Hides, green	lbs	–	51,620	20,434
Hay	bales	58	2,362	4,954
Herrings	bxs	–	2,343	1,471
Hogs	heads	10,762	77,817	46,102
Hops	bales	12	1,158	283
Iron and steel	pcs	3,073	47,605	55,171
Do.	bdls	1,308	13,474	29,547
Do.	tons	–	3,297	55
Lead	pigs	1,391	19,676	20,962
Lard	bbls	948	5,702	3,555
Do.	kegs	–	991	5,319
Leather	bdls	94	3,347	4,212

Imports into Cincinnati—Continued.

Articles.		Past week.	Total.	Last year.
Lemons	bxs	–	91	245
Lime	bbls	500	21,486	19,851
Liquors	hhds and pipes	3	267	664
March'dise and sundries	pkgs	3,060	38,500	69,226
Merchandise	tons	22	979	1,202
Molasses	bbls	520	6,317	7,432
Malt	bush	680	12,473	4,168
Nails	kegs	1,516	15,782	26,191
Oil	bbls	124	1,956	2,363
Oranges	bxs and bbls	38	135	351
Oakum	bales	–	416	225
Oats	bush	68	43,302	52,531
Oil cake	lbs	–	6,000	20,000
Pork and bacon	hhds	194	1,706	1,276
Do.	tcs	–	35	95
Do.	bbls	791	2,249	3,107
Do.	bulk	40,580	896,311	369,102
Potatoes	bbls	263	5,879	12,063
Pig metal	tons	311	3,925	4,459
Pimento and pepper	bags	15	173	880
Rye	bush	160	14,254	8,176
Rosin, tar, &c.	bbls	–	2,146	900
Raisins	bxs	874	8,191	8,752
Rope, twine, &c.	pkgs	–	189	487
Rice	tcs	60	97	176
Sugar	hhds	234	2,112	2,282
Do.	bbls	69	3,093	2,174
Do.	bxs	80	617	1,152
Seed, flax	bbls	64	17,013	10,797
Do. grass	-	274	1,493	512
Do. hemp	-	–	25	16
Salt	sks	717	1,822	19,093
Do.	bbls	1,210	17,192	47,285
Shot	kegs	–	651	471
Tea	pkgs	124	3,412	1,414
Tobacco	hhds	6	1,476	668
Do.	bls	5	423	744
Do.	bxs & kgs	216	8,329	3,977
Tallow	bbls	13	1,015	1,014
Wines	bbls & ½ cks	–	380	1,356
Do.	bkts & bxs	30	1,202	985
Wheat	bush	1,817	158,285	182,105
Wool	bales	2	452	481
Whiskey	bbls	2,640	72,656	58,712
Yarns, cotton	pkgs	150	1,237	1,990
Yarns	bales	–	22,356	29,777

Exports from Cincinnati, commencing September 1, 1851, *and same time in* 1850.

Articles.		Past week.	Total.	Last year.
Apples, green	bbls	26	5,725	4,159
Alcohol	-	24	1,992	1,262
Beef	-	44	7,721	8,308
Do.	tcs	–	2,133	6,930
Beans	bbls	–	946	692
Brooms	doz	75	1,331	2,872
Butter	bbls	124	565	930
Do.	firkins and kegs	232	8,633	13,633
Bran, &c.	sks	–	–	1,944
Bagging	pcs	100	3,653	3,909
Corn	sks	4,871	15,327	3,840
Cornmeal	bbls	2	162	95
Cheese	sks	–	8	10
Do.	bxs	2,058	54,121	45,417
Candles	-	2,794	26,872	25,214
Cattle	head	–	–	12
Cotton	bales	122	1,668	742
Coffee	sks	321	11,175	9,640
Cooperage	pcs	621	20,698	21,555
Eggs	bbls	48	683	484
Flour	bbls	4,333	77,530	134,891
Feathers	sks	26	2,218	884
Fruit, dried	bush	24	87	2,620
Grease	bbls	12	1,025	894
Grass seed	-	87	350	48
Horses	head	–	–	82
Hay	bales	–	54	32
Hemp	bales	12	433	450
Hides	lbs	–	19,924	
Do.	No	464	4,272	3,616
Iron	pcs	2,291	30,907	11,762
Do.	bdls	701	8,645	23,418
Do.	tons	10	2,450	1,846
Lard	bbls	147	7,927	4,412
Do	kegs	325	25,348	10,168
Lard oils	bbls	81	4,780	7,104
Linseed oil	-	57	1,761	2,335
Molasses	-	516	7,471	4,583
Oil cake	tons	–	377	361
Oats	sks	–	890	594
Potatoes, &c.	bbls	755	5,521	3,313
Pork and bacon	hhds	107	4,358	2,353
Do.	trcs	–	1,387	1,197
Do.	bbls	958	18,509	22,291

Exports from Cincinnati—Continued.

Articles.		Past week.	Total.	Last year.
Pork and bacon in bulk	lbs	32,790	614,785	94,419
Rope, twine, &c. -	pkgs	36	1,520	2,876
Soap - - -	bxs	202	8,016	5,261
Sheep - - -	head	–		
Sugar - - -	hhds	267	3,316	2,204
Salt - - -	bbls	148	10,397	14,216
Do. - - -	sks	349	6,235	2,846
Seed, flax - -	bbls	–	547	6
Sundry merchandise -	pkgs	3,140	82,032	199,981
Do. do. -	tons	–	2,240	4,063
Do. liquors - -	bbls	466	7,831	4,517
Do. manfactures -	pcs	–		9,405
Do. produce - -	pkgs	1,729	19,989	6,789
Starch - - -	bxs	16	4,252	3,314
Tallow - - - -		100	1,985	4,700
Tobacco -	kgs and bxs	139	6,814	4,671
Do. - - -	hhds	9	1,128	140
Do. - - -	bales	–	37	
Vinegar - - -	bbls	65	1,074	794
Whiskey - - - -		3,598	59,153	52,843
Wool - - -	bales	28	945	501
Do. - - -	lbs	–		
White lead - -	kgs	37	16,484	10,788
Castings - -	pcs	266	4,233	16,908
Do. - - -	tons	–	430	364
Pork - - -	bxs	100	160	754

COMMERCE OF MILAN, OHIO.

Imports in 1851.

Articles.		Quantity.	Value.
Merchandise - - -	pounds	2,677,095	$609,273
Dairy salt - - - -	sacks	1,755	219
Coarse do - - - -	barrels	5,407	5,745
Plaster - - - -	-	894	1,341
Whiskey - - - -	-	28	196
Fish - - - -	-	86	602
Water lime - - - -	-	403	806
Beer - - - -	-	86	516
Green apples - - - -	-	117	234
Barley - - - -	bushels	205	103
Coal - - - -	tons	305	1,220
Shingle wood - - -	cords	180	2,189
Shingles - - - -	number	979,750	2,469
Lumber - - - -	feet	531,961	5,320
Total value - - -			650,185

Exports in 1851.

Articles.		Quantity.	Value.
Wheat - - - -	bushels	258,778	$178,557
Corn - - - -	-	227,564	88,105
Oats - - - -	-	56,033	16,810
Pork - - - -	barrels	439	5,268
Beef - - - -	-	297	2,079
Dried fruit - - - -	-	43	276
Butter - - - -	-	4	60
Lard - - - -	-	3	80
High wines - - - -	-	1,402	10,164
Lumber - - - -	-	818,090	7,180
Eggs - - - -	barrels	66	317
Salt - - - -	-	21	43
Sweet potatoes - - - -	-	12	30
Flax-seed - - - -	-	19	100
Clover-seed - - - -	-	7	28
Flour - - - -	-	7,103	6,179
Sundries - - - -	-	28	180
Vinegar - - - -	-	6	30
Corn-meal - - - -	-	67	105
Oil-meal - - - -	-	20	50
Beer - - - -	-	15	90

Exports—Continued.

Articles.		Quantity.	Value.
Tallow		660	$9,900
Hickory-nuts		3	5
Ashes	casks	335	11,236
Butter	kegs	496	1,960
Lard		51	357
Sheep-pelts	barrels	78	1,250
Wool	pounds	265,162	1,950
Rags		28,070	561
Feathers		300	90
Hides	number	1,600	2,750
Leather	pounds	5,197	1,039
Grindstones		52,670	46
Merchandise		18,000	3,601
Furniture		26,160	2,316
Broom-corn		13,600	650
Shingle-wood		19	228
Shingles		270,000	675
Staves		1,456½	2,917
Total value			435,816

R. M. GORDON, *Collector*.

LAKE TRADE OF BUFFALO.

Lake Imports for the season of 1851.

Articles.		Quantity.
Flour	barrels	1,258,224
Pork	do	32,169
Beef	do	73,074
Ashes	do	13,509
Whiskey	do	66,524
Cornmeal	do	3,081
Seed	do	11,186
Eggs	do	11,396
Fish	do	7,875
Oil	do	6,093
Lead	pigs	28,713
Iron	tons	2,739
Coal	do	17,244
Hides	number	48,430
Horses	do	2,912
Cattle	do	8,211
Hogs	do	89,420
Sheep	do	14,120
Rags	bales	3,854
Paper	bundles	8,495
Feathers	sacks	3,935
Hair	bales	425
Wax	packages	314
Wheat	bushels	4,167,121
Corn	do	5,988,775
Oats	do	1,140,340
Barley	do	142,773
Rye	do	10,652
Butter	pounds	2,342,900
Cheese	do	4,907,800
Lard	do	4,798,500
Tallow	do	1,063,900
Bacon	do	7,951,300
Lumber	feet	68,006,000
Staves	number	10,519,000
Wool	bales	6,943
Pelts	do	4,644
Broom-corn	do	5,752
Hemp	do	3,023
Flax	do	558
Leather	rolls	8,186
Paint	barrels	5,464
Fire-brick	M	154
Grindstones	tons	5,222
Sand stones	boxes	690
Potatoes	barrels	5,838

Lake imports for 1851—Continued.

Articles.		Quantity.
Furs	packages.	4,900
Deer-skins	do	3,878
Tobacco	do	3,603
Soap	boxes	304
Starch	do	3,469
Candles	do	4,367
Fruit	barrels	5,343
Sugar	do	23
Saleratus	boxes	814
Ship knees	tons	4,774
C. blocks	number	665
Laths	M	1,056
Shingles	do	6,110
Shingle-bolts	cords	473
Oars	number	38,860
Cedar	cords	685
Brooms	dozen	4,463
Copper	tons	645
Cement	barrels	1,409
Nails	kegs	1,779
Marble	tons	65
Ties	number	5,252
Wood	cords	82
Arrivals	number	4,597
Beans	barrels	1,280
Reapers	number	226
Glue	barrels	173
Nuts	do	908
Ginseng	packages	369
Oil-cake	tons	2,438
Axes	boxes	440
Hardware	packages	1,288
Glassware	do	4,657
Earthen-ware	do	427
Wooden-ware	do	1,137
Forks	bundles	229
Hoes	do	847
Shovels	do	393
Rakes	do	2,000
Snaths	do	883
Cotton	bales	1,181
Railroad iron	bars	27,672
Glass	boxes	1,239
Hubbs	number	1,000
Hoop-poles	do	1,980
Building-stone	tons	718
Sundries	packages	27,106
Clearances	number	4,258

EXPORTS FROM MILWAUKIE.

The following are some of the principal Exports from Milwaukie for 1850 and 1851, which we find in the Sentinel :

Articles.		1850.	1851.
Flour	barrels	100,017	101,811
Beef	do	1,426	2,649
Pork	do	476	3,050
Wheat	bushels	297,578	130,754
Barley	do	15,279	99,897
Corn	do	5,000	26,430
Oats	do	2,100	55,124
Wool	pounds	126,595	320,511

The following is a comparative statement of the amount of Lumber received for the last two seasons :

Articles.		1850.	1851.
Boards	feet	30,160,370	30,103,092
Shingles	number	17,001,000	15,180,750

GALENA EXPORTS.

A Statement of the Exports from Galena, Illinois, for 1851.

Articles.		Quantity.	Value.
Lead	pounds	33,082,190	$1,417,851
Flour	barrels	39,335	127,672
Corn	bushels	24,090	8,431
Oats	do	59,629	14,907
Barley	do	42,734	21,372
Wheat	do	350	210
Rye	do	390	195
Potatoes	do	14,000	8,400
Beans	do	510	767
Flaxseed	do	25	25
Pork	barrels	3,185	47,775
Lard	pounds	125,000	12,500
Bacon	do	312,568	35,256
Butter	do	87,618	10,852
Lime	barrels	1,168	992
Corn meal	do	171	342
Eggs	dozen	22,880	2,288
Hides and skins	number	9,396	14,125

Statement of Exports from Galena—Continued.

Articles.		Quantity.	Value.
Horses - - -	number	800	$40,000
Neat cattle - -	- do -	1,500	30,000
Sheep - - -	- do -	500	750
Hogs - - -	- do -	250	1,500
Soap - - -	boxes	900	2,022
Candles - -	- do -	1,200	3,800
Beef - - -	barrels	32	348
Hay - - -	tons	75	600
Total value -	- -	- -	1,700,358

The total amount and value of Lumber, &c., received at Galena for the year 1851, were as follow:

Articles.		Quantity.	Value.
Lumber - -	feet -	5,085,684	$50,856
Laths - - -	number	89,100	2,450
Shingles - -	- do -	2,470,500	7,411
Log timber - -	feet -	12,312	515
Wood - - -	cords -	4,245	12,735

THE EAST INDIA AND PACIFIC TRADE.

A correspondent of the "Boston Traveller" furnished a detailed statement of the East India and Pacific trade of th United States, of which we make a brief abstract. The following table will show the East India and Pacific port arrivals and clearances, for the whole United States, during the year ending December 31, 1851:

Ports.	Arrivals.	Clearances.
Boston	88	90
New York	119	54
Baltimore	41	12
New Bedford	5	
Salem	7	10
Philadelphia	2	
New Orleans	1	
Other ports	4	3
	*267	169
Last year	185	153
Increase this year	82	16

*Of these 267 arrivals, 182 vessels were owned in the New England States.

The arrivals and clearances from New York were:

Ports.	Arrivals.	Clearances.
Canton	40	10
Shanghae	18	2
Callao	16	1
Valparaiso	9	4
Manilla	9	2
Hong Kong	5	1
Calcutta	4	1
Batavia	3	13
Zanzibar	3	2
Mauritius	3	
Cape Town	1	3
Other ports	8	15
Total	119	54
Last year	69	51
Increase this year	50	3

These tables do not include the arrivals and clearances from and for California; which were:

Ports.	Arrivals.	Clearances.
New York	14	56
Boston	6	36
Baltimore	4	10
New Bedford	4	
Philadelphia	3	8
Providence	1	
Bath	1	
New London	1	
Savannah	1	
New Orleans	....	5
Total	35	115

COFFEE AND SUGAR TRADE OF THE UNITED STATES.

[From the New York Shipping List.]

COFFEE TRADE, 1851.

Imports, Exports, Stock, estimated Consumption, &c., for the year ending December 31, 1851, *(exclusive of California and Oregon.)*

New York.	Bags.	Pockets, &c.	Casks.	Bbls.	Bales.	Value Jan. 1, 1852.	Value Jan. 1, 1851.
Brazil	255,548	....	......	......	......	8¼ a 9¼	10 a 11¼
St. Domingo	77,176	....	......	......	......	7¾ a 8	10 a 10½
Porto Cabello	41,175	....	......	......	......	8½ a 9	10½ a 11½
Maracaibo	36,473	....	10	......	......	8½ a 9	11 a 11½
Laguayra and Porto Cabello	11,598	....	......	......	......	....	....
Laguayra	8,082	....	......	......	......	8½ a 9	10½ a 11¼
Laguayra and Maracaibo	1,165	....	......	......	......	....	....
Coro, (Venezuela)	641	....	......	......	......	....	....
Bolivar city	688	....	......	......	......	8½ a 8¾	11 a 11½
Savanille	819	....	......	......	......	....	....
Carthagena	127	....	......	......	......	....	....
Santa Martha	82	....	......	......	......	....	....
Costa Rica	585	....	......	......	......	8½ a 9¼	11½ a 11¾
Jamaica	5,541	....	35	1,204	......	9 a 9½	10 a 10¾
Cuba	5,045	....	5	104	......	8 a 8¾	10½ a 11¼
Porto Rico	3,696	....	29	12	......	8 a 8¾	10 a 11¼
Batavia	....	53,938	......	......	......	11 a 11¾	12½ a 13
Rotterdam	11,914	....	......	......	......	....	....
Africa	620	....	......	......	......	....	....
Other foreign ports	86	....	......	......	......	....	....
From foreign ports	467,349	53,938	79	1,320	......	....	....
Received coastwise	42,760	18,350	......	......	1,221	....	....
Total receipts	510,109	72,288	79	1,320	1,221	....	....

Imports, &c.—Continued.

		Bags, &c.
Total packages received in 1851 - - - -		585,017
Add stock January 1, 1851 - - - - -		16,000
Total supply - - - - - -		601,017
Deduct export - - - - -	23,708	
And stock January 1, 1852 - - -	93,500	
		117,208
Taken from this port for consumption and shipped coastwise in 1851 - - - - - -		483,809
Or about 66,714,430 pounds.		
Total packages received in 1850 - - - -		382,986
Add stock January 1, 1850 - - - - -		36,000
Total supply - - - - - -		418,986
Deduct exports - - - - -	45,711	
And stock January 1, 1851 - - -	16,000	
		61,711
Taken from this port, for consumption, and shipped coastwise in 1850 - - - - - -		357,275
Or about 48,589,400 pounds.		

Imports at New York from foreign and coastwise ports.

Years.	Bags, &c.	Exports.	Stock 31st Dec.
1850 - - -	382,986	45,711	16,000
1849 - - -	401,075	49,000	36,000
1848 - - -	418,003	31,594	24,000
1847 - - -	427,470	18,116	21,000

Statement of Imports and Exports.

Received—		Total packages. 1851.	Total packages. 1850.	Stock, January 1. 1852.	Stock, January 1. 1851.	Exported. 1851.	Exported. 1850.	Value, January 1. 1852.	Value, January 1. 1851.
At New York.									
Foreign ports		522,686	321,112	93,500	16,000	23,708	45,711		
At Boston.									
St. Domingo	71,969	-	-	-	-	-	-	8 a 8½	10½ a 10¾
Java	61,014	-	-	-	-	-	-	10½ a 11¼	11¼ a 12¼
Brazil	13,343	-	-	-	-	-	-	7¾ a 8¾	11 a 12
Other foreign ports	13,247	-	-	-	-	-	-		
		159,573	125,881	32,000	6,000	22,998	28,536		
At Philadelphia.									
Laguayra	32,168								
Brazil	76,043	-	-	-	-	-	-	8 a 9½	9½
Other foreign ports	15,043	-	-	-	-	-	-	8 a 9	10½ a 1
		123,254	100,261	18,500	None.	6,063	6,088		
At Baltimore.									
Brazil	206,240								
Laguayra, &c.	21,081								
Other foreign ports	17,872								
		305,193	184,630	28,000	26,000	2,945	6,778		
At New Orleans.									
Brazil	5,096								
Cuba, &c	7,672	-	-	-	-	-	-		
		342,768	295,397	92,600	31,000	-	4,006	7½ a 8½	10½ a 10¾
Received at other ports		49,566	27,295	8,100	4,185	71		-	9½ a 9¾
Tota		1,503,040	1,054,576	272,700	83,185	55,785	91,119		

Statement of imports and exports—Continued.

		Packages.
Receipts in United States in 1851 - - -		1,503,040
Add stock January 1, 1851 - - - -		83,185
Total supply - - - - -		1,586,225
Deduct exports in 1851 - - - -	55,785	
And stock January 1, 1852 - - -	272,700	
		328,485
Taken for consumption in 1851 - - -		1,257,740
Or about 184,721,400 pounds.		
Receipts in the United States in 1850 - -		1,054,576
Add stock January 1, 1850 - - - -		101,900
Total supply - - - - -		1,156,476
Deduct exports in 1850 - - - -	91,119	
And stock January 1, 1851 - - -	83,185	
		174,304
Taken for consumption in 1850 - - -		982,172
Or about 134,539,736 pounds		

RECAPITULATION.

Consumption estimates—

	Pounds.
Taken from New York - - - -	59,363,030
" Baltimore - - - - -	46,449,470
" New Orleans - - - -	45,128,960
" Philadelphia - - - -	14,031,500
" Boston - - - - -	12,684,340
" other ports - - - -	7,064,160
Total - - - - - - -	184,721,460

Stock, 1st January, 1852.

At New York, of Brazil, bags - - - -	43,000
" Java, pockets, &c. - - -	27,500
" Laguayra and Maracaibo, bags - -	18,000
" other kinds, packages - - -	5,000
Total at New York, packages - - - -	93,500
" New Orleans, of Brazil - - - -	92,600
" Baltimore, of Brazil - - - -	28,000
" Philadelphia, (mostly,) of Brazil - - -	18,500
" Boston, (mostly,) of Java, in pockets - -	32,000
" other ports, (mostly,) of Brazil - - -	8,100
Total, packages - - - - - -	272,700

In the foregoing estimate of consumption we have not included the *coastwise receipts* at the ports, they being already embraced in the calculation at the port where they were originally received.

NOTE.—The estimated consumption of the country for 1851, it will be seen, is about equal to 36½ per cent. over that of 1850; but it will be remembered that the importation of 1850 was much smaller than that of several previous years; that prices in 1850 ruled high, and the consumption was, in a great degree, limited, substitutes being used to a considerable extent; and at the close of that year the stock held by dealers was nearly exhausted.

SUGAR TRADE, 1851.

Imports, Exports, Stocks, and estimated Consumption of raw, clayed, &c., for the year ending December 31, 1851, (exclusive of California and Oregon.)

New York.	Hhds.	Tierces.	Barrels.	Boxes.	Bags.	Cases.
Cuba	94,070	1,548	5,079	188,387	813	
Porto Rico	29,374	64	2,020			
St. Croix	1,236	–	38			
Brazil	–	–	565	–	43,794	303
Manilla	–	–	–	–	108,257	
Surinam	817	3	133			
Nassau, N. P.	136	23	103			
Halifax	–	–	–	–	2,090	
St. John, N. B.	69	–	17			
Other foreign ports	317	10	302	24		
Total foreign	126,019	1,648	8,257	188,411	154,954	303
Texas	1,576	–	235	102		
Louisiana	15,945	45	326			
Other coastwise	3,758	13	35,920	3,384	13,733	
Total supply	147,298	1,706	44,738	191,897	168,687	303
Exported	929	81	20	3,091		
	146,369	1,625	44,718	188,806	168,687	303
Add stock Jan. 1, '51	1,601	–	–	8,835	3,798	
Total supply	147,970	1,625	44,718	197,641	172,485	303
Deduct stock Jan. 1, 1852	7,582	–	–	13,512	26,105	303
Consumpt'n at N. Y.	140,388	1,625	44,718	184,129	146,380	

Or about 132,832 tons; of which foreign, imported direct, 120,599 tons. Same time last year, 104,071 tons; of which foreign, imported direct, 65,089 tons.

Received at New York, from foreign and coastwise ports, from 1st January to 31st December.

Year.	Hhds.	Tierces.	Barrels.	Boxes.	Bags.
1851	147,298	1,706	44,738	191,897	168,687
1850	116,848	1,311	35,019	132,814	61,260
1849	128,417	1,404	21,105	63,557	93,938
1848	108,703	2,258	19,946	120,354	90,086
1847	87,861	779	17,765	144,898	24,255
1846	67,238	577	7,242	85,744	37,652
1845	88,268	1,626	17,039	22,958	38,771
1844	62,881	513	11,075	106,918	35,689
1843	59,003	331	9,896	50,549	38,417
1842	54,495	75	13,048	58,012	60,533

Stock in New York January 1.

Year.	Hhds.	Boxes.	Bags.
January 1, 1852	7,582	13,512	26,105
1851	1,601	8,835	3,798
1850	3,213	1,699	24,666
1849	4,549	14,127	
1848	2,262	2,500	
1847	1,279	–	3,817
1846	1,297		

Most of the barrels received from coastwise ports are refined sugar.

Receipts of foreign from 1st January, 1851, *to* 31*st December*, 1851.

Ports.	Hogsheads and tierces.	Barrels.	Boxes.	Bags.	Casks.
At New York - -	127,667	8,257	188,411	154,954	303
Boston - - -	11,571	1,223	82,906	88,126	
Philadelphia - -	27,648	5,084	34,971	53,907	
Baltimore - -	17,044	2,542	3,597	8,310	
New Orleans - -	350	–	28,619	–	1,683
Other ports - - -	6,168	321	11,071	5,320	
Total receipts - -	190,448	17,427	349,575	310,617	1,986
Add stock Jan. 1, 1851	3,525	–	20,261	7,102	
Total supply - -	193,973	17,427	369,836	,719	1,986
Deduct export 1851 -	2,951	2,904	6,542	1,344	
	191,022	14,523	363,294	316,375	1,986
Deduct stock, January 1, 1852 - - -	9,367	–	31,446	27,425	303
Total consumption -	181,655	14,523	331,848	288,950	1,683

Or about - - - - - - - - -	201,405	tons.
Add crop of 1850–'51, Louisiana, Texas, &c., the bulk of which came to market in 1851, and assuming the stock in each year to be equal - - - - -	120,331	"
Would make the total consumption in the United States from January 1, 1851, to December 31, 1851 -	321,736	"
Consumption of foreign in 1850 - - - -	160,210	"
Add crop of Louisiana, Texas, Florida, &c., 1849–'50	141,592	"
Would make the total consumption of 1850 - -	301,802	"
Excess in 1851 - - - - - - - - -	19,934	"

Stock at the different ports on the 1st *of January*.

Ports.	Hhds., &c.	Boxes.	Bags.	Cases.
1852.				
New York - - -	6,141	13,512	26,105	303
Boston - - - -	774	10,013		
Philadelphia - - -	1,852	7,541	1,320	
Baltimore - - -	250			
New Orleans - - -				
Other ports - - -	350	400		
Total - - -	9,367	31,466	27,425	303
1851.				
New York - - -	1,213	8,835	3,798	
Boston - - - -	400	7,514	3,054	
Philadelphia - - -	1,287	2,900	250	
Baltimore - - -	600			
New Orleans - - -	–	700		
Other ports - - -	425	312		
Total - - -	3,525	20,261	7,102	

The preceding statement we believe to be a correct exhibit of the quantity of raw, clayed, &c., sugar taken from the ports for consumption in the country. It will be observed we do not include the receipts of European refined sugar, being unable to obtain any reliable data for them; and we do not embrace in our exports any foreign or domestic refined sugar, having confined ourselves wholly to the descriptions noticed. The quantity of sugar made here from molasses is large, and the production of the maple tree the last season is estimated at 17,500 tons.

METEOROLOGY AND THE COTTON AND SUGAR CROPS.

The following valuable table is taken from Affleck's Rural Almanac for 1852, and was compiled by the editor from the records of the late Dr. Tooley and G. J. C. Davis, esq., of Natchez, and also from his own records.

Years.	White frost, latest in spring. Date.	Temperature at sunrise.	White frost, earliest in fall. Date.	Temperature at sunrise.	Date of first blooms.
1825	Feb 15	42	Oct. 19	44	
1826	April 11	43	Nov. 18	41	
1827	Mar. 19	44	Nov. 30	38	
1828	Mar. 17	42	Nov. 12	44	
1829	Mar. 22	32	Nov. 1	43	
1830	Feb. 14	41	Oct. 20	44	
1831	Mar. 21	41	Oct. 20	40	
1832	Mar. 18	30	Nov. 9	36	
1833	Mar. 30	44	Nov. 20	44	
1834	Mar. 30	39	Nov. 20	41	
1835	Mar. 23	42	Nov. 10	46	
1836	Mar. 25	43	Nov. 22	44	
1837	April 9	44	Nov. 26	42	
1838	Mar. 18	43	Nov. 22	44	
1839	Mar. 6	37	Nov. 7	42	
1840	Mar. 31	41	Oct. 25	42	June 6
1841	Mar. 18	45	Oct. 23	38	June 10
1842	Feb. 22	42	Oct. 26	43	May 17
1843	April 1	44	Oct. 28	39	June 9
1844	Mar. 31	38	Nov. 19	41	May 25
1845	Mar. 21	42	Nov. 12	44	May 30
1846	April 14	43	Nov. 19	44	June 10
1847	Mar. 27	40	Nov. 19	42	May 30
1848	Mar. 14	43	-	-	June 1
1849	April 16	41	Nov. 8	41	June 6
1850	April 7	40	Oct. 26	36	June 24

Cotton and Sugar Crops—Continued.

When killed by frost.	Item of cotton crop. Crop of United States.	Item of cotton crop. Consumption of United States.	Sugar crop of United States.	Year.
	Bales.	Bales.	Hhds.	
				1825
	937,000	104,483	(1818—25,000)	1826
	712,000	120,593	(1822—30,000)	1827
	857,744	118,853	88,000	1828
	976,845	126,512	48,000	1829
	1,038,848	182,142	70,000	1830
	987,477	173,800	75,000	1831
	1,070,438	194,412	70,000	1832
	1,205,394	196,413	75,000	1833
	1,254,328	216,888	100,000	1834
	1,360,725	236,733	30,000	1835
	1,422,930	229,540	70,000	1836
	1,801,497	246,063	65,000	1837
	1,360,532	276,018	70,000	1838
	2,177,835	295,193	115,000	1839
	1,634,945	297,288	87,000	1840
October 26	1,683,574	267,850	90,000	1841
October 23	2,378,875	325,714	140,000	1842
November 1	2,030,409	346,744	100,346	1843
October 28	2,394,503	389,000	200,090	1844
October 29	2,100,537	422,597	186,650	1845
November 3	1,778,651	427,627	140,000	1846
October 19	2,347,634	531,772	240,000	1847
November 26	2,728,596	518,039	220,000	1848
None	2,096,706	487,769	247,923	1849
December 3	2,355,257	404,108	211,203	1850

HOGS PACKED IN THE WEST.

[From the Cincinnati Price Current, February, 1852.]

Below we present a detailed statement of the hogs packed at the principal points in the West, including the returns given in the *Price Current* of 28th ultimo and 4th instant, with those received since the latter date.

The exhibit is more full and accurate than any we have been able to publish in former years; and although not embracing *every* point, it will answer all the purposes for which such a statement is useful.

The actual number cut up at St. Louis is less than our estimate, and we therefore correct the figures accordingly. This is also the case as regards Louisville, and we have besides found it necessary to make two or three corrections in the figures showing the number packed at other smaller points.

With regard to the business at Louisville we would remark that no detailed statement has been published since the close of the season; and, in the absence of such reliable information, we add three thousand on to the lowest estimate; making the number 193,000, which is 4,000 less than indicated by the figures previously given, the latter being, we believe, the highest estimate.

We give the several States in order, commencing with

OHIO.

Where packed.	1851-'52.	1850-'51.
Cincinnati	362,048	334,529
Chillicothe	42,000	21,000
Waynesville	4,480	5,800
Franklin	1,291	
Utica	90	45
Wilmington	1,000	3,000
Claysville	165	250
Higginsport	1,800	2,000
Centreville	517	440
Somerville	1,400	2,000
Hamilton	5,200	6,200
Westville	1,400	1,400
West Florence	800	800
Lebanon	2,400	7,000
Columbia	1,002	1,233
Manchester	270	600
Circleville	15,700	19,200
Harveysburg	1,100	1,500
Bellebrook	2,040	2,137
Ripley	9,500	8,000
West Union	....	1,500
Aberdeen	500	1,500
Winchester	1,402	1,284
Troy	10,000	11,000
Waverly	6,000	11,000
Total	461,075	443,418

INDIANA.

Where packed.	1851-'52.	1850-'51.
Madison	97,202	96,349
Americus	800	800
Lafayette	38,600	33,000
Newport	3,700	4,800
Eugene	7,662	6,726
Connersville	16,281	10,000
Williamsport	4,775	5,450
Laurel	7,000	4,500
Centreville	4,400	
Dublin	2,200	1,700
Milton	1,681	2,000
Perrysville	2,886	3,624
Logansport	5,300	8,000
Terre Haute	62,651	65,548
Durkee's Ferry	4,200	5,000
Evansville	9,500	6,500
Vincennes	13,300	11,000
Lawrenceville	1,900	1,900
Paris	2,622	2,476
Covington	4,200	3,500
Cambridge city	13,000	18,119
Montezuma	1,675	2,900
Lawrenceburg	3,855	4,200
Vernon	846	2,050
Clinton	8,500	9,000
New Harmony	4,600	
Palestine	....	757
Hutsonville	3,000	4,400
Carlisle	500	1,500
Merom	2,700	1,000
York	1,100	1,655
Darwin	300	1,200
Armiesburg	2,525	2,094
Attica	6,000	7,600
Peru	2,500	5,000
Wabashtown	900	1,000
Huntington	500	200
Jonesburg	600	
Crawfordsville	6,000	
Delphi	8,000	7,000
Lagro	1,800	1,500
Fort Wayne	....	4,000
Total	359,761	348,754

ILLINOIS.

Where packed.	1851-'52.	1850-'51.
Naples	2,880	3,095
Springfield	10,000	8,000
Lacon	9,500	13,000
Peoria	17,000	26,000
Pekin	16,000	27,000
Canton	7,000	12,000
Macomb	3,000	5,000
Rushville	2,600	2,800
Beardstown	24,400	34,000
Lagrange	1,930	2,850
Meredocia	4,500	11,000
Greggsville	2,990	5,000
Pittsfield	1,500	2,500
Florence	900	2,390
Canton	8,671	13,601
Farmington	3,000	6,000
Liverpool	....	2,400
Lewistown	1,500	2,000
Ellisville	800	2,000
Fairview	600	1,000
Peru	1,400	4,000
Quincy	17,500	24,500
Alton	25,000	20,000
Hennepin	800	2,000
Perry	2,000	2,500
Linville	800	1,500
Winchester	3,500	4,000
Vermont	1,000	2,900
Princeton	2,000	3,500
Chillicothe	....	4,000
Warsaw	2,000	7,000
Total	174,671	257,536

IOWA.

Where packed.	1851-'52.	1850-'51.
Burlington	10,000	25,000
Keokuk	10,000	30,000
Muscatine	7,500	15,500
Total	27,500	70,500

KENTUCKY.

Where packed.	1851-'52.	1850-'51.
Louisville	193,000	196,414
Maysville	6,300	9,500
Total	199,300	205,914

MISSOURI.

Where packed.	1851-'52.	1850-'51.
St. Louis	47,168	82,274
Hannibal	9,000	17,000
Churchville	2,000	8,000
Total	58,168	107,274

Recapitulation.

Where packed.	1851-'52.	1850-'51.
Ohio	461,075	443,418
Indiana	359,761	348,754
Illinois	174,671	257,536
Iowa	27,500	70,500
Missouri	58,168	107,274
Kentucky	199,300	205,914
Green and Cumberland rivers	8,500	24,000
Total	1,288,975	1,457,396
		1,288,975
Deficiency	....	168,421
West of White river	....	2,000
Bedford, Indiana	....	6,600
Shawneetown and Grayville	....	5,000
Total deficiency	....	182,021

There are some points in Iowa and Missouri to hear from, and these returns we will give hereafter, as soon as received in a reliable shape.

As we remarked in a previous number of the *Price Current*, most of the above returns were received from our correspondents at the several points; and, while we do not claim for the figures entire accuracy, we believe the statements upon the whole to be as correct as it is possible to obtain.

Since writing the above, we have received the following additional return:

Chicago, Illinois, 1851-'52, 13,000; 1850-'51, 20,000.

THE OIL TRADE.

The "New Bedford Shipping List" says the amount of tonnage employed in the trade has been considerably increased during the last year, in spite of numerous losses in the Arctic seas. The number of vessels employed in the service at present is as follows, viz: 558 ships and barques, 27 brigs, and 5 schooners; being an increase over last year of 56 ships, 3 brigs, and 8 schooners. This number is large, but it still falls below that of 1846, when there were 678 ships, 35 brigs, and 22 schooners in the trade. From the best estimate we can make, the amount during the present year will hardly exceed 100,000 barrels, and may fall considerably below that figure. In addition to this, the accounts from the sperm whale fishery are not encouraging, and there is a probable prospect that importations for a year to come will not exceed 65,000 barrels.

Stock of Sperm and Whale Oil on hand, January 1, 1852.

Places.	Sperm.	Whale.
New Bedford	7,500	19,500
Fairhaven	1,850	4,500
Mattapoisett	500	....
Westport	3,400	....
Nantucket	4,000	2,200
Edgartown	....	1,300
Other places, (estimated)	....	9,000
	17,250	36,500

The following table will show the amount of Oil and Whalebone on hand from 1851 *to* 1845, *inclusive.*

Year.	Sperm.	Whale.	Bone.
January 1, 1851	3,610	14,062	242,000
1850	3,760	13,000	440,000
1849	10,147	20,936	994,600
1848	5,636	29,126	921,500
1847	14,613	7,775	112,800
1846	40,701	5,221	211,000
1845	32,992	11,950	Unknown.

The number of vessels and amount of tonnage employed in the Whale-fishery since 1844, *have been as follow:*

Year.	Ships and Barques.	Brigs.	Schooners.	Tonnage.
January 1, 1850	510	20	13	171,484
1849	581	21	12	196,110
1848	621	22	16	210,603
1847	610	31	21	230,218
1846	673	35	22	233,189
1845	643	35	17	218,655
1844	595	81	9	200,147

THE ANTHRACITE COAL TRADE.

[From the Philadelphia Commercial List.]

Table showing the quantity of Coal sent to market annually, from its commencement, in 1820, to 1850, inclusive.

Years.	Total Lehigh.	Schuylkill.	Little Schuylkill.	Total Schuylkill.	Lackawanna.	Pine Grove.	Lyken's Valley.	Shamokin.	Wyoming.	Total supply.	Increase and decrease.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1820	365	....	....	....	....	....	....	....	....	365	....
1821	1,073	....	....	....	....	....	....	....	....	1,073	708*
1822	2,441	....	....	....	....	....	....	....	....	2,440	1,167*
1823	5,823	....	....	....	....	....	....	....	....	5,823	3,583*
1824	9,541	....	....	....	....	....	....	....	....	9,541	3,748*
1825	28,396	6,500	....	6,500	....	....	....	....	....	34,896	25,355*
1826	31,280	16,767	....	16,767	....	....	....	....	....	48,047	13,151*
1827	32,074	31,360	....	31,360	....	....	....	....	....	63,434	15,387*
1828	30,232	47,284	....	47,284	....	....	....	....	....	77,516	14,082*
1829	25,110	79,972	....	79,972	7,000	....	....	....	....	112,083	35,567*
1830	41,750	89,984	....	89,984	42,700	....	....	....	....	174,734	62,351*
1831	40,966	81,854	....	81,854	54,000	....	....	....	....	176,820	2,386*
1832	75,000	195,271	14,000	209,271	84,500	....	....	....	....	368,771	191,951*
1833	123,000	216,210	36,761	252,971	111,777	....	....	....	....	487,748	178,977*
1834	106,244	191,540	35,152	226,692	43,700	....	....	....	....	376,636	72,112†
1835	131,250	302,024	37,494	339,518	98,845	5,500	....	....	....	515,103	198,467‡
1836	146,522	393,975	38,070	432,045	104,500	9,998	5,439	....	....	698,484	123,381*
1837	225,937	491,280	31,922	523,152	115,387	16,726	6,430	....	....	887,632	189,148*
1838	214,211	421,569	12,306	433,875	76,321	16,665	6,005	4,104	....	746,181	141,451†
1839	222,042	333,937	8,249	442,176	122,300	19,227	5,372	11,930	....	823,479	77,298*
1840	225,501	433,263	19,028	452,291	148,470	19,463	5,302	15,928	....	867,045	43,566*
1841	142,807	543,280	41,412	584,692	192,270	15,306	6,176	22,154	....	964,255	97,210
1842	271,913	491,602	26,831	541,504	205,253	31,437	181	10,098	47,346	1,107,732	143,477*
1843	267,125	647,308	30,005	677,313	227,605	22,879	....	9,870	57,740	1,262,532	154,800*
1844	376,363	782,070	58,309	840,379	251,005	22,879	....	13,087	114,906	1,623,459	360,927*
1845	430,993	1,008,901	76,122	1,085,023	266,072	27,719	....	10,135	176,401	2,002,877	379,418*
1846	522,518	1,150,828	86,155	1,236,983	318,400	31,208	....	12,646	188,003	2,333,494	330,617*
1847	643,568	1,467,499	105,345	1,572,844	388,200	55,346	....	14,904	229,896	2,970,597	637,103*
1848	680,193	1,490,209	162,625	1,652,834	434,267	61,238	2,000	19,357	237,271	3,082,860	112,263*
1849	880,987	1,428,156	174,757	1,605,626	454,240	56,938	25,000	19,658	258,080	3,241,890	159,030*
1850	722,688	1,500,047	211,960	1,712,007	543,886	78,299	35,000	19,921	275,109	3,371,420	129,530*
1851	988,251	1,868,277	310,307	2,178,584	788,485	62,809	53,150	23,989	336,017	4,389,476	1,018,056*

* Increase. † Decrease. ‡ Including 20,000 from the Dauphin mine.

The total quantity of Coal shipped from the Lehigh coal mines annually, from the commencement of the trade, in 1820, to 1851, inclusive.

Years.	Lehigh Coal Company.	Beaver Meadow Company.	Hazleton Company.	Sugarloaf, now Diamond.	Buck Mountain Company.	Summit Spring Mountain.	Wilksbarre railroad.	Cranbury.	Total Lehigh.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1820	365								365
1821	1,073								1,073
1822	2,440								2,440
1823	5,823								5,823
1824	9,541								9,541
1825	28,396								28,396
1826	31,280								31,280
1827	32,074								32,074
1828	30,232								30,232
1829	25,110								25,110
1830	41,750								41,750
1831	40,966								40,966
1832	75,000								75,000
1833	123,000								123,000
1834	106,244								106,240
1835	131,250								131,252
1836	146,522								146,524
1837	192,320	33,617							225,937
1838	159,564	38,426	16,221						214,211
1839	142,071	38,595	33,826	7,550					222,042
1840	102,212	43,845	50,441	29,039	54				225,591
1841	*78,168	26,224	21,247	17,170					142,807
1842	163,742	45,159	31,082	31,930					271,913
1843	138,825	54,692	43,950	26,814	2,844				267,125
1844	219,245	70,335	70,168	2,866	13,749				376,368
1845	257,740	77,230	70,266	1,843	23,914				430,993
1846	274,663	85,870	98,109		46,103	17,908	5,965		522,513
1847	334,929	109,110	105,595		50,817	32,840	10,247		643,568
1848	335,569	84,930	86,641	6,391	71,101	65,531	10,425	18,605	680,193
1849	379,285	73,708	92,401	11,356	85,819	102,599	19,590	36,155	800,987
1850	424,258	27,571	54,309	12,099	103,937	43,793	32,153	24,568	722,688
1851	480,823	42,263	113,297	36,712	104,456	116,517	25,072	70,111	989,251

* Great freshet, which injured the canal.

STATISTICS OF THE MANUFACTURES OF THE UNITED STATES.

The subjoined summary of the manufacturing industry of the United States is derived from the Report of Mr. Kennedy, the Superintendent of the Census.

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The period which has elapsed since the receipt of the returns has been so short as to enable the Office to make but a general Report of the facts relating to a few of the most important manufactures.

If, in some instances, the amount of "capital invested" in any branch of manufacture should seem too small, it must be borne in mind, that when the product is of several kinds, the capital invested, not being divisible, is connected with the product of the greatest consequence. This, to some extent, reduces the capital invested in the manufacture of bar-iron in such establishments where some other article of wrought-iron predominates—sheet-iron, for example. The aggregate, however, of the capital invested in the various branches of wrought-iron will, it is confidently believed, be found correct.

The entire capital invested in the various manufactures in the United States, on the 1st of June, 1850—not to include any establishments producing less than the annual value of $500—

Amounted, in round numbers, to	$530,000,000
Value of raw material	550,000,000
Amount paid for labor	240,000,000
Value of manufactured articles	1,020,300,000
Number of persons employed	1,050,000

Cotton Goods.

STATES.	No. establishments in operation.	Capital invested.	Bales cotton.	Tons coal.	Value of all raw material.	No. hands employed. Males.	Females.
Maine	12	$3,329,700	31,531	2,921	$1,573,110	780	2,959
New Hampshire	44	10,950,500	83,026	7,679	4,839,429	2,911	9,211
Vermont	9	202,500	2,243	- -	114,415	94	147
Massachusetts	213	28,455,630	223,607	46,545	11,289,309	9,293	19,437
Rhode Island	158	6,675,000	50,713	13,116	3,484,579	4,959	5,916
Connecticut	128	4,219,100	39,483	2,866	2,500,062	2,708	3,478
New York	86	4,176,920	37,778	1,539	1,985,973	2,632	3,688
New Jersey	21	1,483,500	14,437	4,467	666,645	616	1,096
Pennsylvania	208	4,528,925	44,162	24,189	3,152,530	3,564	4,099
Delaware	12	460,100	4,730	1,920	312,068	413	425
Maryland	24	2,236,000	23,325	2,212	1,165,579	1,008	2,014
Virginia	27	1,908,900	17,785	4,805	828,375	1,275	1,688
North Carolina	28	1,058,800	13,617	- -	531,903	442	1,177
South Carolina	18	857,200	9,929	- -	295,971	399	620
Georgia	35	1,736,156	20,230	1,000	900,419	873	1,399
Florida	-	80,000	600	- -	30,000	28	67
Alabama	12	651,900	5,208	- -	237,081	346	369
Mississippi	2	38,000	430	- -	21,500	19	17
Louisiana							
Texas							
Arkansas	3	16,500	170	- -	8,975	13	18
Tennessee	33	669,600	6,411	3,010	297,500	310	581
Kentucky	8	239,000	3,760	720	180,907	181	221
Ohio	8	297,000	4,270	2,152	237,060	132	269
Michigan							
Indiana	2	43,000	675	300	28,220	38	57
Illinois							
Missouri	2	102,000	2,160	1,658	86,446	75	80
Iowa							
Wisconsin							
California							
District of Columbia	1	85,000	960	- -	67,000	41	103
Total	1,094	74,501,031	641,240	121,099	34,835,056	33,150	59,136

Cotton Goods—Continued.

States.	Entire wages per month. Males.	Entire wages per month. Females.	Average wages per mo. Males.	Average wages per mo. Females.	Value of entire products.	Yards sheeting, &c., &c.	Sundries.
Maine	$22,895	$35,973	$29 35	$12 15	$2,596,356	32,852,556	
New Hampshire	75,713	124,131	26 00	13 47	8,830,619	113,106,247	149,700 lbs. yarn.
Vermont	1,460	1,861	15 53	12 65	196,100	1,651,000	53,050 "
Massachusetts	212,892	264,514	22 90	13 60	19,712,461	298,751,392	353,660 "
Rhode Island	92,282	76,656	18 60	12 95	6,447,120	96,725,612	1,902,980 lbs. thr'd & y'n.
Connecticut	51,679	41,060	19 08	11 80	4,257,522	51,780,700	950,000 lbs. yarn.
New York	48,244	35,699	18 32	9 68	3,591,989	44,901,475	2,180,600 "
New Jersey	11,078	10,487	17 98	9 56	1,109,524	8,122,580	2,000,000 "
Pennsylvania	63,642	40,656	17 85	9 91	5,322,262	45,746,790	5,308,561 "
Delaware	6,326	4,926	15 31	11 58	538,439	3,521,636	533,000 "
Maryland	15,546	19,108	15 42	9 48	2,120,504	27,883,923	46,000 "
Virginia	12,983	11,791	10 18	6 98	1,486,384	15,640,107	1,755,915 "
North Carolina	5,153	7,216	11 65	6 13	831,342	2,470,110	2,967,000 "
South Carolina	5,565	5,151	13 94	8 30	748,338	6,563,737	1,348,343 "
Georgia	12,725	10,352	14 57	7 39	2,135,044	7,209,292	4,198,351 "
Florida	900	335	32 14	5 00	49,920	624,000	
Alabama	4,053	2,946	11 71	7 98	382,260	3,081,000	790,000 "
Mississippi	270	101	14 21	5 94	30,500	- -	171,000 "
Louisiana							
Texas							
Arkansas	190	106	14 61	5 88	16,637	- -	81,250 "
Tennessee	3,394	3,730	10 94	6 42	510,624	363,250	2,396,250 "
Kentucky	2,707	2,070	14 95	9 36	273,439	1,003,000	725,000 "
Ohio	2,191	2,534	16 59	9 42	394,700	280,000	438,000 "
Michigan							
Indiana	495	386	13 02	6 77	44,200	- -	300,000 "
Illinois							
Missouri	820	800	10 93	10 00	142,900	- -	13,260 bales batting
Iowa							
Wisconsin							
California							
Dist. of Columbia	575	825	14 02	8 00	100,000	1,400,000	
Total	653,778	703,414	-	-	61,869,184	763,678,407	27,873,600 lbs. and bales.

WOOLLEN GOODS.

States.	No. establishments in operation.	Capital invested.	Pounds of wool used.	Tons of coal.	Value of all raw material.	No. hands employed. Males.	No. hands employed. Females.
Maine	36	$467,600	1,438,434	- -	$495,940	310	314
New Hampshire	61	2,437,700	3,604,103	3,600	1,267,329	926	1,201
Vermont	72	886,300	2,328,100	- -	830,684	683	710
Massachusetts	119	9,089,342	22,229,952	15,400	8,671,671	6,167	4,963
Rhode Island	45	1,013,000	4,103,370	2,032	1,463,900	987	771
Connecticut	149	3,773,950	9,414,100	7,912	3,325,709	2,907	2,581
New York	249	4,459,370	12,538,786	- -	3,838,292	4,262	2,412
New Jersey	41	494,274	1,510,289	1,889	548,367	411	487
Pennsylvania	380	3,005,064	7,560,379	10,777	3,282,718	3,490	2,236
Delaware	8	148,500	393,000	45	204,172	122	18
Maryland	38	244,000	430,300	100	165,568	262	100
Virginia	121	392,640	1,554,110	357	488,899	478	190
North Carolina	1	18,000	30,000	- -	13,950	15	15
South Carolina							
Georgia	3	68,000	153,816	- -	30,392	40	38
Florida							
Alabama							
Mississippi							
Louisiana							
Texas	1	8,000	30,000	- -	10,000	4	4
Arkansas							
Tennessee	4	10,900	6,200	- -	1,675	15	2
Kentucky	25	249,820	673,900	- -	205,287	256	63
Ohio	130	870,220	1,657,726	2,110	578,423	903	298
Michigan	15	94,000	162,250	- -	43,402	78	51
Indiana	33	171,545	413,350	90	120,486	189	57
Illinois	16	154,500	396,964	987	115,367	124	54
Missouri	1	20,000	80,000	1,071	16,000	15	10
Iowa	1	10,000	14,500	- -	3,500	7	
Wisconsin	9	31,225	134,200	- -	32,630	25	
California							
District of Columbia	1	700	5,000	- -	1,630	2	
Total	1,559	28,118,650	70,862,829	46,370	25,755,988	22,678	16,574

Woollen Goods—Continued.

States.	Entire wages per month.		Average wages per month.		Value of entire products.	Yards of cloth manufactured.	Sundries.
	Males.	Females.	Males.	Females.			
Maine	$6,998	$3,697	$22 57	$11 77	$753,300	1,023,020	1,200 lbs. yarn.
New Hampshire	21,177	17,451	22 86	14 53	2,127,745	9,712,840	165,200 "
Vermont	16,712	8,388	24 46	11 81	1,579,161	2,830,400	
Massachusetts	141,533	70,581	22 95	14 22	12,770,565	25,865,658	749,550 "
Rhode Island	20,431	11,708	20 70	15 18	2,381,825	8,612,400	46,000 "
Connecticut	70,141	33,216	24 12	12 86	6,465,216	9,408,777	
New York	85,147	28,377	19 97	11 76	7,030,604	7,924,252	261,700 "
New Jersey	10,367	4,192	25 22	8 60	1,164,446	771,100	350,000 "
Pennsylvania	67,138	23,279	19 23	10 41	5,321,866	10,099,234	1,941,621 "
Delaware	2,293	312	18 79	17 33	251,010	152,000	
Maryland	4,875	1,189	18 60	11 89	295,140	373,100	
Virginia	8,688	1,883	18 17	9 91	841,013	2,037,025	398,705 "
North Carolina	270	105	18 00	7 00	23,750	34,000	
South Carolina							
Georgia	1,099	536	27 47	14 10	88,750	340,660	
Florida							
Alabama							
Mississippi							
Louisiana							
Texas	80	80	20 00	20 00	15,000	14,000	4,000 blankets.
Arkansas							
Tennessee	265	12	17 66	6 00	6,310	- -	2,220 hats.
Kentucky	3,919	689	15 30	11 11	318,819	878,034	
Ohio	18,191	3,250	20 14	10 90	1,111,027	1,374,087	65,000 lbs. yarn.
Michigan	1,689	585	21 65	11 47	90,242	141,570	
Indiana	4,122	630	21 81	11 05	205,802	235,500	104,000 "
Illinois	2,728	676	22 00	12 52	206,572	306,995	137,000 "
Missouri	480	65	32 00	6 50	56,000	12,000	6,000 prs. blankets.
Iowa	78	- -	11 14	- -	13,000	14,000	
Wisconsin	562	- -	22 48	- -	87,992	36,000	74,350 lbs. yarn.
California							
District of Columbia	60	- -	30 00	- -	2,400	10,000	
Total	489,039	210,901	-	-	43,207,555	82,206,652	4,294,326 lbs. yarn.

PIG IRON.

State.	No. establishments in operation.	Capital invested.	Tons ore used.	Tons mineral coal.	Bushels coke and charcoal.	Value raw material, fuel, &c.
Maine	1	$214,000	2,907	- -	213,970	$14,939
New Hampshire	1	2,060	500	- -	50,000	4,900
Vermont	3	62,500	7,676	150	326,437	40,175
Massachusetts	6	469,000	27,909	- -	1,855,000	185,741
Rhode Island						
Connecticut	13	225,600	35,450	- -	2,870,000	289,295
New York	18	605,000	46,385	20	3,000,074	321,027
New Jersey	10	967,000	51,266	20,865	1,621,000	332,707
Pennsylvania	180	8,570,425	877,283	316,060	27,505,186	3,732,427
Delaware						
Maryland	18	1,420,000	99,866	14,088	3,707,500	560,725
Virginia	29	513,800	67,319	39,982	1,311,000	158,207
North Carolina	2	25,000	900	- -	150,000	27,900
South Carolina	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Georgia	3	96,000	5,189	- -	430,000	25,840
Florida						
Alabama	3	11,000	1,838	- -	145,000	6,770
Mississippi	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
Louisiana						
Texas	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
Arkansas		[illegible]	[illegible]		[illegible]	[illegible]
Tennessee	23	1,0[illegible]	88,[illegible]	177,167	[illegible]	[illegible]
Kentucky	21	[illegible]	72,010	- -	4,[illegible]	[illegible]
Ohio	35	1,503,000	140,610	21,730	5,428,800	630,027
Michigan	1	[illegible]	[illegible]	- -	[illegible]	[illegible]
Indiana	2	[illegible]	[illegible]	[illegible]	310,000	[illegible]
Illinois	2	65,000	5,500	- -	170,000	15,[illegible]
Missouri	5	619,000	37,000	55,180	-	97,367
Iowa						
Wisconsin	1	15,000	3,000	- -	150,000	8,250
California						
District of Columbia						
Total	377	17,346,425	1,579,309	645,242	54,165,236	7,005,[illegible]

Pig Iron—Continued.

STATES.	Number of hands employed.		Entire wages per month.		Average wages per month.		Tons of pig iron made.	Value of other products.	Value of entire products.
	Males.	Females.	Males.	Females.	Males.	Females.			
Maine	71	-	$1,562	-	$22 00	-	1,484	- -	$36,616
New Hampshire	10	-	180	-	18 00	-	200	- -	6,000
Vermont	100	-	2,208	-	22 08	-	3,200	- -	68,000
Massachusetts	263	-	7,238	-	27 52	-	12,287	- -	295,123
Rhode Island									
Connecticut	148	-	3,967	-	26 80	-	13,420	$20,000	415,600
New York	505	-	12,625	-	25 00	-	23,022	12,800	597,920
New Jersey	600	-	12,720	-	21 20	-	24,031	- -	560,544
Pennsylvania	9,285	9	201,039	$46	21 65	$5 11	285,702	40,000	6,071,513
Delaware									
Maryland	1,370	-	27,595	-	20 14	-	43,641	96,000	1,056,400
Virginia	1,115	14	14,232	96	12 76	6 86	22,103	- -	521,924
North Carolina	26	5	208	22	8 00	4 40	400	- -	12,500
South Carolina									
Georgia	135	3	2,355	15	17 44	5 00	900	28,000	57,300
Florida									
Alabama	40	-	700	-	17 50	-	522	5,000	22,500
Mississippi									
Louisiana									
Texas									676,100
Arkansas									694,[illegible]
Tennessee	1,713	109	[illegible]	558	[illegible]	5 11	30,420	41,800	
Kentucky	1,845	10	37,3[illegible]	47	[illegible]	4 70	24,245	10,000	
Ohio	2,415	-	59,129	-	24 48	-	52,658	- -	1,255,850
Michigan	25	-	[illegible]	-	[illegible] 00	-	660	6,000	21,[illegible]
Indiana	88	-	2,[illegible]	-	[illegible] 00	-	1,880	- -	[illegible]
Illinois	150	-	3,310	-	22 06	-	2,700	- -	70,[illegible]
Missouri	334	-	8,112	-	24 28	-	19,250	- -	314,600
Iowa									
Wisconsin	60	-	1,800	-	30 00	-	1,000	- -	27,000
California									
District of Columbia									
Total	20,298	150	421,435	784	-	-	564,755	259,700	12,748,777

CASTINGS.

STATES.	No. establishments in operation.	Capital invested.	Tons pig iron.	Tons of old metal.	Tons of ore.	Tons mineral coal.	Bushels coke and charcoal.
Maine	25	$150,100	3,591	245	- -	1,319	14,000
New Hampshire	26	232,700	5,673	500	- -	1,680	20,500
Vermont	26	290,720	5,279	274	- -	1,066	198,400
Massachusetts	68	1,499,050	31,134	3,361	- -	12,401	3,500
Rhode Island	20	428,800	8,918	- -	- -	4,670	4,000
Connecticut	60	580,800	11,396	337	- -	7,592	30,600
New York	323	4,622,482	108,945	3,212	- -	22,755	181,190
New Jersey	45	593,250	10,666	350	- -	5,444	175,800
Pennsylvania	320	3,422,924	69,501	819	- -	49,228	276,855
Delaware	13	373,500	4,440	- -	- -	4,967	
Maryland	16	359,100	7,220	- -	- -	5,000	30,000
Virginia	54	471,160	7,114	205	- -	7,878	71,600
North Carolina	5	11,500	192	- -	- -	- -	6,375
South Carolina	6	185,700	169	- -	2,800	- -	405,560
Georgia	4	35,600	440	- -	- -	100	9,800
Florida							
Alabama	10	216,625	2,348	- -	- -	- -	31,300
Mississippi	8	100,000	1,197	- -	- -	248	92,000
Louisiana	8	255,000	1,660	- -	- -	3,205	
Texas	2	16,000	250	- -	- -	250	
Arkansas							
Tennessee	16	[illegible]	[illegible]	- -	5,050	24,690	13,300
Kentucky	20	[illegible]	9,731	- -	- -	2,649	[illegible]
Ohio	183	[illegible]	[illegible]	1,843	2,000	20,096	[illegible]
Michigan	63	[illegible]	[illegible]	- -	[illegible]	[illegible]	[illegible]
Indiana	14	[illegible]	1,968	5	- -	133	[illegible]
Illinois	29	260,400	4,818	50	- -	1,412	12,500
Missouri	6	187,020	5,100	200	- -	2,598	
Iowa	3	5,500	81	- -	- -	- -	[illegible]
Wisconsin	15	116,350	1,271	15	- -	595	[illegible]
California	1	5,600	75	- -	- -	25	
District of Columbia	2	14,000	545	- -	- -	80	
Total	1,391	17,416,361	345,563	11,416	9,850	190,891	[illegible]

Castings—Continued.

States.	Value raw material, fuel, &c.	No. of hands employed.		Average wages per month.		Tons castings made.	Value of other products.	Value of entire products.
		Males.	Females.	Males.	Females.			
Maine - - -	$112,570	243	1	$29 00	$5 00	3,691	- -	$265,000
New Hampshire -	177,060	374	-	33 05	-	5,764	$27,700	371,710
Vermont - - -	160,603	381	-	28 27	-	5,000	87,770	460,831
Massachusetts - -	1,057,904	1,596	-	30 90	-	32,074	- -	2,235,635
Rhode Island - -	258,267	800	-	29 63	- -	8,558	119,500	728,705
Connecticut - -	351,369	942	7	27 02	8 00	11,210	70,000	981,400
New York - -	2,393,768	5,925	-	27 49	-	104,588	- -	5,921,980
New Jersey - -	301,048	803	-	24 09	-	10,259	- -	686,430
Pennsylvania - -	2,372,467	4,782	1	27 55	6 00	57,810	661,160	5,354,881
Delaware - -	153,852	250	-	23 36	-	3,630	55,000	267,462
Maryland - -	259,190	761	-	27 50	-	6,244	80,000	685,000
Virginia - - -	297,014	810	9	19 91	9 44	5,577	- -	674,416
North Carolina -	8,341	15	-	23 46	-	172	- -	12,[illegible]
South Carolina -	29,128	153	2	13 59	4 00	1,286	- -	87,683
Georgia - - -	11,950	39	-	27 43	-	415	- -	46,200
Florida - - -								
Alabama - - -	102,085	212	-	30 05	-	1,915	- -	271,1[illegible]
Mississippi - -	50,370	112	-	37 91	-	924	2,800	117,400
Louisiana - -	75,300	347	-	35 60	-	1,570	4,000	312,500
Texas - - -	8,400	35	-	43 43	-	200	15,000	55,[illegible]
Arkansas - -								
Tennessee - -	90,035	261	8	17 96	4 50	3,384	- -	264,[illegible]
Kentucky - -	295,533	558	20	24 89	4 15	5,888	- -	744,316
Ohio - - -	1,199,790	2,758	-	27 33	-	37,399	208,700	3,0[illegible]
Michigan - -	91,865	337	-	28 68	-	2,070	25,616	27[illegible]
Indiana - - -	66,918	143	-	25 74	-	1,757	- -	149,[illegible]
Illinois - - -	172,330	332	-	28 50	-	4,160	89,250	441,[illegible]
Missouri - - -	133,114	297	-	19 63	-	5,200	- -	336,[illegible]
Iowa - - -	2,524	17	-	32 35	-	71	2,600	8,[illegible]
Wisconsin - -	86,930	228	-	26 73	-	1,342	64,025	216,19[illegible]
California - -	8,530	3	-	23 33	-	75	- -	20,740
Dist. of Columbia -	18,100	27	-	27 05	-	512	11,000	41,696
Total - - -	10,346,355	23,541	48	-	-	322,745	1,524,121	25,108,155

WROUGHT IRON.

States.	No. establishments in operation.	Capital invested.	Tons pig metal.	Tons blooms used.	Tons ore used.	Tons mineral coal.	Bushels coke and charcoal.
Maine - - - - - -							
New Hampshire - - -	2	$4,000	145	- -	- -	- -	50,000
Vermont - - - - -	8	62,700	750	525	2,625	- -	337,000
Massachusetts - - - -	6	610,300	7,030	- -	- -	11,022	78,600
Rhode Island - - - -	1	208,000	2,000	- -	[illegible]	6,000	[illegible]
Connecticut - - - - -	18	529,500	7,081	1,644	- -	5,062	783,600
New York - - - - -	60	1,131,300	8,530	- -	44,642	13,908	5,[illegible],150
New Jersey - - - - -	53	1,016,843	10,430	- -	14,549	4,507	1,[illegible],180
Pennsylvania - - - - -	131	7,620,066	163,702	20,405	- -	325,967	3,939,998
Delaware - - - - - -	2	15,000	510	60	- -	- -	228,000
Maryland - - - - - -	17	780,650	10,172	3,389	- -	10,455	24[illegible],000
Virginia - - - - - -	39	791,211	17,296	2,500	- -	66,515	10[illegible],000
North Carolina - - - -	19	103,000	[illegible]	- -	4,650	- -	357,900
South Carolina - - - -	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Georgia - - - - - -	3	9,200	100	- -	- -	- -	76,600
Florida - - - - - -							
Alabama - - - - - -	1	2,500	120	- -	- -	- -	30,000
Mississippi - - - - -							
Louisiana - - - - - -							
[illegible] - - - - - -	[illegible]	[illegible]	[illegible]				
[illegible] - - - - - -							
Arkansas - - - - - -							
Tennessee - - - - - -	43	[illegible]	11,[illegible]	325	9,151	62,038	[illegible]
Kentucky - - - - - -	4	176,000	2,000	1,600	- -	- -	280,000
Ohio - - - - - - -	11	620,800	13,675	2,900	- -	22,755	466,900
Michigan - - - - - -							
Indiana - - - - - -	3	17,000	50	- -	3,150	- -	85,000
Illinois - - - - - -							
Missouri - - - - - -	2	42,100	1,204	- -	- -	9,834	
Iowa - - - - - - -							
Wisconsin - - - - -							
California - - - - - -							
District of Columbia - - -							
Total - - - - - -	422	14,495,220	251,491	33,344	78,787	538,063	14,510,828

Wrought Iron—Continued.

States.	Value of raw material used.	No. hands employed.		Average wages per mo.		Tons of wrought iron made.	Value of other products.	Value of entire products.
		Males.	Females.	Males.	Females.			
Maine								
New Hampshire	$5,600	6	-	$32 00	- -	110	- -	$10,400
Vermont	66,194	57	-	31 05	- -	2,045	- -	163,986
Massachusetts	221,194	260	-	22 50	- -	6,720	- -	428,320
Rhode Island	111,750	220	-	26 00	- -	2,650	- -	222,400
Connecticut	358,780	374	-	31 59	- -	6,325	$5,000	667,560
New York	838,314	1,037	-	26 00	- -	13,636	195,000	1,423,968
New Jersey	320,950	593	-	27 78	- -	8,162	- -	629,273
Pennsylvania	5,488,391	6,764	7	27 68	$7 50	182,506	219,500	8,902,907
Delaware	19,500	50	-	24 19	- -	550	- -	55,000
Maryland	439,511	568	-	23 33	- -	10,000	- -	771,431
Virginia	591,448	1,295	-	23 62	- -	15,328	- -	1,254,995
North Carolina	28,114	173	14	10 37	5 28	850	- -	66,980
South Carolina								
Georgia	5,986	26	1	11 35	5 00	90	- -	15,384
Florida								
Alabama	3,000	14	-	20 00	- -	100	- -	7,500
Mississippi								
Louisiana								
Texas								
Arkansas								
Tennessee	385,616	731	55	15 20	5 00	10,348	38,800	670,618
Kentucky	180,800	183	-	32 06	- -	3,070	- -	299,700
Ohio	604,493	708	-	33 61	- -	14,416	- -	1,076,192
Michigan								
Indiana	4,425	22	2	27 45	4 00	175	- -	11,760
Illinois								
Missouri	24,509	101	-	30 00	- -	963	- -	68,700
Iowa								
Wisconsin								
California								
District of Columbia								
Total	9,698,109	13,178	79	- -	- -	278,044	458,300	16,747,074

MALT AND SPIRITUOUS LIQUORS.

States.	Capital invested.	Quantities and kinds of grain, &c., consumed.						
		Bushels of barley.	Bushels of corn.	Bushels of rye.	Bushels of oats.	Bushels of apples.	Hogsheads of molasses.	Tons of hops.
Maine	$17,000	-	-	-	-	-	2,000	
Vermont	7,000	2,500	-	-	-	-	-	1
Massachusetts	457,500	80,000	19,400	26,600	-	-	35,130	29
Rhode Island	17,000	12,500	-	-	-	-	-	6
Connecticut	15,500	-	20,000	20,000	-	-	10	2
New York	2,585,900	2,062,250	1,647,266	909,067	6,707	60,940	24,500	581
New Jersey	409,655	103,700	254,000	58,400	-	409,700	-	42
Pennsylvania	1,719,960	550,105	1,483,555	517,180	24,700	51,200	10	263
Maryland	247,100	76,900	166,100	54,300	460	-	-	25
Virginia	100,915	20,000	250,700	62,680	450	-	-	14
North Carolina	21,930	-	64,650	4,700				
South Carolina	3,475	-	18,100					
Georgia	7,150	-	20,150	2,500	1,500			
Alabama	500	-	-	-	-	-	25	
Louisiana	8,500	10,000	-	-	-	-	-	10
Kentucky	168,895	65,650	551,350	30,520	-	5,000	-	18
Tennessee	66,125	3,000	258,400	5,480				
Missouri	298,900	124,440	309,200	24,900	-	-	-	31
Ohio	1,262,974	330,950	3,588,140	281,750	19,500	-	-	178
Indiana	334,950	118,150	1,417,900	48,700	1,000	-	-	18
Illinois	303,400	98,000	703,500	48,700	2,200	-	-	30
Michigan	139,425	32,030	212,300	19,150	-	-	-	16
Iowa	19,500	-	51,150	7,200				
Wisconsin	98,700	91,020	29,900	9,200				
New Mexico	7,300	-	2,000	12,900	-	-	-	28
Utah	3,000	1,000						
District of Columbia	12,000	5,000	-	-	-	-	-	2
Total	8,334,254	3,787,195	11,067,761	2,143,927	56,517	526,840	61,675	1,294

Malt and Spirituous Liquors—Continued.

States.	Hands employed.	Quantities of liquors produced.		
		Barrels of ale, &c.	Gallons of whiskey and high wines.	Gallons of rum.
Maine	5	- -	- -	220,000
Vermont	2	800		
Massachusetts	131	25,800	120,000	3,786,000
Rhode Island	9	3,900		
Connecticut	20	- -	130,000	1,200
New York	1,380	644,700	9,231,700	2,488,800
New Jersey	197	34,750	1,250,530	
Pennsylvania	911	189,581	6,548.810	1,500
Maryland	126	26,380	787,400	
Virginia	123	5,500	879,440	
North Carolina	75	- -	153,030	
South Carolina	33	- -	43,900	
Georgia	15	- -	60,450	
Alabama	2	- -	- -	3,000
Louisiana	8	3,000		
Kentucky	274	19,500	1,491,745	
Tennessee	159	- -	657,000	
Missouri	179	44,850	939,400	
Ohio	1,033	96,943	11,865,150	
Indiana	287	11,005	4,639,900	
Illinois	274	27,925	2,315,000	
Michigan	98	10,320	690,900	
Iowa	19	- -	160,600	
Wisconsin	98	31,320	127,000	
New Mexico	21	- -	42,000	
Utah	3	300		
District of Columbia	5	1,350		
Total	5,487	1,177,924	42,133,955	6,500,500

TANNERIES IN THE UNITED STATES.

States.	No. of establishments.	Capital invested.	No. of hides and skins.		Value of raw material.
			Hides.	*Skins.	
Maine	213	$732,747	316,334	81,350	$892,343
New Hampshire	163	441,975	166,579	109,595	543,779
Vermont	152	346,250	125,052	44,330	357,946
Massachusetts	246	1,377,725	750,220	293,000	2,311,178
Rhode Island	10	42,900	10,571	14,861	40,615
Connecticut	115	360,500	122,455	67,110	453,854
New York	942	5,025,143	1,707,862	871,894	6,065,221
New Jersey	133	572,857	101,485	120,731	423,537
Pennsylvania	1,039	3,540,318	926,450	293,798	3,169,309
Delaware	16	99,350	26,050	12,950	99,620
Maryland	116	628,900	169,585	68,810	725,612
Virginia	341	676,983	189,200	74,573	498,926
North Carolina	151	251,055	77,805	24,035	191,237
South Carolina	91	184,335	55,000	13,830	131,679
Georgia	140	262,855	81,484	21,705	185,604
Florida	4	9,400	2,100	1,200	4,300
Alabama	149	200,570	79,033	13,922	158,247
Mississippi	92	145,615	52,315	9,730	111,474
Louisiana	15	38,800	10,500	2,850	26,440
Texas	22	33,850	9,350	1,750	18,624
Arkansas	51	42,100	16,450	3,851	35,230
Tennessee	394	490,320	166,944	43,429	396,159
Kentucky	275	763,455	196,200	69,380	537,147
Ohio	706	1,340,389	344,280	228,493	1,118,080
Michigan	60	236,000	72,365	23,600	203,450
Indiana	358	514,897	141,549	57,070	405,838
Illinois	96	188,373	50,825	21,575	129,907
Missouri	148	228,095	120,667	44,493	247,956
Iowa	14	20,350	5,340	850	10,745
Wisconsin	8	78,950	29,800	14,900	93,380
New Mexico	1	500	120	- -	200
District of Columbia	2	25,000	5,000	4,200	25,600
Total	6,263	18,900,557	6,128,970	2,653,865	19,613,237

*There are about 6,000,000 sheep, goat, and other small skins tanned and dressed annually, which are not included in the above table.

Tanneries in the United States—Continued.

States.	Hands employed.		Monthly wages.		No. of sides of leather, skins, &c., produced.		Value.
	Males.	Females.	Males.	Females.	Skins.	Sides of leather.	
Maine	787	3	$17,229	$28	81,350	632,668	$1,620,636
New Hampshire	502	-	11,737	-	109,595	333,158	900,421
Vermont	397	-	8,807	-	44,330	250,104	587,466
Massachusetts	1,510	32	41,245	368	293,000	1,500,440	3,519,123
Rhode Island	38	-	829	-	14,861	21,142	75,040
Connecticut	407	-	10,027	-	67,110	244,910	731,000
New York	4,914	31	103,171	293	871,894	3,415,724	9,804,000
New Jersey	405	-	8,946	-	120,731	202,970	724,466
Pennsylvania	2,978	2	54,784	17	293,798	1,852,900	5,275,492
Delaware	108	-	2,533	-	12,950	52,100	163,742
Maryland	479	-	8,034	-	68,810	339,170	1,103,139
Virginia	900	6	13,643	62	74,573	378,400	894,877
North Carolina	372	1	5,291	4	24,035	155,610	352,535
South Carolina	264	-	3,667	-	13,830	110,000	261,332
Georgia	402	-	7,107	-	21,705	162,968	361,586
Florida	12	-	189	-	1,200	4,200	9,200
Alabama	457	5	7,700	45	13,922	158,066	335,911
Mississippi	266	3	4,924	25	9,730	104,630	229,407
Louisiana	51	3	930	22	2,850	21,000	55,025
Texas	63	1	1,007	10	1,750	18,700	52,050
Arkansas	110	-	1,814	-	3,851	32,900	78,774
Tennessee	915	6	14,338	32	43,429	333,888	746,484

States.	Males.	Females.	Males.	Females.	Skins.	Sides of leather.	Value.
Kentucky	877	2	14,417	9	69,380	392,400	985,267
Ohio	1,826	-	35,830	-	228,493	688,560	1,964,591
Michigan	265	-	6,782	-	23,600	144,730	363,980
Indiana	836	2	15,199	14	57,070	283,098	714,813
Illinois	240	-	5,145	-	21,575	101,650	244,028
Missouri	412	5	8,306	41	44,493	241,334	466,241
Iowa	28	-	543	-	850	10,680	24,520
Wisconsin	75	-	4,710	-	14,900	59,600	175,710
New Mexico	3	-	60	-	-	240	940
District of Columbia	10	-	270	-	4,200	10,000	40,000
Total	20,909	102	416,214	970	2,653,865	12,257,940	32,861,796

VII.

METEOROLOGICAL TABLES.

EXTRACT FROM THE METEOROLOGICAL REGISTER AT FORT SNELLING, MINNESOTA TERRITORY.

By P. Prescott.

Year.	Month.	Monthly mean of thermometer.	Quantity of rain during the month.
		Degrees.	Inches.
1843 - -	May - - - - - -	52.25	3.12
	June - - - - - -	62.98	5.22
	July - - - - - -	69.90	2.69
	August - - - - -	66.56	1.84
	September - - - - -	57.95	5.14
	October - - - - -	37.24	0.50
	November - - - - -	26.61	1.43
	December - - - - -	23.14	0.27
1844 - -	January - - - - -	10.46	1.50
	February - - - - -	23.44	0.72
	March - - - - -	33.61	0.97
	April - - - - - -	52.13	0.00
	May - - - - - -	55.88	4.50
	June - - - - - -	62.50	1.64
	July - - - - - -	69.58	4.80
	August - - - - -	64.74	4.37
	September - - - - -	55.45	4.26
	October - - - - -	42.22	0.97
	November - - - - -	29.41	0.77
	December - - - - -	18.17	0.58
1845 - -	January - - - - -	20.64	0.49
	February - - - - -	26.35	1.40
	March - - - - -	35.14	2.80
	April - - - - - -	47.50	3.15
	May - - - - - -	60.38	1.51
	June - - - - - -	67.83	6.80
	July - - - - - -	74.93	2.56

Extract—Continued.

Year.	Month.	Monthly mean of thermometer.	Quantity of rain during the month.
		Degrees.	Inches.
1845 - -	August - - - - - -	69.66	3.28
	September - - - - - -	60.56	2.21
	October - - - - - -	46.87	0.66
	November - - - - - -	30.85	0.40
	December - - - - - -	14.85	0.08
1846 - -	January - - - - - -	29.98	0.52
	February - - - - - -	20.33	0.02
	March - - - - - -	39.20	1.71
	April - - - - - - -	46.98	2.90
	May - - - - - - -	63.56	2.00
	June - - - - - - -	67.26	3.10
	July - - - - - - -	74.50	4.95
	August - - - - - -	74.22	3.80
	September - - - - - -	63.38	2.23
	October - - - - - -	46.33	2.45
	November - - - - - -	40.71	2.10
	December - - - - - -	22.50	0.21
1847 - -	January - - - - - -	5.32	0.29
	February - - - - - -	20.67	0.11
	March - - - - - -	24.32	0.44
	April - - - - - - -	46.60	0.45
	May - - - - - - -	52.00	4.96
	June - - - - - - -	65.38	2.66
	July - - - - - - -	72.56	3.66
	August - - - - - -	67.06	2.49
	September - - - - - -	58.56	4.00
	October - - - - - -	47.77	0.37
	November - - - - - -	31.23	1.71
	December - - - - - -	17.37	0.66
1848 - -	January - - - - - -	17.93	0.62
	February - - - - - -	20.27	1.13
	March - - - - - -	28.64	1.71
	April - - - - - - -	44.93	0.15
	May - - - - - - -	60.66	5 28
	June - - - - - - -	67.75	2.83
	July - - - - - - -	67.01	4.60
	August - - - - - -	67.56	3.19
	September - - - - - -	54.58	2.46
	October - - - - - -	47.90	0.62
	November - - - - - -	26.01	0.09
	December - - - - - -	7.15	0.15

Extract—Continued.

Year.	Month.	Monthly mean of thermometer.	Quantity of rain during the month.
		Degrees.	Inches.
1849 - -	January - - - - - -	7.02	0.10
	February - - - - - -	8.04	0.20
	March - - - - - -	26.24	4.11
	April - - - - - -	37.30	5.20
	May - - - - - -	60.07	5.97
	June - - - - - -	64.20	2.60
	July - - - - - -	63.22	4.13
	August - - - - - -	64.21	5.42
	September - - - - - -	61.05	2.52
	October - - - - - -	47.24	5.25
	November - - - - - -	42.06	1.48
	December - - - - - -	9.20	1.95
1850 - -	January - - - - - -	14.00	1.67
	February - - - - - -	18.30	0.83
	March - - - - - -	24.20	2.23
	April - - - - - -	47.05	2.60
	May - - - - - -	55.09	0.57
	June - - - - - -	71.02	4.62
	July - - - - - -	76.63	6.15
	August - - - - - -	74.29	2.97
	September - - - - - -	60.80	1.82
	October - - - - - -	49.43	0.32
	November - - - - - -	33.73	1.68
	December - - - - - -	12.54	0.04
1851 - -	January - - - - - -	15.29	0.20
	February - - - - - -	22.67	0.13
	March - - - - - -	39.91	1.23
	April - - - - - -	49.13	2.68
	May - - - - - -	56.83	3.96
	June - - - - - -	66.31	2.15
	July - - - - - -	75.46	2.60
	August - - - - - -	68.40	3.29
	September - - - - - -	- -	3.64

Meteorological observations made near Laphamsville, Kent county, Michigan, 1851.

By W. E. Wetmore.

Month.	Monthly mean.	Highest daily mean.	Lowest daily mean.	Maximum.	Minimum.	Monthly range.	Warmest day.	Coldest day.	Rain and melted snow.	Fair days.	Cloudy days.	Rainy days.	Snowy days.	Snowy and rainy days.	Prevailing wind, force, and direction.
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.			Inches.						
January............	28.90	40.66	3.66	50	— 8	58	14th	30	2.84	12	10	2	6	1	Light, SW., SE.
February............	32.65	46.33	19 00	53	10	43	26	16	6.70	5½	10	7½	5	......	Light, SW., SE.
March............	39.33	59.33	21.33	77	1	76	26	2	3.06	19	4½	2½	4	1	Strong, SW., NW.
April............	43.87	60.66	32.66	78	21	57	25	11	4.31	14	4	8	2	2	Moderate, SW., NW.
May............	54.38	71.66	36.00	86	24	62	10	1	10.54	11½	8½	10	1	......	Light, SE., SW.
June............	64.10	80.00	53.00	96	42	54	28	3	3.79	19	4	7	......	......	Mod., SW. to NE.
July............	69.50	77.33	60.00	94	43	51	15	3	3.30	16½	7½	7	......	......	Light, SW., NW.
August............	66.24	77.66	55.00	92	37	55	12	27	3.32	19	7½	4½	......	......	Light, SW. to NE.
September............	64.26	80.00	46.00	96	32	64	12	27	3 80	21	3	6	......	......	Light, SW., NW.
October............	49.59	67.00	29.66	81	25	56	10	26	5.68	11	6	11	......	3	Light, SW., NW.
November............	35.23	55.33	27.33	63	15	48	1	24	2.64	5	9	4	9	3	Light, SW., NW.
December of 1850....	26.14	39.66	12.33	45	— 6	51	2	13	3.10	7	12½	2	8½	1	Light, SW., NW.
Total............	......	......	......	......	......	......	......	......	53.08	160½	86½	71½	35½	11	

The yearly mean is 47°.85.
The coldest day in the year, January 30.
The warmest day in the year, June 28.
The yearly range, 104°.
Ground-sparrows appeared, February 25.
Willows in blossom, March 18.

Peach, currant, &c., April 29.
Oaks in leaf, May 17.
Wheat in full blossom, June 19.
First autumnal frost, September 25.
First snow, October 21.

Abstract of Meteorological observations made near Fort Madison, Lee county, Iowa, for the year ending Nov. 30, 1851.

BY D. MCCREADY.

Months.	Monthly mean.	Highest temperature.	Time of highest temperature.	Lowest temperature.	Time of lowest temperature.	Range.	Quantity of rain.	Quantity of snow.	Prevailing course of wind from—	Days on which snow and rain fell, and other remarks.
							Inches.	*Inches.*		
December, 1850.	25.03	46	Sunset, 1	$\frac{\circ}{2}$	Sunrise, 5, 8	48	2.00	2.37	NW. and SW..	Rain, 1, 2; snow, 3, 4, 5, 6, 18, 28; depth of rain in 1850, 47.39 inches; snow, 18.57; yearly mean, 50.86.
January, 1851..	30.13	58	Noon, 24, 25	$\frac{\circ}{12}$	Sunrise, 30	70	55	.75	SW. and NW..	Rain, 8, 27; snow, 16, 28, 31.
February, 1851.	34.25	66	Noon, 23, 24	4	Sunrise, 11, 16	62	1.70	.05	NW. and SW..	Rain, 14, 19, 26; snow, 21.
March, 1851...	43.44	76	Noon, 29	15	Sunrise, 8	61	1.66	.05	NW., SW., SE.	Rain, 4, 5, 16, 20, 21, 22, 29, 30; snow, 7.
April, 1851 ...	48.03	76	Noon, 25	28	Sunrise, 6, 8	48	2.45	10.00	NW., SE., SW.	Rain, 1, 4, 7, 12, 13, 18, 29; snow-storm commenced night of 4th; storm from NW., continued to drift and storm until 3 o'clock in the evening of the 5th.
May, 1851....	62.37	86	Noon, 28	26	Sunrise, 1	40	10.80	....	SE., SW., S....	Rain, 2, 6, 7, 9, 11, 12, 16, 17, 18, 19, 20, 21, 26, 27, 28, 30, 31.
June, 1851.....	68.88	96	Noon, 26	50	Sunrise, 4	46	8.60	....	SE., SW.......	Rain, 2, 3, 4, 5, 6, 12, 14, 15, 19, 20, 21, 25, 26, 28, 30.
July, 1851.....	77.23	102	Noon, 28	51	Sunrise, 1	51	5.95	....	SE., SW.......	Rain, 1, 4, 6, 15, 16, 17, 22, 23, 28; cholera in Fort Madison 25th.
August, 1851...	71.91	93	Noon, 8	52	Sunrise, 27	66	2.95	....	SE., NE., E....	Rain, 2, 3, 6, 10, 11, 13, 25, 29; cholera in West Point, second time, 11th, and Madison, second time, 8th to 12
September, 1851	71.34	94	Noon, 6	32	Sunrise, 28	62	1.90	....	SE.............	Rain, 13, 18, 20, 23; first frost 25th, end of the growing season.
October, 1851..	54.32	80	Noon, 1	18	Sunrise, 26	54	2.70	....	SE., SW., NW.	Rain, 9, 10, 28.
November, 1851	36.90	54	Noon & sunset 4	19	Sunrise, 6, 10	35	2.97	.50	NW., SW., SE.	Rain, 11, 12, 19, 27; snow, 22.
Yearly mean...	51.98	......	....	....	....	....	44.23	13.72		

The thermometer is elevated 5 feet from the ground, has a northern exposure, out of the influence of the direct rays of the sun. The mean temperature is deduced from three daily observations, taken at sunrise, noon, and sunset. The rain gauge was a vessel of equal width at top and bottom, usually set upon the ground. January 30 was the coldest day during this far of 1851; thermometer 12 degrees below zero at sunrise, 1 degree at noon below, and 3 above zero at sunset. July 28, warmest day; thermometer at 10 o'clock, A. M., 99°; at 2 o'clock, 102°; at 12 o'clock, 100°; at sunset, 83°. July 13, at 11 o'clock, thermometer 100°, and remained so until half-past 2 o'clock in the evening. N. B. $\frac{\circ}{12}$ means 12 degrees below zero.

ABSTRACTS FROM A METEOROLOGICAL JOURNAL, KEPT BY J. HALL AT ATHENS, MENARD COUNTY, ILLINOIS.—LATITUDE 39° 55′ NORTH; LONGITUDE 12° 52′ WEST FROM WASHINGTON.

Table No. 1, *showing the mean temperature of each month; also, the average clearness of the sky and quantity of rain, for the year* 1851.

Months.	TEMPERATURE. At sunrise.	At 9 a. m.	At 3 p. m.	At sunset.*	Monthly mean.	Highest degree.	Lowest degree.	Monthly range.	Clearness of the sky—monthly average.	Perpendicular depth of rain which fell during the month.
January	24.93	30.45	37.12	34.06	31.64	61	— 9	70	5.74	0.52
February	29.14	34.75	42.14	38.28	36.07	63	8	55	4.03	4.38
March	35.64	46.06	53.16	48.12	45.74	76	16	60	6.32	0.05
April	40.00	51.26	57.90	51.80	50.24	76	29	47	5.67	4.70
May	55.74	66.06	73.19	66.64	65.41	92	26	66	5.61	6.71
June	62.79	70.10	75.86	69.96	69.68	87	52	35	4.76	10.16
July	68.09	78.90	84.03	76.64	76.91	96	52	44	7.00	3.45
August	65.70	73.81	79.19	70.90	72.41	92	54	38	5.35	6.86
September	62.30	72.46	79.30	68.30	70.64	93	37	56	7.13	2.79
October	46.42	56.09	62.77	51.90	54.48	79	23	56	6.93	0.98
November	33.33	38.63	43.76	36.30	38.11	58	19	39	3.73	2.38
December	21.67	25.64	30.54	24.33	25.55	62	—11	73	3.96	2.93
Yearly mean	45.47	53.68	59.91	53.10	53.07	96	—11	107	5.51	46.91

* After the 1st of August the observations were omitted at sunset and made at 9 p. m.

Table No. 2, *exhibiting the mean temperature of each month from July,* 1847, *to January,* 1852; *also, the highest and lowest degree of temperature, together with the monthly range.*

Months.	1847. Monthly mean.	Highest degree.	Lowest degree.	Monthly range.	1848. Monthly mean.	Highest degree.	Lowest degree.	Monthly range.	1849. Monthly mean.	Highest degree.	Lowest degree.	Monthly range.	1850. Monthly mean.	Highest degree.	Lowest degree.	Monthly range.	1851. Monthly mean.	Highest degree.	Lowest degree.	Monthly range.
January	....	.....	.....	.....	31.52	58	— 9	67	31.10	55	— 9	64	30.85	55	— 1	56	31.64	61	— 9	70
February	....	.....	.....	.....	32.15	65	5	60	26.23	57	—11	68	30.95	75	— 9	84	36.07	63	8	55
March	....	.....	.....	.....	38.31	78	— 7	85	42.93	78	20	58	36.49	73	5	68	45.74	76	16	60
April	....	.....	.....	.....	48.22	84	26	58	49.22	84	22	62	44.44	74	23	51	50.24	76	29	47
May	....	.....	.....	.....	63.70	92	39	53	60.22	86	31	55	56.51	88	30	58	65.41	92	26	66
June	....	.....	.....	.....	67.47	92	40	52	71.48	95	52	43	71.38	91	44	47	69.68	87	52	25
July	74.64	97	45	52	69.25	92	48	44	72.63	100	48	52	76.13	96	57	39	76.91	96	52	44
August	70.87	88	47	41	70.34	94	51	43	69.28	90	48	42	74.97	96	55	41	72.41	92	54	38
September	65.60	90	42	48	57.46	88	35	53	64.36	86	42	44	63.70	87	46	41	70.64	93	37	56
October	52.71	88	20	68	50.07	77	26	51	50.46	75	35	40	52.46	79	24	55	54.48	79	23	56
November	40.93	78	12	66	32.75	59	7	52	57.53	77	25	52	40.71	72	20	52	38.11	58	19	39
December	30.38	64	— 6	70	25.58	59	0	59	23.20	54	— 1	55	25.82	49	— 4	53	25.55	62	—11	73
Annual mean.	55.85	.....	.....	.....	49.73	94	— 9	103	49.88	100	—11	111	50.37	96	— 9	105	53.07	96	—11	107

Table No. 3, *containing the amount of rain which fell during each month for nine years, viz: from January* 1, 1843, *to January* 1, 1852.

Months.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	Monthly average.
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
January	2.00	2.80	1.95	4.87	2.27	1.60	5.54	1.51	0.52	2.56
February	1.92	1.30	0.46	1.83	3.47	2.37	1.04	0.80	4.38	1.95
March	3.05	3.40	2.20	2.55	1.51	4.47	4.71	1.52	1.05	2.71
April	4.50	5.90	6.50	7.84	2.09	3.33	4.96	5.03	4.70	4.98
May	6.00	7.55	2.55	3.96	3.12	4.03	3.51	3.60	6.71	4.55
June	5.74	17.13	13.68	5.28	1.07	4.48	2.91	6.22	10.16	7.40
July	1.87	4.50	2.63	2.33	2.01	4.55	2.31	4.50	3.45	3.12
August	0.75	2.80	1.63	1.13	2.64	5.03	3.43	6.40	6.86	3.40
September	6.60	0.32	4.14	7.44	3.76	1.70	5.06	4.68	2.79	4.05
October	1.00	1.00	2.48	1.16	4.62	2.23	2.46	2.06	0.98	1.99
November	5.10	1.75	3.35	1.55	4.80	2.05	1.37	2.58	2.38	2.77
December	2.40	0.72	1.48	4.96	1.25	8.39	1.19	1.79	2.93	2.79
Annual amount	40.93	49.17	43.04	44.90	32.61	44.23	38.49	40.69	46.91	42.33

ATHENS, MENARD COUNTY, ILLINOIS,
January 1, 1852.

DEAR SIR: The foregoing abstracts from my meteorological journal, which I now send for publication in the "Patent Office Report," are copied with great care. My observations being made for my own use, I think that I can say that they can be relied upon as being as correct as observations could be made under ordinary circumstances.

J. HALL.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS NEAR WASHINGTON ARKANSAS, FOR THE YEARS 1850 AND 1851, NORTH LATITUDE 33° 44'.

BY N. D. SMITH.

Months.	1850.			1851.		
	Thermometer.		Rain.	Thermometer.		Rain.
	Highest.	Lowest.	Inches.	Highest.	Lowest.	Inches.
January	66	28	10.75	70	18	1.12
February	78	14	5.12	76	20	12.25
March	80	28	3.25	80	28	4.5
April	86	36	9.5	84	38	2.25
May	90	44	3.87	88	38	3.75
June	92	56	3.88	94	64	2.38
July	94	64	4.38	100	62	1.75
August	101	63	7	102	64	2.5
September	88	52	1	94	44	.62
October	82	32	4.62	86	36	1.25
November	78	22	4.87	80	18	3.25
December (to the 10th)	74	12	5	74	18	.5
			63.24			36.12

Warmest day in 1850, August 13, 101°. Coldest day in 1850, December 7, 12°. Warmest day in 1851, August 14, 102°. Coldest day in 1851, January 9, 18°.

The above report, as to rain, will only apply to my own immediate neighborhood, and would vary materially from an account kept within three miles of me, in any direction. To ascertain the quantities of rain that fall in any considerable extent of country, during any given time, it would be necessary to keep accounts at different places. In this southern clime, especially during the summer months, we seldom have a general rain, but only local showers, pervading but a small extent of territory; and not unusually these local showers fall repeatedly upon the same localities, sufficiently often for the requirements of the growing crops, making them abundant; while within the distance of two or three miles very distinct showers, and at veiry different times, are received, and in insufficient quantities. These showers also vary in their quantities and manner of falling; sometimes we have a fall of two and even three inches in the space of an hour, and succeeded by a drought of four or five weeks; and again we have light showers of an eighth or a quarter of an inch a day, for several days in succession.

In 1850, from the 20th February to the 1st of April, the weather was favorable, and the soil in good condition for ploughing and planting, and much corn was up, promising well; but on the first two days of this month, there fell nearly three inches of rain, which saturated the ground;

this was followed by frost, that killed most of the corn that was up. Replanting was immediately resorted to; but from the 16th of April to the 13th of May a continued succession of cold rains, amounting to nine inches in all, had the effect of rotting the seed in the ground, making replanting again necessary. From this time the season continued favorable until the last of July, when a drought commenced which continued till the 25th of August. Corn was in roasting ear, and cotton backward. Rain then set in, and in six days there fell seven inches, accompanied with a wind that prostrated all the heavy corn and destroyed a large portion of it. Corn and cotton that year yielded less than half the average.

In 1851, from the middle of March to the middle of May, the season was as favorable as could be desired, and every prospect of fruitfulness better than we had had for several years; but from that time, when an increased supply of rain was essential to perfect the crops, a drought followed, with highly increased heat, the thermometer ranging up to 90°, and gradually rising, through July and August, up to 102°, without rain enough at any one time to lay the dust. Our wells throughout the prairies all failed, and all the streams nearly dried up. Many families were compelled to haul water for house use from two to five miles. Cotton suffered much less than corn, and is said to be two-thirds of an average crop. Corn is less than half, and sweet potatoes almost a failure. And yet, in a neighborhood only two miles from me, a rain of two inches fell on the 17th of June, and another of one inch on the 10th of July—those five plantations have produced first rate crops. Many instances of the kind have occurred in small districts throughout the country.

METEOROLOGICAL OBSERVATIONS MADE AT EAST MONTPELIER, WASHINGTON COUNTY, VERMONT.

By B. J. Wheeler.

1844.

Months.	Clear days.	Cloudy days.	Rainy days.	Snowy days.	Clear evenings.	Cloudy evenings.	Rainy even's.	Snowy evenings.
January - -	18	8	1	4	19	4	3	5
February - -	13	14	-	2	11	16	-	2
March - -	16	12	1	2	11	16	2	2
April - -	20	9	1	-	20	8	2	
May -	9	22	-	-	11	17	3	
June - -	12	14	4	-	11	15	4	
July - -	19	9	3	-	15	11	5	
August - -	15	16	-	-	12	17	2	
September -	22	7	1	-	17	11	1	1
October - -	14	13	4	-	10	15	6	
November -	10	18	-	2	10	17	1	2
December -	9	22	-	-	9	21	1	
Total - -	177	164	15	10	156	168	30	12

1845.

Months.	Clear days.	Cloudy days.	Rainy days.	Snowy days.	Clear evenings.	Cloudy evenings.	Rainy evenin's.	Snowy even's.
January - -	8	20	-	3	11	17	1	2
February - -	12	13	1	2	13	11	1	3
March - -	15	14	-	2	15	15	-	1
April - -	13	15	1	1	14	14	1	1
May - - -	15	16	-	-	16	12	2	1
June - -	20	10	-	-	18	10	2	
July - -	17	13	1	-	17	12	2	
August - -	21	9	1	-	21	10		
September -	14	14	2	-	12	17	1	
October - -	21	8	2	-	18	12	1	
November -	5	21	4	-	9	18	2	1
December -	15	12	-	4	13	14	-	4
Total - -	176	165	12	12	177	162	13	13

Meteorological Observations at East Montpelier—Continued.

1846.

Months.	Clear days.	Cloudy days.	Rainy days.	Snowy days.	Clear evenin's.	Cloudy evenin's.	Rainy evenin's.	Snowy even's.
January - -	9	19	1	2	11	18	1	1
February - -	12	13	-	3	11	15	-	2
March - -	15	15	1	-	14	16	1	
April - -	19	11	-	-	18	9	3	
May - - -	11	20	-	-	15	13	3	
June - -	14	15	1	-	16	8	6	
July - - -	12	19	-	-	16	13	2	
August - -	19	12	-	-	20	11		
September -	19	10	1	-	18	10	2	
October - -	9	20	1	1	12	17	2	
November -	7	21	-	2	8	19	1	2
December -	8	21	-	2	11	16	-	4
Total - -	154	196	5	10	170	165	21	9

SNOW.

	Inches
January - - - - - -	27
February - - - - - -	18
March - - - - - -	4
April - - - - - - -	2
May - - - - - - -	1
October - - - - - -	10
November - - - - - -	20
December - - - - - -	26
Total - - - - - -	9 feet.

Meteorological Observations at East Montpelier—Continued.

1847.

Months.	Clear days.	Cloudy days.	Rainy days.	Snowy days.	Clear evenin's.	Cloudy evenin's.	Rainy evenin's.	Snowy even's.
January - -	10	20	-	1	10	17	1	3
February - -	9	18	-	1	8	17	1	2
March - -	15	15	-	1	14	15	1	1
April - -	10	19	-	1	14	15	1	
May - - -	17	11	3	-	19	10	2	
June - -	12	18	-	-	9	19	2	
July - -	16	15	-	-	14	15	2	
August - -	18	13	-	-	14	16	1	
September -	11	19	-	-	12	17	1	
October - -	13	17	1	-	15	13	3	
November -	8	21	1	-	10	16	4	
December -	5	24	1	1	5	22	3	1
Total - -	144	210	6	5	144	192	22	7

SNOW.

	Inches.
January - - - - - -	31
February - - - - - -	28
March - - - - - -	22
April - - - - - -	13
May - - - - - - -	1
November - - - - - -	5
December - - - - - -	17
Total - - - - - - -	9 ft. 9 in.

Meteorological Observations at East Montpelier—Continued.

1848.

Months.	Clear days.	Cloudy days.	Rainy days.	Snowy days.	Clear evenin's.	Cloudy evenin's.	Rainy evenin's.	Snowy even's.
January - -	14	16	-	1	16	14	-	1
February - -	14	14	-	1	14	14	-	1
March - -	11	18	-	2	15	15	-	1
April - -	15	15	-	-	23	4	2	1
May - - -	12	18	1	-	10	20	1	
June - -	6	23	1	-	12	16	2	
July - - -	8	21	2	-	12	16	3	
August - -	17	14	-	-	20	8	3	
September -	9	21	-	-	10	17	3	
October - -	9	20	2	-	11	15	5	
November -	6	23	1	-	7	21	1	1
December -	3	23	3	2	7	22	-	2
Total - -	124	226	10	6	157	182	20	7

SNOW.

	Inches.
January - - - - - -	26
February - - - - - -	29
March - - - - - -	27
April - - - - - - -	4
November - - - - - -	7
December - - - - - -	29
Total - - - - -	10 ft. 2 in.

Meteorological Observations at East Montpelier—Continued.

1849.

Months.	Clear days.	Cloudy days.	Rainy days.	Snowy days.	Clear evenin's.	Cloudy evenin's.	Rainy evenin's.	Snowy even's.
January - -	13	17	-	1	10	19	1	1
February - -	7	19	-	2	14	13	-	1
March - -	8	21	-	2	12	17	1	1
April - -	11	18	-	1	11	16	1	2
May - -	6	25	-	-	8	21	2	
June - -	16	14	-	-	17	12	1	
July - -	17	14	-	-	18	12	1	
August - -	14	15	2	-	20	7	4	
September -	13	17	-	-	17	12	1	
October - -	9	20	2	-	10	18	3	
November -	6	23	1	-	9	16	4	1
December -	4	22	-	5	5	19	-	7
Total - -	124	225	5	11	151	182	19	13

SNOW.

	Inches.
January - - - - - -	10
February - - - - - -	16
March - - - - - -	20
April - - - - - - -	6
October - - - - - -	1
November - - - - - -	1
December - - - - - -	23
Total - - - - - -	6 ft. 5 in.

Meteorological Observations at East Montpelier—Continued.

1850.

Months.	Clear days.	Cloudy days.	Rainy days.	Snowy days.	Clear evenin's.	Cloudy evenin's.	Rainy evenin's.	Snowy even's.
January - -	10	19	-	2	10	18	-	3
February - -	12	16	-	-	7	19	1	1
March - -	14	15	-	2	13	16	-	2
April - -	20	6	3	1	16	12	-	2
May - -	6	21	4	-	12	13	6	
June - -	14	15	1	-	12	16	2	
July - -	12	17	2	-	16	12	3	
August - -	12	18	1	-	20	9	2	
September -	12	18	-	-	16	11	3	
October - -	11	18	2	-	14	10	6	1
November -	9	18	2	1	11	18	1	
December -	6	20	-	5	9	13	1	8
Total - -	138	201	15	11	156	167	25	17

SNOW.

	Inches.
January - - - - - -	25
February - - - - - -	20
March - - - - - -	12
April - - - - - -	15
October - - - - - -	1
November - - - - - -	6
December - - - - - -	50
Total - - - - - -	10 ft. 9 in.

Meteorological Observations at East Montpelier—Continued.

1851.

Months.	Clear days.	Cloudy days.	Rainy days.	Snowy days.	Clear evenin's.	Cloudy evenin's.	Rainy evenin's.	Snowy even's.
January - -	6	21	-	4	8	20	-	3
February - -	8	16	3	1	11	12	5	
March - -	8	21	-	2	13	17	-	1
April - -	9	20	1	-	12	15	3	
May - -	7	22	2	-	8	17	6	
June - -	13	17	-	-	14	13	3	
July - -	13	17	1	-	12	18	1	
August - -	12	18	1	-	17	11	3	
September -	16	12	2	-	19	9	2	
October - -	9	19	3	-	13	14	3	1
November -	5	21	2	2	6	20	2	2
December -	9	17	3	2	10	15	1	5
Total - -	115	221	18	11	143	181	29	12

SNOW.

	Inches.
January - - - - - -	19
February - - - - - -	8
March - - - - - -	13
April - - - - - -	3
October - - - - - -	1
November - - - - - -	30
December - - - - - -	19
Total - - - - - -	7 ft. 9 in

Meteorological Observations at East Montpelier—Continued.

1850.

Months.	Clear days.	Cloudy days.	Rainy days.	Snowy days.	Clear evenin's.	Cloudy evenin's.	Rainy evenin's.	Snowy even's.
January - -	10	19	-	2	10	18	-	3
February - -	12	16	-	-	7	19	1	1
March - -	14	15	-	2	13	16	-	2
April - -	20	6	3	1	16	12	-	2
May - -	6	21	4	-	12	13	6	
June - -	14	15	1	-	12	16	2	
July - -	12	17	2	-	16	12	3	
August - -	12	18	1	-	20	9	2	
September -	12	18	-	-	16	11	3	
October - -	11	18	2	-	14	10	6	1
November -	9	18	2	1	11	18	1	
December -	6	20	-	5	9	13	1	8
Total - -	138	201	15	11	156	167	25	17

SNOW.

	Inches.
January - - - - - -	25
February - - - - - -	20
March - - - - - -	12
April - - - - - -	15
October - - - - - -	1
November - - - - - -	6
December - - - - - -	50
Total - - - - - -	10 ft. 9 in.

Meteorological Observations at East Montpelier—Continued.

1851.

Months.	Clear days.	Cloudy days.	Rainy days.	Snowy days.	Clear evenin's.	Cloudy evenin's.	Rainy evenin's.	Snowy even's.
January - -	6	21	-	4	8	20	-	3
February - -	8	16	3	1	11	12	5	
March - -	8	21	-	2	13	17	-	1
April - -	9	20	1	-	12	15	3	
May - -	7	22	2	-	8	17	6	
June - -	13	17	-	-	14	13	3	
July - -	13	17	1	-	12	18	1	
August - -	12	18	1	-	17	11	3	
September -	16	12	2	-	19	9	2	
October - -	9	19	3	-	13	14	3	1
November -	5	21	2	2	6	20	2	2
December -	9	17	3	2	10	15	1	5
Total - -	115	221	18	11	143	181	29	12

SNOW.

	Inches.
January - - - - - -	19
February - - - - - -	8
March - - - - - -	13
April - - - - - -	3
October - - - - - -	1
November - - - - - -	30
December - - - - - -	19
Total - - - - - -	7 ft. 9 in

Mean temperature of each month, and of the year, deduced from observations made at sunrise, noon, and sunset of each day.

Months.	Sunrise.	Noon.	Sunset.	Mean.
January	15.2	25.5	22.2	21
February	17.4	29	26.3	24.2
March	24.1	39.4	33.8	32.4
April	33	47.9	43	41.3
May	43.3	59.4	50.9	51.2
June	47.4	67.7	57.3	57.5
July	54.6	73	62.8	63.4
August	50.7	71	61	60.9
September	47.2	65.2	58.5	57
October	40.1	54.6	50.5	48.4
November	25.1	35.2	30.8	30.3
December	11.7	22.6	19.4	17.9
Mean	34.1	49.2	43	42.1

Range at sunrise, 93.
Range at noon, 92.
Range at sunset, 83.
Range during the year, 109.
Warmest sunrise, September 13, 68.
Warmest noons, June 30 and September 10, 84.
Warmest sunsets, June 29 and September 10, 76.
Warmest day, June 30; mean temperature, 73⅓.
Coldest sunrise, February 1, 25.
Coldest noon, January 30, 8.
Coldest sunset, January 30, 7.
Coldest day, January 30; mean temperature, 8⅓.

METEOROLOGICAL OBSERVATIONS MADE AT LITCHFIELD, CONNECTICUT, FOR THE YEAR 1851.

BY J. L. HENDRICK.

Months.	Thermometer.				Weather.						Winds.									Remarks.
	Mean temperature.	Highest degree.	Lowest degree.	Range.	Fair.	Cloudy.	Rain.*	Snow.†	Rain and snow.	Foggy.	East.	Southeast.	South.	Southwest.	West.	Northwest.	North.	Northeast.	Prevailing wind.	
January	25.29	50	9	59	19.5	11.5	3	5	1	....	5	3	5	17	20	18	5	4	W. and NW.	Month rather mild.
February	28.27	50	4	54	10.5	17.5	10	2	....	8	8	2	6	14	10	15	8	5	SW and NW.	First half month cold; second half month mild.
March	33.60	66	12	54	16.5	14.5	1	9	1	....	6	2	4	16	9	14	7	6	SW. and NW.	Month rather mild.
April	42.14	68	20	48	14.5	15.5	9	2	....	1	6	6	5	8	4	10	10	10	NE. and NW.	Whole month rather cold.
May	52.52	83	25	58	16.5	14.5	10	....	2	3	5	4	7	18	12	10	3	5	SW.	Whole month rather cold.
June	60.31	92	39	53	21	9	7	....	....	6	7	3	4	18	16	10	3	3	SW.	Cold till 20th; then warm.
July	66.33	88	49	39	17	14	16	....	....	5	6	2	4	13	17	10	6	2	W.	Month rather cold—at least nights.
August	63.87	87	40	47	21	10	9	....	....	4	5	2	5	19	7	10	3	4	SW.	Month rather cold—at least nights.
September	59.45	90	29	61	20	10	9	....	....	3	8	2	4	12	9	8	6	6	SW.	Warm 6th to 13th, inclusive; warmest week of season.
October	50.16	74	28	46	18	13	9	1	....	3	2	4	6	13	15	8	9	4	SW. and W.	Month mild.
November	32.53	55	13	42	14	16	5	6	....	1	4	2	1	3	15	15	8	1	W. and NW.	Month variable: generally cold.
December	19.99	50	9	59	16	16	2	6	....	4	8	1	2	9	13	11	7	2	W.	First half month mild; second half month very cold.
Whole year	44.54	92	9	101	204.5	160.5	90	31	4	38	70	33	53	160	147	139	75	52	SW.	Summer rather cold.

* I have no rain-gauge.

† Last fall of snow in spring, May 5 and 6. Last frost 7th. First frost in autumn, September 15, (light;) 25th, severe. First fall of snow in autumn, October 26, two inches deep. Three frosts in September; six frosts in October. November 24, severe snow-storm. Fine sleighing two or three days.

Winds.—The table of winds on the preceding page does not show the number of days that the wind blew from the several points of the compass, but the number of *times* that the vane was observed to point in the several directions, whether it remained in that direction a few minutes or a whole day. The object has been to show the *variation* of the wind as well as the *prevailing wind*.

Range of the Thermometer.—The greatest range of the thermometer, as shown by the foregoing table, is that of September, (61°,) and the next greatest those of January and December, (59°.) Warmest month in the year, July; warmest week, September 6 to 13; warmest day, June 27; coldest, December 26; mean, from sunrise to sunset, 2½°.

The mean temperature is not estimated in degrees and minutes, but in degrees and decimals.

The thermometer is kept on the north side of a building, beyond the reach of reflected heat, and fully exposed to the air. Difference in the temperature of this place and that of the south side of the building, on the 27th day of December, 11 to 12 o'clock a. m., 34°.

A Garden Experiment.—The piece of ground that I now occupy as a garden was originally an alder swamp, though situated on a hill of considerable extent and elevation. When cleared, it was partially drained, and used for a number of years as a garden, but was finally abandoned as too wet. In the autumn of 1849, it was ploughed and drained, having lain to meadow a number of years, and was found to consist of a dark clay muck, or loam, so deep that the plough did not reach the bottom, or subsoil, which is a sandy, gravelly loam, with a small mixture of clay.

Among the things planted in the spring of 1850, was a bed of marrowfat peas. The vines, or straw, grew very large, but the pods were small, and not well filled. In the spring of 1851, it was ploughed again, and a ditch dug along one side so deep as to throw up enough of the subsoil to cover a strip three or four feet wide to the depth of two or three inches. On this strip I planted peas again; and not only were the vines large, but the pods, also, were numerous, large, and well filled. I ascribe the difference of the result only to the mixture of the subsoil.

Potatoes.—The potato malady appears to have prevailed more extensively during the past season (1851) than it did the previous year, yet the crop in general is thought to be better than that of 1850.

Best varieties: "Waterbury reds," or "sand-lakes," "mercers," and "pink-eyes."

Time of planting: If on a moist, rich soil, they should be planted early, and dug and used early, or the crop will be lost. Early planting is considered best on any soil.

Progress of the Year.—In my remarks of last year, I stated the probability of being able to give something more definite the present year. I have, however, little to communicate. There is, perhaps, a slow and gradual improvement in the agricultural department of society. I infer this from the condition of our late agricultural fair, compared with those of former years. The interest taken in the matter appeared to be greater than formerly. Many of the agricultural products appeared to be better than those of former years; the character of the stock showed an advance, and farmers seemed more inclined to read on subjects pertaining to their profession. The public mind seems to be waking up a little; and, all things considered, there is hope of a change for the better.

Respectfully, yours,

J. L. HENDRICK.

Hon. Thomas Ewbank,
Commissioner of Patents.

Litchfield, *January* 1, 1852.

Meterological Record for the year 1851 *at Beaver Brook, Sullivan county, N. Y.* By Chas. S. Woodward.

	Barometer. Morn.	Barometer. Noon.	Barometer. Night.	Thermometer. Morn.	Thermometer. Noon.	Thermometer. Night.	Wind. Morn.	Wind. Noon.	Wind. Night.	Remarks.
Jan. 1	28.93	28.88	28.89	18	28	28	West......	Northwest...	WNW ...	Clear, cloudy, and squally.
2	29.13	29.14	29.00	25	31	32	NNW.....	South......	Southeast...	Clear, with light winds.
3	28.69	28.69	28.70	27	31	29	NNW.....	Northwest...	Southeast...	Cloudy and blustry.
4	28.63	28.62	28.79	28	29	26	Southeast...	NNW......	....	Snow, with high wind.
5	29.08	29.10	29.06	18	24	27	Northwest...	West......	Southeast...	Snow at night.
6	29	29	28.99	27	34	36	North.......	South......	Southwest...	Clear, cloudy, and pleasant.
7	28.94	28.97	29.15	33	37	35	Calm.......	Northwest...	Northwest..	Cloudy; clear.
8	29.27	29.30	29.30	24	25	33	Northwest..	North......	East.......	Clear and pleasant.
9	29.09	29.02	28.79	31	31	38	East........	Southeast...	Southeast...	Cloudy and light rain.
10	28.70	28.78	28.76	38	43	43	West.....	West.....	Southwest...	Cloudy.
11	28.88	28.91	28.92	35	38	37	Northwest..	Northwest...	Southwest...	Cloudy.
12	28.87	28.85	28.88	31	35	37	SW; SE...	SW.; S....	Southwest...	Cloudy.
13	28.98	29	29.02	34	38	38	Northwest..	West.....	West.....	Fair.
14	29.12	29	28.97	33	38	42	Northwest...	Southwest..	Southwest...	Cloudy.
15	28.67	28.84	28.82	37	42	49	NW.; SE..	South.......	South......	Cloudy.
16	28.92	28.87	28.86	42	45	50	West.....	West.....	South......	Cloudy.
17	28.79	28.92	29.08	50	44	39	Southwest..	Northwest...	West......	Cloudy and blustry.
18	29.26	29.31	29.44	29	34	26	West......	Northwest...	Northwest...	Clear.
19	29.60	29.63	29.55	17	22	29	North......	Southeast...	Southeast...	Clear and calm.
20	29.17	29	29.02	28	34	36	East........	Southwest..	SW.; NW..	Cloudy, with snow and rain.
21	29.27	29.35	29.36	31	36	36	North......	North......	West......	Cloudy; clear.
22	29.16	29.05	28.98	32	34	35	East.......	West......	Southwest.	Snow.
23	29.08	29.18	29.22	34	40	41	SW.; NW.	Southwest..	North; west.	Pleasant; northern lights at night.
24	29.22	29.13	29.10	29	43	45	S.; N......	Southwest..	Southwest..	Clear.
25	29.30	29.30	29.17	36	39	44	West......	Southwest..	Southwest..	Pleasant.
26	29	29	28.98	35	44	47	Northwest...	Southwest..	Northwest...	Pleasant.
27	29.06	29.10	29.20	38	40	34	Northwest...	West......	West......	Pleasant.
28	29.15	29	28.84	30	31	33	Southeast..	Southeast...	Northeast..	Snow, hail, and rain.
29	28.27	28.27	28.44	37	35	24	NE.; NW..	Northwest...	Northwest...	Snow squalls and high winds.
30	28.72	28.83	29.05	11	11	10	Northwest...	Northwest...	Northwest..	Blustry and cold.
31	29.30	29.44	29.60	19	14	20	Northwest...	Northwest..	Northwest...	Blustry and cold.

Barometer—average, 29.02; highest, January 19; lowest, January 29. Thermometer—average, 32.86; highest, January 16 and 17; lowest, January 31.

Meterological Record for the year 1851—Continued.

	Barometer. Morn.	Barometer. Noon.	Barometer. Night.	Thermometer. Morn.	Thermometer. Noon.	Thermometer. Night.	Wind. Morn.	Wind. Noon.	Wind. Night.	Remarks.
Feb. 1	29.72	29.70	29.66	14	20	25	North......	Southeast...	South......	Cloudy; snow at night.
2	29.45	29.43	29.37	25	29	32	Southeast...	West......	West......	Cloudy.
3	29.23	29.22	29.17	31	35	42	Northwest...	Northwest...	Southwest..	Fair.
4	28.94	28.84	28.74	27	34	37	Southwest..	Southwest..	Southwest..	Heavy white frost; fair.
5	28.70	28.70	28.70	35	37	37	Northwest...	Southwest..	Southwest..	Cloudy and windy.
6	28.66	28.80	29.08	35	29	26	Northwest..	Northwest...	Northwest...	Blustry.
7	29.12	29.13	29.02	20	24	27	Northwest..	Northwest...	Northwest...	Cloudy; flying snow.
8	29.27	29.32	29.33	19	20	21	North......	West......	East.......	Cloudy.
9	29.20	29.12	29.08	19	23	26	Southwest..	South......	Southwest..	Snow at night; cloudy.
10	29	28.88	28.77	31	36	42	Southeast...	South......	Southeast...	Rain; fogey; rain all night.
11	28.87	29	29.18	45	41	36	Northwest...	Northwest...	Northwest...	Cloudy; blustry.
12	29.53	29.63	29.70	25	29	34	Northwest..	Northwest..	North......	Fair.
13	29.76	29.76	29.67	23	30	37	South......	Southwest..	SW.; SE....	Fair.
14	29.52	29.44	29.33	36	39	42	South......	South......	South......	Rain and mist.
15	28.92	28.84	28.76	47	51	57	South......	South......	S.; SW.....	Rain; cloudy.
16	29	29.07	29.23	37	37	34	SW.; NW.	Northwest...	Northwest..	Blustry.
17	29.50	29.55	29.55	27	31	40	Northwest...	Northwest...	South; west.	Fair.
18	29.40	29.41	29.58	32	36	42	West; south	Northwest...	West......	Fair; northern lights.
19	29.72	29.74	29.68	29	35	43	Northwest...	Southeast...	Southeast...	White frost; fair.
20	29.47	29.36	29.33	37	41	42	South......	Southeast...	Southwest..	Hail and rain.
21	29.18	29.13	29	45	47	49	Southeast...	Southeast...	Northeast..	Rain continues; rainy night.
22	28.95	29	29.07	44	46	47	SW.; NE..	West......	Northwest...	Squally.
23	29.15	29.18	29.16	43	47	54	Northwest...	Southwest..	Southwest..	Fair.
24	28.99	28.80	28.69	47	48	46	South......	East.......	Northwest...	Rainy day.
25	29.03	29.10	29.21	37	37	45	Northwest...	Northwest...	Northwest..	Windy; fair.
26	29.31	29.30	29.28	34	43	44	NW.; S....	Southwest..	South......	Clear.
27	29.20	29.17	29.05	42	47	47	South......	Southeast...	Southeast...	Cloudy; rain at night.
28	28.79	28.76	28.83	47	44	40	NE.; NW..	Northwest...	Northwest...	Cloudy and windy.

Barometer—average, 29.19; highest, February 13; lowest, February 6. Thermometer—average, 36.3; highest, February 15; lowest, February 1.

Meteorological Record for the year 1851—Continued.

		Barometer.			Thermometer.			Wind.			Remarks.
		Morn.	Noon.	Night.	Morn.	Noon.	Night.	Morn.	Noon.	Night.	
March	1	29.02	29.07	29.03	32	40	45	Northwest...	West	West	Clear.
	2	29	28.97	28.89	39	43	48	SW.; S....	SW.; SE...	South......	Fair.
	3	28.90	29.01	29.11	37	34	33	Northwest...	Northwest...	West	Snow squalls and high winds.
	4	29.17	29.10	29.07	30	40	47	Southeast...	Southwest..	Southeast...	Fair.
	5	28.99	29.07	29.03	45	50	55	West	Southeast...	Southeast...	Fair; cloudy.
	6	28.93	28.95	29.12	49	51	43	South	Northwest ..	Northwest..	Cloudy; shower; cloudy and windy.
	7	29.30	29.31	29.21	38	38	42	North......	South.......	East.......	Cloudy.
	8	28.99	28.95	28.91	38	41	42	Northeast ..	East.......	East.......	Snow; snow and rain.
	9	29.01	29.07	29.08	34	38	47	Northwest...	Northwest...	North......	Snow squalls; fair.
	10	28.97	29.05	29.18	37	40	39	Northwest...	Northwest...	Northwest...	Snow squalls; fair.
	11	29.14	28.93	28.95	30	40	46	Southeast...	West	West	White frost; cloudy.
	12	29.15	29.23	29.21	39	37	42	Northwest..	Southwest..	Southwest..	Windy; pleasant.
	13	29.18	29	29.09	36	40	44	Southeast...	Northwest...	Northwest...	Snow; clear.
	14	29.20	29.27	29.25	37	41	45	North......	Southeast...	Southwest..	Fair; cloudy.
	15	29.14	29	29	42	47	50	Northwest...	West	West	Foggy; rain; fair.
	16	28.90	28.90	28.93	48	48	46	Northeast ..	East.......	East.......	Rain all day.
	17	28.88	28.78	28.75	40	40	40	East	East.......	Northeast ..	Stormy.
	18	28.70	28.70	28.70	37	38	38	North......	North......	North	Snow.
	19	28.70	28.70	28.69	36	40	36	Northwest...	Northwest...	Northwest...	Cloudy, and snow squalls.
	20	28.69	28.70	28.78	34	34	36	Northwest...	Northwest...	West	Cloudy, and snow squalls.
	21	28.87	28.92	28.98	35	40	39	Northwest...	Northwest...	Northwest...	Cloudy.
	22	29.04	29.05	29.03	35	40	53	North	Calm	Southwest..	A beautiful day.
	23	29.07	29.06	28.98	40	45	49	North	Southeast...	East.......	Cloudy, and looks like a storm; snow at night.
	24	28.76	28.74	28.72	43	47	51	Northwest..	Southwest..	Northwest...	Fair.
	25	28.93	29.10	29.26	41	44	48	Northwest...	Northwest...	Northwest...	Fair and pleasant.
	26	29.40	29.38	29.32	32	42	53	Calm	Southwest..	South......	Fair and pleasant.
	27	29.23	29.18	29.09	47	64	65	South......	Southwest..	Southwest..	Fair, pleasant, and cloudy.
	28	28.96	29.07	29.30	61	58	57	SW.; W...	Northwest...	North.......	Windy.
	29	29.40	29.40	29.42	38	48	53	North......	South......	Southeast...	White frost; pleasant.
	30	29.39	29.35	29.28	42	50	55	South......	South......	South......	Windy, but pleasant.
	31	29.18	29.18	29.23	55	65	67	Southwest..	Southwest..	Northwest...	A beautiful day.

Barometer—average, 29.04; highest, March 29; lowest, March 19 and 20. Thermometer—average, 43.4; highest, March 31; lowest, March 4 and 11.

Meteorological Record for the year 1851—Continued.

		Barometer.			Thermometer.			Wind.			Remarks.
		Morn.	Noon.	Night.	Morn	Noon.	Night.	Morn.	Noon.	Night.	
April	1	29.36	29.40	29.30	45	50	60	North......	Southeast...	Southeast...	Clear and pleasant.
	2	29.30	29.13	28.99	50	50	52	Southeast...	Southeast...	Southeast...	Rainy day.
	3	28.89	28.87	28.87	47	50	52	Northwest...	West	West	Fair.
	4	29	29.02	29.05	44	50	57	Southwest..	Northwest..	Southwest..	Fair; cloudy.
	5	29.09	29.07	29	48	58	60	North.......	South.......	Southeast...	Pleasant; cloudy; rainy night.
	6	28.80	28.82	28.93	58	61	66	South......	Southwest..	West......	Cloudy; clear.
	7	29.15	29.22	29.22	46	50	60	Northwest. .	Northwest...	Southwest..	Cloudy and cool; pleasant; cloudy.
	8	29.14	28.80	28.71	53	55	61	South......	Southeast...	SE.; SW...	Cloudy; heavy rain.
	9	29.13	29.26	29.32	44	47	58	Northwest...	Northwest...	Calm	Clear and windy.
	10	29.30	29.28	29.34	46	60	58	South......	Southwest..	West.......	Clear and calm.
	11	29.40	29.41	29.43	41	50	48	Southwest..	West	Northwest...	Cloudy, clear, and cool.
	12	29.52	29.51	29.45	38	50	49	North.......	North.......	Southeast...	Pleasant.
	13	29.37	29.20	29.07	42	45	51	Northeast ..	Southeast...	Southeast...	Cloudy.
	14	28.87	28.75	28.73	37	44	48	Northeast ..	North.......	Southeast...	Cloudy.
	15	28.79	28.79	28.78	39	40	43	Northeast ..	Northeast ..	Northeast ..	Cloudy; rain.
	16	28.72	28.70	28.63	43	45	46	Northeast ..	North.......	North.......	Rain.
	17	28.64	28.66	28.70	43	47	48	Northeast ..	North.......	North.......	Rain.
	18	28.74	28.74	28.74	43	48	48	North	North	North.......	Cloudy.
	19	28.66	28.64	28.57	43	44	43	South.......	Southeast...	Northeast..	Rain and mist; rain and snow.
	20	28.52	28.60	28.62	40	45	43	North.......	Northwest..	North.......	Snow.
	21	28.66	28.65	28.70	40	42	42	Northwest...	Northwest...	Northwest...	Rain; cloudy.
	22	28.73	28.77	28.70	38	43	50	Northwest...	Northwest..	Northwest...	Cloudy.
	23	28.85	28.90	28.90	42	50	64	Northwest...	Northwest..	Northwest.	
	24	28.80	28.75	28.75	47	58	64	Northwest...	Northwest...	Northwest.	
	25	28.80	28.80	28.90	48	52	60	East.			
	25	28.95	28.95	28.95	43	48	60	Southeast.			
	27	28.95	28.90	28.90	50	54	56	Southeast...	....	....	Rain; cloudy.
	28	28.90	28.92	29.04	48	50	49	Northwest...	North.......	Northwest...	Cloudy.
	29	29.10	29.16	29.17	45	48	51	Northwest...	North.......	Southwest..	Cloudy; partly clear.
	30	29.14	29.09	29.02	44	47	47	Northeast ..	South......	Southeast...	Rain all day.

Barometer—average, 28.96; highest, April 12; lowest, April 20. Thermometer—average, 49; highest, April 6; lowest, April 14.

Meteorological Record for the year 1851—Continued.

		Barometer.			Thermometer.			Wind.			Remarks.
		Morn.	Noon.	Night.	Morn.	Noon.	Night.	Morn.	Noon.	Night.	
May	1	28.82	28.80	28.84	47	54	47	North.......	West......	Northwest...	Fair; squalls; northern lights.
	2	28.87	29	29.10	37	42	46	Northwest...	Northwest...	West......	Cloudy and cold; fair.
	3	29.15	29.10	29.07	35	47	47	Southwest..	Southwest..	South......	Frost; rain; cloudy.
	4	28.98	28.98	28.94	49	52	51	West......	Northwest...	North......	Cloudy; rain at night.
	5	28.86	28.84	28.83	44	45	43	Northwest..	North.......	North.......	Snow; rain and snow.
	6	28.90	28.94	29.05	40	46	46	North......	North.......	West......	Fair; cloudy.
	7	29.06	29.08	29.07	41	47	49	Southwest..	East.........	Northwest...	Fair; cloudy.
	8	29.10	29.10	29.05	42	50	60	Southwest...	....	....	Hazy, but pleasant.
	9	29.05	29.03	29.05	48	57	59	Southwest..	Southwest..	Southwest..	Hazy, but pleasant; showers.
	10	29.10	29.14	29.17	51	60	62	West.......	Southwest..	Southwest..	Fair; showers.
	11	29.12	29.10	29.13	56	62	67	Southwest...	Southeast..	East; west..	Cloudy; showers; thunder showers.
	12	29.10	29.07	29.08	60	62	64	East........	Southeast...	South.......	Foggy; light showers.
	13	29.05	29	28.94	62	70	75	Southeast ..	Southwest..	West.......	Foggy; thunder showers; heavy thunder showers at night.
	14	28.99	29	29.13	64	66	60	Northwest..	Northwest...	Northwest...	Cloudy, clear, and cool.
	15	29.27	29.29	29.28	50	53	65	Northwest...	Northwest...	Northwest...	Clear.
	16	29.29	29.20	29.20	52	66	64	Northeast ..	Southeast...	South.......	Clear; hazy.
	17	29.02	28.98	29	57	61	66	Southwest..	Southwest..	Northwest...	Cloudy; showers; clear.
	18	29.03	29.08	29.12	60	63	66	North.......	Northwest...	NW.; SE..	Cloudy.
	19	29.21	29.21	29.16	60	62	62	East........	Southeast...	Southeast...	Foggy; cloudy.
	20	29	28.92	28.86	58	71	70	East........	Southwest..	Southwest...	Rain; thunder clouds.
	21	28.94	29.01	29.08	62	64	63	Northwest...	Northwest...	Northwest...	Fair.
	22	29.09	28.94	28.84	53	62	70	West.......	South.......	Southwest...	Cloudy; thunder showers; heavy thunder showers at night.
	23	28.72	28.78	29.04	65	72	57	Southwest..	West.......	Northwest...	Hazy; showers; cool.
	24	29.35	29.39	29.40	50	57	61	North.......	West.......	South.......	Fair.
	25	29.43	29.41	29.41	50	61	66	Southwest...	Southeast ..	East........	Fair.
	26	29.40	29.33	29.27	53	67	68	East........	South.......	West.......	Foggy; fair.
	27	29.24	29.15	29.09	60	68	67	Northeast ..	Southwest..	South; west	Cloudy; showers; cloudy.
	28	29.02	29	29	66	70	78	Northwest...	....	....	Cloudy.
	29	29.10	29.10	29.10	66	67	66	East........	....	....	Cloudy, and rain in afternoon.
	30	29.10	29.10	29.10	58	58	70	East........	....	....	Cloudy and rainy.
	31	29.20	29.25	29.25	51	55	64	Northwest...	....	....	Clear and pleasant.

Barometer—average, 29.08; highest, May 25; lowest, May 1. Thermometer—average, 57.8; highest, May 28; lowest, May 3.

Meteorological Record for the year 1851—Continued.

		Barometer.			Thermometer.			Wind.			Remarks.
		Morn.	Noon.	Night.	Morn.	Noon.	Night.	Morn.	Noon.	Night.	
June	1	29.20	29.15	29.08	56	57	56	Southeast...	Southeast...	Southwest..	Cloudy; rain; cloudy.
	2	28.91	28.85	28.80	55	62	70	SW.; SE....	....	....	Cloudy.
	3	28.90	28.90	28.90	52	56	60	Northwest...	....	....	Windy.
	4	28.90	28.90	29	54	58	66	Northwest...	....	....	Clear and pleasant.
	5	29.10	29.15	29.14	54	58	64	Southwest...	....	West.......	Hazy.
	6	29.05	28.99	28.86	54	60	67	Southwest..	Southwest..	South......	Fair; showers; cloudy.
	7	28.65	28.64	28.80	66	67	64	South.......	Northwest...	Northeast ..	Rain; cloudy; stormy.
	8	28.86	28.56	28.77	58	57	55	Southeast...	Southeast...	Southeast...	Stormy all day.
	9	28.72	28.80	28.93	55	66	64	East........	West.......	West.......	Stormy; showery squalls.
	10	29.07	29.13	29.14	54	63	61	North.......	Northwest...	Northwest...	Clear and cool.
	11	29.12	29.06	29	57	73	69	West.......	Southwest..	Southwest...	Hazy; showers; cloudy.
	12	29.04	29.05	29.08	60	61	67	West.......	Northwest...	Northwest...	Clear and pleasant.
	13	29.08	29.09	29.16	61	64	65	Northwest...	Northwest...	Northwest...	Fair.
	14	29.20	29.22	29.27	53	60	66	Northwest..	Northwest...	North.......	Fair.
	15	29.20	29.18	29.13	52	61	68	Northwest...	Northwest..	North.......	Fair.
	16	29.19	29.23	29.33	56	58	62	North.......	Northeast ..	East........	Fair.
	17	29.42	29.43	29.44	50	60	58	Northeast ..	Northeast ..	North.......	Fair.
	18	29.50	29.48	29.43	54	57	66	Northwest..	South.......	South.......	Fair.
	19	29.39	29.32	29.22	52	58	63	East........	Southeast...	Southeast...	Hazy.
	20	29.15	29.10	29.09	58	72	70	Northwest...	Southwest...	Southwest...	Hazy and cloudy.
	21	29.09	29.09	29.09	66	74	76	Southwest..	South.......	South.......	Cloudy; hazy.
	22	28.99	28.95	28.92	67	74	77	South.......	South.......	Southwest...	Cloudy; slight showers.
	23	28.90	28.92	28.92	70	74	74	South.......	South.......	Southwest...	Cloudy; heavy thunder showers.
	24	28.98	29	29.05	66	69	72	Northwest ..	West.......	West.......	Fair.
	25	29.09	29.09	29.09	61	70	70	South.......	Northwest...	West.......	Fair.
	26	29.09	29.01	28.98	60	69	70	West.......	SE.; W.....	West.......	Thunder showers around.
	27	28.96	28.98	29	65	70	78	South.......	West.......	West.......	Fair.
	28	29.04	29.05	29.03	64	68	71	West.......	South.......	South.......	Hazy; cloudy.
	29	29.02	28.99	28.95	66	71	83	South.......	Southeast...	South.......	Foggy; thunder.
	30	28.97	28.97	28.96	72	76	78	South.......	Southwest...	West.......	Foggy; showers; clear.

Barometer—average, 29.05; highest, June 28; lowest, June 27. Thermometer—average, 69.8; highest, June 29; lowest, June 3, 15, and 19.

Meteorological Record for the year 1851—Continued.

	Barometer.			Thermometer.			Wind.			Remarks.
	Morn.	Noon.	Night.	Morn.	Noon.	Night.	Morn.	Noon.	Night.	
July 1	28.96	28.99	29.12	70	74	74	Southwest..	Northwest..	Northwest...	Raining; fair.
2	29.18	29.17	29.16	66	72	72	Northwest...	West......	Southwest..	Fair.
3	29.12	29.04	28.96	65	67	68	Northwest...	Southeast...	SW.; SE...	Cloudy; showers.
4	28.86	28.88	28.99	64	65	68	North......	Northwest...	Northwest...	Squalls, clear, and cool.
5	29.04	29.06	29.08	58	64	69	Northwest...	Northwest...	West.......	Clear and cool.
6	29.07	29.02	28.97	61	66	71	West.......	Southwest..	Southwest..	Cloudy.
7	28.90	28.96	29.03	67	71	77	West.......	West.......	North.......	Cloudy; clear.
8	29.09	29.12	29.10	61	67	64	South......	South.......	Southeast...	Foggy and cloudy; slight rain.
9	29.04	28.98	28.96	63	74	80	Southeast...	Southwest..	South......	Rain; cloudy; thunder showers at night.
10	28.80	28.88	28.93	71	78	78	Southwest..	West.......	Northwest...	Fair.
11	29.05	29.01	29.16	68	69	72	Southwest..	Northwest..	Northwest...	Cloudy; fair; cloudy.
12	29.21	29.24	29.21	66	68	75	West.......	Northwest...	Northwest...	Cloudy; fair; cloudy.
13	29.20	29.19	29.16	67	68	73	Northwest...	Northwest..	Northwest...	Cloudy; fair; clear.
14	29.16	29.14	29.09	61	68	71	Northwest...	North.......	North.......	Fair.
15	29.04	28.97	28.95	61	73	67	North.......	Southwest..	Southwest..	Foggy; slight rain; cloudy.
16	28.94	28.93	28.92	67	70	79	Calm......	SE.; W....	West.......	Cloudy; heavy thunder showers.
17	28.95	28.95	28.94	70	75	81	Southwest..	Northwest...	Northwest...	Fog; fair.
18	28.97	28.97	28.95	67	73	76	West......	Southwest..	Southwest..	Cloudy.
19	28.86	28.85	28.84	70	77	73	Southwest..	South......	West.......	Cloudy; thunder showers.
20	28.87	28.93	29.06	66	68	68	Northwest...	West.......	Northwest...	Squall clouds; fair.
21	29.17	29.23	29.25	62	68	76	Northwest...	West.......	West.......	Clear.
22	29.26	29.25	29.21	60	66	74	Southwest..	SW.; SE..	Southwest..	Fair.
23	29.20	29.22	29.21	68	72	80	Northwest...	Southwest..	Calm......	Hazy; fair.
24	29.18	29.18	29.09	70	72	76	Southwest..	South......	South......	Cloudy; slight rain; cloudy; rain at night.
25	29.04	29.06	28.97	69	75	78	West.......	West.......	West.......	Cloudy; thunder showers.
26	28.92	28.90	28.86	70	75	76	West.......	West.......	West.......	Fair.
27	28.80	28.78	28.80	70	74	77	Northwest...	Northwest...	Northwest...	Fair.
28	28.80	28.82	28.86	65	72	71	Northwest...	Northwest...	North.......	Squalls; cool.
29	28.90	28.96	29.06	64	67	72	Northwest...	Northwest...	Northwest...	Fair; slight rain; cloudy.
30	29.10	29.16	29.16	64	65	66	Southeast...	South......	SW.; SE...	Fine rain; cloudy.
31	29.22	29.24	29.22	62	63	66	Northeast..	East.......	West.......	Cloudy and misty.

Barometer—average, 29.03; highest, July 22; lowest, July 27. Thermometer—average, 69.6; highest, July 17; lowest, July 5.

Meteorological Record for the year 1851—Continued.

	Barometer.			Thermometer.			Wind.			Remarks.
	Morn.	Noon.	Night.	Morn.	Noon.	Night.	Morn.	Noon.	Night.	
Aug. 1	29.22	29.22	29.20	59	63	68	Northeast..	Northeast..	West......	Fair.
2	29.19	29.19	29.19	57	61	74	Calm......	Northwest...	Northwest...	Foggy; fair.
3	29.20	29.20	29.20	58	64	73	South......	South......	Calm......	Fair.
4	29.24	29.15	29.23	62	66	71	Northwest...	South......	Southeast...	Cloudy.
5	29.20	29.22	29.23	67	71	76	East.......	Southwest..	West.......	Raining; fair.
6	29.29	29.27	29.22	64	68	76	Southwest..	South......	West......	Fair.
7	29.16	29.10	29.07	64	72	76	West.......	West......	Southwest..	Fair; showers; fair.
8	29.17	29.19	29.17	68	74	78	Northwest...	Northwest.	Southwest..	Hazy.
9	29.06	29	29	69	75	77	West.......	Southwest..	Northwest...	Fair; showers from northwest; clear.
10	29.12	29.14	29.12	62	64	74	Northwest...	South......	Northwest...	Fair.
11	29.11	29.08	29.05	59	68	73	Northwest..	South......	Southeast...	Clear; cloudy.
12	29.06	29.09	29.10	69	74	79	West.......	Northwest...	Northwest...	Clear; fair.
13	29.16	29.17	29.14	64	77	78	West.......	West......	Northwest..	Foggy; slight rain; fair.
14	29.07	29.05	29.02	72	68	69	Southwest..	West......	Northwest...	Cloudy; slight rain; clear.
15	29.03	29.02	29.02	57	62	68	Northwest...	Northwest...	North......	Fair.
16	29.06	29.08	29.07	55	62	67	West......	Northwest..	Northwest..	Fair; cloudy.
17	29.08	29.06	29	63	62	62	Southwest..	Southeast..	East.......	Stormy; cloudy; heavy showers in the night.
18	29.05	29.12	29.16	60	65	67	SW.; NW.	Northwest...	Northwest...	Fair.
19	29.24	29.26	29.25	55	60	67	West......	Northwest..	Northwest...	Fair.
20	29.25	29.22	29.18	57	63	64	West......	Southeast..	Southeast...	Fair; cloudy; rain in the night.
21	29.20	29.20	29.19	60	62	63	East.......	Southeast...	Southeast...	Misty rain all day.
22	29.04	29.04	28.99	64	67	72	South......	Southwest...	Southwest..	Heavy rain, with thunder; cloudy; heavy thunder showers last night.
23	29	29	28.99	68	71	78	West......	West......	Southwest..	Fair.
24	29.07	29.07	29.07	62	67	75	North......	West......	West......	Fair.
25	28.98	28.96	28.90	63	78	77	West......	Southwest..	Southwest..	Hazy and hot; cloudy; high wind and some rain at night.
26	28.95	29.02	29.17	65	61	64	North......	North......	North......	Clear and cool all day.
27	29.31	29.33	29.31	52	64	67	North......	Northwest..	Northwest..	Frost; clear.
28	29.35	29.35	29.35	51	56	68	North......	Northwest..	Northwest..	Foggy; clear.
29	29.35	29.35	29.35	53	59	69	South......	South......	Southwest..	Foggy; clear.
30	29.32	29.26	29.24	56	63	72	Southwest..	Southwest..	South......	Foggy; clear.
31	29.26	29.25	29.25	58	68	74	Southeast...	West......	Northwest...	Hazy; cloudy.

Barometer—average, 29.15; highest, August 28 and 29; lowest, August 25. Thermometer—average, 66.2; highest, August 8 and 23; lowest, August 28.

Meteorological Record for the year 1851—Continued.

		Barometer.			Thermometer.			Wind.			Remarks.
		Morn.	Noon.	Night.	Morn.	Noon.	Night.	Morn.	Noon.	Night.	
Sept.	1	29.32	29.35	29.34	67	70	74	Northwest..	Southeast ..	West......	Cloudy all day.
	2	29.25	29.11	29.06	65	65	70	South......	Southwest...	Northwest .	Light rain; clear.
	3	29.10	29.17	29.23	60	65	68	West......	North......	Northeast ..	Clear; cloudy.
	4	29.29	29.31	29.31	60	64	72	Northeast...	North......	Southwest ..	Foggy; fair.
	5	29.34	29.33	29.32	60	69	75	North......	South......	West......	Foggy; fair.
	6	29.31	29.31	29.27	66	70	78	North......	South......	South......	Fair.
	7	29.28	29.29	29.27	68	74	78	East......	Southeast ..	South......	Hazy; fair; halo round moon.
	8	29.29	29.29	29.27	70	74	82	Northwest..	Southwest...	Southwest...	Cloudy; fair and hot.
	9	29.29	29.30	29.29	70	74	80	South	Southeast ..	South......	Fair and very dry.
	10	29.30	29.29	29.28	74	79	78	Southeast ..	South......	West......	Foggy; thunder shower; cloudy.
	11	29.28	29.26	29.25	71	78	80	Northwest..	West......	West......	Foggy; fair.
	12	29.26	29.19	29.17	69	80	77	West......	West......	South......	Foggy; heavy shower, with high wind.
	13	29.09	29.06	28.99	69	74	78	Southwest.	Northwest..	West......	Foggy; fair; shower; cloudy; rain in the night.
	14	29.26	29.32	29.35	61	60	66	West......	Northwest..	North......	Cloudy; clear and cool.
	15	29.49	29.51	29.54	49	51	59	East......	West......	Northwest..	White frost; clear.
	16	29.55	29.53	29.52	47	56	57	Northwest..	Northwest..	Northwest..	White frost; clear.
	17	29.53	29.53	29.40	46	52	64	Northwest..	Northwest..	Northwest..	White frost; clear.
	18	29.50	29.43	29.39	48	53	64	Northwest..	Northwest..	Southwest...	Foggy; clear.
	19	29.32	29.27	29.24	49	57	65	South......	Northwest..	Southwest...	Foggy; clear; cloudy.
	20	29.24	29.22	29.19	56	61	71	West......	Southwest...	West......	Clear.
	21	29.18	29.17	29.17	59	67	69	West......	West......	West......	Fair; cloudy; raining moderately.
	22	29.32	29.32	29.36	61	60	59	Northeast...	Southwest...	Southwest...	Light rain; raining moderately.
	23	29.21	29.08	28.86	56	56	59	East......	Southeast ..	Southwest...	Stormy; raining moderately; rain last night.
	24	29.04	29.10	29.18	52	51	58	Northwest..	Northwest..	Northwest..	Fair.
	25	29.29	29.27	29.20	40	48	56	South......	South	Southeast ..	Heavy frost; clear.
	26	29.10	29	28.95	43	52	58	Northwest..	Southeast ..	Southwest...	Heavy frost; cloudy.
	27	28.90	28.90	29.29	55	61	64	South......	South......	Southeast ..	Cloudy.
	28	28.93	28.93	28.93	60	61	63	East......	Southeast ..	South......	Rainy; flying clouds.
	29	29.05	29.05	29	54	56	58	South......	South......	Southeast ..	Fair; rain at night.
	30	28.98	28.99	29.05	52	56	54	Northwest..	Northwest..	Northwest..	Cloudy and squally.

Barometer—average, 29.23; highest, September 16; lowest, September 23. Thermometer—average, 63.1; highest, September 8; lowest, September 25.

Meteorological Record for the year 1851—Continued.

		Barometer.			Thermometer.			Wind.			Remarks.
		Morn.	Noon.	Night.	Morn.	Noon.	Night.	Morn.	Noon.	Night.	
Oct.	1	29.10	29.14	29.14	49	50	58	Northwest..	Northwest..	Northwest..	Clear and cool.
	2	29.20	29.20	29.12	42	48	55	Northwest..	Northwest..	Southwest...	Hazy.
	3	28.90	28.80	28.76	50	53	55	Southwest...	Southeast ..	Northwest..	Thunder showers; stormy.
	4	28.79	28.79	28.98	53	58	54	North......	Northwest..	Northwest..	Stormy; squalls.
	5	29.10	29.15	29.17	49	52	54	Northwest..	Northwest..	Northwest..	Hazy; cloudy.
	6	29.27	29.26	29.25	50	52	59	Northwest..	Northwest..	Northwest..	Fair.
	7	29.30	29.30	29.30	47	55	62	North......	Northwest..	Northwest..	A beautiful day.
	8	29.33	29.33	29.33	48	53	70	Southeast ..	North......	South......	Indian summer.
	9	29.37	29.36	29.36	53	60	67	Northwest..	Southeast ..	Northwest..	Foggy; Indian summer.
	10	29.33	29.33	29.26	54	55	67	Southeast ..	Southwest...	Southeast ..	Foggy; Indian summer.
	11	29.21	29.22	29.20	58	62	66	Northwest..	Southeast ..	Southeast ..	Foggy; hazy; cloudy.
	12	29.14	29.07	29.03	60	64	64	Northeast ..	Northeast...	Northeast ..	Foggy; mist; cloudy.
	13	28.88	28.75	28.80	64	67	63	Northeast ..	Southwest...	Northwest..	Raining; squalls.
	14	28.98	29.02	28.96	51	58	58	Northwest..	Southwest...	Southwest...	Cloudy.
	15	[illegible]	29.10	29.16	51	50	55	West......	Northwest..	Northwest..	Fair.
	16	29.30	29.30	29.30	42	46	52	Northwest..	Northwest..	Northwest..	Frosty and clear.
	17	29.30	29.30	29.25	42	50	53	North......	Southwest...	South......	Clear and pleasant.
	18	29.24	29.24	29.09	47	52	56	South......	South......	Northeast...	Cloudy; misty rain; rainy night.
	19	28.73	28.67	28.65	53	55	55	Northeast ..	Northwest..	Northwest..	Stormy.
	20	28.83	28.84	28.97	48	52	56	Northwest...	....	West......	Fair.
	21	28.95	28.95	29.03	50	63	60	Southwest...	Southwest...	Southwest...	Fair; cloudy; showers at night.
	22	29.07	29.06	29	53	53	65	Southwest...	Southwest...	Southwest...	Cloudy all day.
	23	29.09	29.09	29.16	43	43	46	Northwest..	Southwest ..	Southwest...	Fair; squalls; clear.
	24	29.12	29.10	29	36	42	49	Calm	Southwest...	Southwest ..	Clear.
	25	28.86	28.77	28.67	44	48	51	Southwest...	Southwest...	Southwest...	Cloudy; high wind in the night.
	26	28.68	28.69	28.65	47	45	44	SW.; NW..	Northwest..	Northwest..	Cloudy all day.
	27	28.66	28.70	28.89	38	36	39	North......	Northwest..	Northwest..	Cloudy; snow squalls.
	28	29.04	29.04	29.04	35	39	49	Southwest...	Southwest...	Southwest...	Hazy; cloudy.
	29	29.10	29.20	29.10	43	47	56	Southeast ..	Southeast ..	Southeast ..	Cloudy all day; rainy night.
	30	28.97	28.90	28.83	57	60	60	East......	South......	Southwest...	Stormy; thunder showers.
	31	28.84	28.90	28.92	53	53	52	Northwest..	Northwest..	Northwest..	Fair.

Barometer—average, 29.05; highest, October 9; lowest, October 19 and 26. Thermometer—average, 51.4; highest, October, 8; lowest, October 28.

Meteorological Record for the year 1851—Continued.

		Barometer.			Thermometer.			Wind.			Remarks.
		Morn.	Noon	Night.	Morn.	Noon.	Night.	Morn.	Noon.	Night.	
Nov.	1	28.93	28.96	28.91	43	48	50	Northwest..	Northwest..	West	Frost; hazy all day.
	2	28.66	28.64	28.62	48	50	54	South......	SW.; SE...	Northwest..	Rain; cloudy.
	3	28.60	28.60	28.59	48	45	44	Northwest..	North.......	Northwest .	Cloudy; snow squalls.
	4	28.60	28.60	28.60	36	36	34	Northwest..	Northwest..	Northwest..	Cloudy and blustry.
	5	28.80	28.83	28.93	34	36	37	Northwest..	Northwest..	West	Cloudy.
	6	29	29.05	29.10	32	37	37	Northwest..	Northwest .	Northwest..	Frost; cloudy and windy.
	7	29.16	29.16	29.16	32	37	42	Northwest..	Northwest..	Northwest..	Fair.
	8	29.16	29.16	29.13	32	36	42	Southwest..	Southwest...	Southwest...	Fair; cloudy.
	9	29.16	29.19	29.18	40	41	41	West......	Southwest ..	Northeast ..	Cloudy all day; rain and snow at evening.
	10	[illegible].10	29.09	29.22	39	40	39	East.......	Northwest..	North.....	Rain; cloudy; clear.
	11	29.50	29.55	29.63	30	32	36	Northwest..	Northwest..	North......	Frosty and clear; clear.
	12	29.67	29.61	29.50	27	30	37	West......	South	Southwest...	Fair; cloudy; slight hail at night.
	13	29.28	29.25	29.20	35	36	36	Northwest..	Northwest..	Northwest..	Cloudy all day.
	14	29.12	29.05	28.87	35	35	34	Southeast ..	South	East.......	Stormy mist, freezing as it falls; rainy night.
	15	28.60	28.51	28.60	36	38	39	Southeast ..	Northwest..	Northwest..	Stormy; cloudy and windy.
	16	28.97	29.04	29.07	38	40	40	Northwest..	Northwest..	West	Cloudy all day.
	17	29.05	29.05	29.10	40	41	41	Northwest..	Northwest..	West......	Flying clouds all day; light snow at night.
	18	29.19	29.19	29.18	38	39	38	West.....	Northwest..	West	Clear; cloudy.
	19	29.19	29.20	29.20	33	38	43	West......	Southwest...	Southwest...	Frost; pleasant; cloudy.
	20	29.22	29.17	29.10	36	38	39	Northeast ..	Southeast ..	Southeast ..	Cloudy all day; heavy gale in the night and storm.
	21	28.56	28.44	28.42	39	41	42	Northeast ..	Southeast ..	Northwest..	Stormy; cloudy.
	22	28.58	28.68	28.80	38	39	39	West......	West	West	Snow squalls all day.
	23	28.98	28.99	28.98	37	38	38	West......	Northwest..	Southwest..	Cloudy.
	24	28.97	28.97	29.09	35	35	39	N.; NW...	Northwest..	Northwest..	Cloudy.
	25	29.14	29	28.35	37	39	36	Northwest..	Northeast ..	....	Cloudy; snow in the afternoon.
	26	28.35	28.45	29	31	34	35	Northwest..	....	....	Windy.
	27	29.25	29.25	29.10	26	30	36	Northwest..	East.......	....	Frost; clear.
	28	28.40	28.35	28.50	36	38	36	East.......	West	Northwest..	Rainy; squally.
	29	28.85	28.92	29	35	39	39	Northwest..	West	West	Cloudy and windy.
	30	29.07	29.07	29.12	33	36	35	Northwest..	West	Northwest..	Fair; cloudy and windy.

Barometer—average, 28.97; highest, November 12; lowest, November 25, 26, and 28. Thermometer—average, 34.5; highest, November 1; lowest, Nov. 27.

Meteorological Record for the year 1851—Continued.

		Barometer.			Thermometer.			Wind.			Remarks.
		Morn.	Noon.	Night.	Morn.	Noon	Night.	Morn.	Noon.	Night.	
Dec.	1	29.15	29.13	29.11	28	29	27	Northwest..	Northwest..	Northwest..	Windy; fair; clear.
	2	29	28.85	28.80	22	25	27	Northwest..	Northwest..	Northwest..	Hazy and windy all day; halo round the moon.
	3	28.80	28.83	28.85	24	26	27	Northwest..	Northwest..	Northwest..	Cloudy and blustry all day.
	4	28.97	29.01	29.05	26	28	28	Northwest..	Northwest..	Northwest..	Snowing; cloudy and blustry all day.
	5	29.22	29.29	29.33	25	29	31	Northwest..	Northwest..	Northwest..	Cloudy; fair; cloudy.
	6	29.50	29.52	29.50	25	29	33	Northwest..	Northwest..	Northwest..	Clear all day; hazy at evening.
	7	29.42	29.38	29.27	28	33	35	South......	SW.; SE...	SW.; SE...	Cloudy; light rain; rain at night.
	8	29.07	28.89	28.83	36	40	43	SW.; NW..	West	West	Cloudy all day, with rain squalls.
	9	29.08	29.10	29.14	32	34	32	Northwest..	Northwest..	Northwest..	Very blustry all day.
	10	29	28.85	28.70	30	32	35	West	West	West	Cloudy; blustry.
	11	28.67	28.96	28.99	28	27	28	Northwest..	Northwest..	Northwest..	Cloudy and windy; cloudy.
	12	28.95	28.84	28.75	28	30	32	SW.; SE. ..	Southeast ..	Southeast ..	Very cloudy; cloudy all day.
	13	28.68	28.68	28.77	34	33	29	West	Northwest..	Northwest..	Cloudy; squalls.
	14	29.01	29	28.91	18	21	23	SW.; SE...	South......	Southeast ..	Cloudy all day.
	15	28.70	28.61	28.58	26	29	32	Southeast ..	Southeast ..	Southeast ..	Cloudy; slight snow.
	16	28.74	28.79	28.88	20	20	21	Northwest..	West	West	Clear all day.
	17	28.90	28.92	28.90	10	12	14	Northwest..	West	West	Clear all day.
	18	28.84	28.81	28.80	10	13	16	West	Northwest..	West	Clear; cloudy.
	19	28.80	28.75	28.66	16	20	25	Southwest...	Southwest...	West	Clear all day.
	20	28.50	28.60	28.77	24	27	27	Southwest...	West	Northwest..	Cloudy and squally all day.
	21	29.04	29.07	29.13	20	21	23	West	West	West	Cloudy and windy; cloudy.
	22	29.20	29.15	29.10	20	23	25	East.......	Fast.......	East.......	Slight snow all day.
	23	29.01	29.10	29.22	24	25	25	Northwest..	Northwest..	Northwest..	Cloudy; fair and cold.
	24	29.29	29.20	29	15	17	19	Northwest..	Southwest..	Southeast...	Slight snow; heavy snow squall.
	25	28.94	29	29.06	27	29	31	Northwest..	Northwest..	Northwest..	Cloudy; blustry; cloudy; snow at night.
	26	29.22	29.30	29.46	18	20	20	Northwest..	Northwest..	Northwest..	Fair; clear; very clear.
	27	29.50	29.48	29.43	12	10	17	Variable....	East.......	East.......	Hazy; looks like a storm.
	28	29.10	29	28.98	25	31	35	Southeast ..	Southeast ..	Southeast...	Raining fast; rain; cloudy.
	29	29.09	29.15	29.18	37	40	44	NW.; SE. .	West	South	Cloudy all day.
	30	29.16	29.12	29.07	34	39	41	South......	Southeast ..	Southeast...	Frosty; foggy and cloudy all day.
	31	29.05	28.97	28.78	40	42	42	Northeast ..	SE.; NE....	Northeast ..	A rainy day.

Barometer—average, 29.01 highest, December 6 lowest, December 15. Thermometer—average, 26.6; highest, December 29; lowest, December 27.

Monthly average.

Months.	Barometer.	Thermometer.
	°	°
January - - - - -	29.02	32.8
February - - - - -	29.19	36.3
March - - - - -	29.04	43.4
April - - - - -	28.96	49
May - - - - -	29.08	57.8
June - - - - -	29.05	63.8
July - - - - -	29.03	69.6
August - - - - -	29.15	66.2
September - - - - -	29.23	63.1
October - - - - -	29.05	51.4
November - - - - -	28.97	34.5
December - - - - -	29.01	26.6
Average of the year - - -	29.06.5	49.54

Warmest day of the year, September 8.
Coldest day of the year, December 27.

The foregoing record was kept at Beaver Brook, Sullivan county, State of New York, elevated about 500 or 600 feet above the level of the sea. The barometer is placed in a hall not immediately subject to the influence of a change of temperature. The record of the thermometer is, therefore, no guide for the out-door temperature, especially in winter. The temperature of summer, as it would be in the shade, would probably agree pretty well with the record. The out-door temperature in winter, in extreme cold weather, would be (from actual experiment) from 10° to 20° lower than indicated by this record.

The foregoing has been prepared principally under my personal observation. When absent from home, I have had to depend on others. The figures I believe to be correct; but, when absent, the wind and atmospheric changes have not been noticed as particularly as I might wish. Having no weather-vane, the wind is noticed only to the nearest main point.

CHAS. J. WOODWARD.

Beaver Brook, *January* 1, 1852.

N. B. The time of observation has been, generally, sunrise, noon, and sunset.
C. J. W.

METEOROLOGICAL OBSERVATIONS FOR 1851, MADE AT CANANDAIGUA, NEW YORK.

By Professor N. T. Clark.

Months.	Maximum temp.	Minimum temp.	Range of temp.	Mean temperature.	Amount of rain.	Amount of snow.	Total fall of water.	No. of days upon which rain fell.	No. of days upon which snow fell.
	Deg.	Deg.	Deg.	Deg.	Inches.	Ins.	Inches.		
January - -	45	4	41	28½	½	4	1	2	10
February - -	55	2	53	30¾	2¾	12	4	9	7
March - -	71	11	60	36	1	10	2	3	12
April - -	65	24	41	45	3¼	2	3½	11	3
May - -	80	30	50	56½	3¾	-	3¾	14	
June - -	92	40	52	64	2¼	-	2¼	16	
July - -	92	50	42	67¾	3½	-	3½	22	
August - -	85	46	39	67	1½	-	1½	12	
September -	91	35	56	61¼	2¼	-	2¼	12	
October - -	72	29	43	49¾	1½	-	1½	13	3
November -	62	18	44	40	2	10	3	7	13
December -	52	5	57	23½	½	24	3	4	15
For the year -	92	5	97	47½	24¾	62	31¼	125	63

Table showing the quantity of rain that fell in Philadelphia, from 1845 to 1851, from an account kept at the Pennsylvania Hospital.

Months.	1845.	1846.	1847.	1848.	1849.	1850.	1851.
January	3.76	4.63	4.73	2.03	0.73	4.77	1.23
February	4.74	3.33	4.57	1.44	2.61	2.87	3.11
March	2.41	4.60	4.70	2.75	5.47	4.75	3.47
April	2.58	2.11	0.58	1.54	1.75	2.66	4.56
May	1.60	3,44	1.57	4.90	4	6.50	4.81
June	3.72	3.30	3.30	4.43	2.19	2.03	3.43
July	2.76	4.60	2.77	3.28	2.93	5.97	2.52
August	7.30	6 27	3.18	1.71	6.97	8 33	2.55
September	2.16	0.25	8.07	1.81	1.40	7.73	1.13
October	2.53	2.44	3	3.75	5.60	1.09	3.02
November	2.50	7.97	2.83	2.34	2.60	3.32	3.35
December	3.96	3.44	5.79	5.01	5.84	4.51	2.27
Total	40.02	44.38	45.09	34.99	42.09	54.54	35.55

METEOROLOGICAL STATEMENT FOR 1851 AT ALL SAINT'S PARISH, WACCAMAW, S. C.

OBSERVATIONS KEPT BY REV. A. GLENNIE.

Months.	Thermometer. Max.	Thermometer. Min.	Range.	Mean of max.	Mean of min.	Mean.	Greatest fall.	Greatest rise.	Mean of dew-point, 2 p. m.	Rain. Days.	Rain. Inch's.	Snow.	Sleet.	Dew, nights.
	Degrees.	Degrees.	Deg.	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Deg.					
January	17th, 70	31st, 19	51	55.46	41.74	48.60	13th, 14th, 60 to 29—31	14th, 29 to 57—28	44.87	12	3.31	..	2	13
February	28th, 78	1st, 21	57	58.21	46.42	52.31	16th, 17th, 60 to 30—30	18th, 38 to 59—21	47.82	6	2.57	..	..	16
March	16th, 78	4th, 34	44	65.58	49.41	57.49	7th, 8th, 76 to 46—30	11th, 37 to 64 } 20th, 35 to 62 } —27	46.00	8	2.19	..	..	17
April	30th, 81	15th, 43	38	69.00	54.53	61.76	8th, 9th, 75 to 51 } 11th, 12th, 71 to 47 } —24	11th, 46 to 71—25	48.60	9	2.89	..	..	15
May	23d, 90	3d, 47	43	77.25	62.22	69.73	1st, 2d, 75 to 52—23	3d, 47 to 70 } 12th, 56 to 79 } —23	57.80	5	1.77	..	..	18
June	4th, 90	1st, 56	34	80.60	69.90	75.25	4th, 5th, 90 to 69—21	1st, 56 to 77—21	68.63	14	7.24	..	..	19
July	28th, 93	20th, 66	27	84.06	74.48	79.27	19th, 20th, 89 to 66—23	20th, 66 to 83—17	72.67	17	10.74	..	..	21
August	12th, 89	29th, 63	26	83.19	74.38	78.78	26th, 27th, 85 to 70—15	30th, 64 to 79—15	72.87	12	7.35	..	..	19
September	14th, 84	29th, 48	36	77.43	64.83	71.13	29th, 30th, 71 to 49—22	29th, 48 to 71—23	64.13	7	1.42	..	..	25
October	13th, 79	28th, 35	44	72.35	56.51	64.43	26th, 27th, 69 to 36—33	28th, 35 to 62—27	57.93	6	1.89	..	..	27
November	2d, 76	7th, 8th, 32	44	61.30	46.43	53.86	25th, 26th, 67 to 36—31	9th, 39 to 67—28	49.30	10	3.73	..	..	20
December	10th, 29th, 69	18th 19th 19	50	53.45	38.00	45.72	26th, 27th, 66 to 33—33	29th, 41 to 69—28	42 83	5	1.43	1	..	21
										111	46.53	1	2	231

The thermometer was highest, July 28th—93°. The thermometer was lowest, January 31st, December 18th and 19th—19°. Range, 74°. Mean temperature, 64°.49. Mean of dew-point, 2 p. m., 56°.12.

Meteorological statement—Continued.

Months.	Barometer. Maximum.		Barometer. Minimum.		Range.	Mean of maximum.	Mean of minimum.	Mean.	Greatest fall.	Greatest rise.	Wind. N.	NE	E.	SE.	S.	SW.	W.	NW.	Varying between— NE.	E. by S.	SW.	W. by N.	Variable.	Summer, W. morning, SE. forenoon, SW. afternoon.
Jan...	19th,	30.48	2d,	29.50	.98	30.17	30.08	30.12	2d, .60	18th, .41	5	6	...	...	2	5	1	1	3	...	6	1	1	...
Feb...	19th,	30.58	4th,	29.80	.78	30.22	30.15	30.18	20th, .20	25th, .23	...	...	...	...	...	No record.			...	...	...	...	...	...
Mar...	26th,	30.47	17th,	29.70	.77	30.18	30.13	30.15	7th, .21	19th, .29	1	1	1	...	3	2	2	1	3	4	5	2	6	...
April.	10th,	30.36	19th,	29.54	.82	30.04	29.95	29.99	13th, .48	20th, .30	...	...	4	...	1	1	...	...	6	1	6	9	2	...
May..	25th,	30.35	5th,	29.69	.66	30.18	30.11	30.14	4th, .40	5th, .33	...	2	2	...	3	3	...	...	3	6	3	1	1	7
June...	18th,	30.33	7th,	29.78	.55	30.10	30.03	30.06	20th, .19	9th, .24	...	...	1	...	1	...	1	...	8	...	5	...	2	12
July..	12th,	30.27	19th, 29th,	29.92	.35	30.10	30.04	30.07	13th, .20	31st, .16	...	...	...	...	1	4	3	...	3	4	2	...	3	11
Aug..	29th,	30.28	24th,	29.63	.65	30.14	30.07	30.10	24th, .44	25th, .27	1	4	...	...	3	2	...	...	5	2	7	...	1	6
Sep.	16th, 17th,	30.42	27th,	29.83	.59	30.17	30.13	30.15	13th, .14	14th, .23	4	8	1	2	...	...	...	2	6	3	...	1	3	...
Oct....	7th,	30.33	26th,	29.55	.78	30.12	30.04	30.08	26th, .32	27th, .48	2	4	...	...	...	1	...	2	10	...	5	2	5	...
Nov...	12th,	30.44	21st,	29.62	.82	30.13	30.01	30.07	20th, .42	26th, .43	2	6	2	...	...	...	6	1	3	2	3	1	4	...
Dec.	6th, 7th,	30.57	15th,	29.67	.90	30.22	30.11	30.16	2d, .30	26th, .37	3	3	1	...	1	5	1	7	1	1	2	1	5	...

The barometer was highest, February 19........................ 30.58
Do..........lowest, January 2........................ 29.50

Range........................ 1.08

CLARKSVILLE, HABERSHAM COUNTY, GEORGIA,
January 28, 1852.

DEAR SIR: Enclosed I send you a condensed statement of the temperature of the atmosphere at Clarksville, by a Fahrenheit thermometer, for portions of the years 1847, 1848, and 1849, at sunrise, 2 o'clock p. m., and 9 o'clock p. m., kept by Robert Campbell, esq. No record having ever been kept for an entire year is the reason why this statement embraces only portions of the respective years.

Yours, respectfully, &c.,

J. VAN BUREN.

Hon. THOMAS EWBANK.

Thermometrical Observations at Clarksville, Habersham county, Georgia, 1,615 feet altitude above the ocean, in the years 1847, 1848, 1849.

BY ROBERT CAMPBELL, ESQ.

Time.	Minimum.	Maximum.	Average.	Monthly average.
1847.	°	°	°	
June, sunrise -	53	73	65.06	
2 p. m. -	70	85	76.03	
9 " -	64	72	68.23	
				69.77
July, sunrise -	57	71	66.35	
2 p. m. -	70	84	76.00	
9 " -	62	74	69.42	
				70.59
August, sunrise -	60	70	66.16	
2 p. m. -	72	84	78.00	
9 " -	64	74	70.36	
				71.51
September, sunrise -	44	72	59.05	
2 p. m. -	63	82	73.76	
9 " -	50	76	65.57	
				66.13
October, sunrise -	30	64	47.48	
2 p. m. -	58	77	68.96	
9 " -	40	68	56.68	
				54.35

Thermometrical Observations at Clarksville—Continued.

Time.	Minimum.	Maximum.	Average.	Monthly average.
1848.	°	°	°	°
June, sunrise	51	72	64.67	
2 p. m.	72	86	78.43	
9 "	63	75	70.10	
				71.07
July, sunrise	59	72	66.55	
2 p. m.	72	85	79.36	
9 "	67	76	71.84	
				72.58
August, sunrise	56	72	66.26	
2 p. m.	70	84	78.13	
9 "	66	74	71.13	
				71.84
September, sunrise	36	68	54.75	
2 p. m.	58	84	73.48	
9 "	48	76	62.85	
				63.69
October, sunrise	30	60	47.52	
2 p. m.	55	77	67.06	
9 "	40	64	54.39	
				56.32
November, sunrise	18	58	34.33	
2 p. m.	38	69	52.07	
9 "	26	59	43.03	
				43.13
December, sunrise	25	66	44.57	
2 p. m.	35	72	52.89	
9 "	32	65	47.86	
				48.44

Thermometrical Observations at Clarksville—Continued.

Time.	Minimum.	Maximum.	Average.	Monthly average.
1849.	°	°	°	°
June, sunrise	60	70	64.26	
2 p. m.	66	83	77.00	
9 "	62	74	69.18	
				70.15
July, sunrise	54	70	66.00	
2 p. m.	69	82	76.00	
9 "	60	73	69.00	
				70.34
August, sunrise	58	70	66.20	
2 p. m.	71	84	82.16	
9 "	64	75	70.71	
				73.01
September, sunrise	40	66	56.47	
2 p. m.	67	83	73.62	
9 "	52	70	63.20	
				64.46
October, sunrise	29	68	47.00	
2 p. m.	54	74	62.45	
9 "	42	68	53.60	
				54.35

Comparison of monthly averages.

Months.	1847.	1848.	1849.
	°	°	°
June	69.77	71.07	70.15
July	70.59	72.58	70.34
August	71.51	71.84	73.01
September	66.13	63.69	64.46
October	57.84	56.32	54.35
Total	335.84	335.50	332.31

VIII.

MISCELLANEOUS.

SEEDS RECEIVED FOR DISTRIBUTION.

Particular attention has been given to the collection of seeds for distribution during the past year; and a larger amount of money has been expended by the Office for this object than during any previous year. The arrival of the foreign seeds was unfortunately delayed till the season had become somewhat advanced; but the whole, with the exception of those delivered to members of Congress, heads of departments, &c., were sent by mail, within three days of their arrival, to every State and Territory of the Union.

In addition to those procured by purchase, many curious and valuable seeds have been sent for distribution from gentlemen both at home and abroad.

Through the agency, and at the suggestion, of M. Alex. Vattemare, there were sent by M. Louis Vilmorin, of Paris, an almost complete collection of the varieties of French wheat in ear, besides a quantity of seeds of grains, grasses, and vegetables. M. Randon, Minister of War, sent samples of the agricultural products of Algiers. These seeds were received and distributed by the Department of the Interior.

From C. F. Hagedorn, esq., Bavarian consul general, were received some olive-tree seeds; also, an assortment of vegetable seeds; and a parcel, containing a new and very prolific variety of rye, sent by the Agricultural Society of Bavaria.

Commodore J. H. Aulick, commander of the East India squadron, having been requested by the Secretary of the Navy to procure valuable plants, seeds, &c., suitable for cultivation in the United States, several cases of cuttings and roots of sugar-cane were sent home by him. They were received at the Department of the Interior, and were thence distributed among the sugar-planters of Louisiana and the neighboring States. A box of Cape of Good Hope wheat, also sent by Commodore Aulick, was received at the Patent Office, and was promptly distributed, through members of Congress and others, to every wheat-growing State in the Union.

Seeds have likewise been sent to the Patent Office by the following gentlemen:

Jacob Hewes, esq., of Leipenville, Delaware county, Pennsylvania.

Thomas Affleck, esq., Washington, Mississippi—a sack of Egyptian oats.

John P. Brown, esq., Constantinople. (The seeds never reached the Office.)

John Moreland, esq., Havana—Cuba tobacco.

Jeremiah Balthorpe, esq., Salem, Virginia—large Indian corn.

Lieutenant Hunter, Fairfax county, Virginia—large oats.

Lewis W. Busher, esq., Avon, New York—superior tobacco, of fine flavor, and very productive.

—— Calvert, esq., Prince George's, Maryland—white corn.

B. P. Johnson, esq., Secretary of the New York State Agricultural Society—an assortment of seeds.

A. Denny, esq., Eaton, Preble county, Ohio—sample of a new species of flaxseed.

Milton A. Haynes, esq., Cornersville, Giles county, Tennessee—a paper of catalpa seed.

Hon. J. M. Bernhisel, delegate from Utah—specimens of Californian, New Mexican, and seven-eared wheat.

H. R. Day, esq., Indian agent in Utah—wheat in the ear; three varieties.

Messrs. Warren & Co., Sacramento city, California—a small package of flower seeds.

Lieutenant J. W. Gunnison—a package of grass seed collected in the Utah valley.

Wm. D. Gillespie, esq., Lexington, Tennessee—specimens of stock pea grown by the Indians in Florida, of upland rice, flour, corn, and water-melon seed.

John B. Robinson, esq., Elk Creek, Erie county, Pennsylvania—some yellow corn.

Correspondence relating to Sugar-cane brought from the East Indies.

NAVY DEPARTMENT,
June 24, 1852.

SIR: Transmitted herewith, for your information, is a copy of despatch No. 21 and its enclosures, received from Commodore John H. Aulick, commanding the United States squadron in the East India and China seas, in relation to the sugar-cane which he has sent home in the "Marion," in obedience to instructions from this Department.

I am, very respectfully, your obedient servant,
WILL. A. GRAHAM.

Hon. A. H. H. STUART,
Secretary of the Interior.

[No. 21.]

U. S. STEAM FRIGATE SUSQUEHANNA,
HONG KONG, *February* 12, 1852.

SIR: In my despatch No. 20 I mentioned having touched at Penang, on my way through the Straits of Malacca, and procured cuttings and roots of the Salangore sugar-cane for seed, in obedience to your order of the 9th of May last. I also obtained a few samples of the Otaheite and Mauritius canes, which some planters at Penang prefer to the Salangore.

I had them all selected, and put up in various ways for transportation, by an experienced late manager of a sugar plantation there, as is shown by the enclosed letters from our consul at Penang, and Mr. Vermont. Some of these roots and cuttings are now growing finely in boxes and tubs. They will be sent on board the Marion to-morrow, and I think they may, with great care, reach home alive.

I enclose a list and description of the cane from Mr. Simons, the gentleman who procured them for me.

I have the honor to be, sir, respectfully, your obedient servant,

J. H. AULICK,

Commanding U. S. Squadron, East India and China Seas.

Hon. WILL. A. GRAHAM,

Secretary of the Navy, Washington, D. C.

PENANG, *January* 16, 1852.

SIR: According to the request I received from you through C. C. Currier, esq., the American consular agent at Penang, I have the honor of sending you—

No. 1. One box, marked S, containing 139 Salangore sugar-cane tops.
No. 2. One box, marked S, containing 137 Salangore sugar-cane tops.
No. 3. One box, marked O, containing 85 Otaheite sugar-cane tops.
No. 4. One box, marked O, containing 71 Salangore sugar-cane tops.
One open case, marked S, containing 6 Salangore cane plants.
One open case, marked O, containing 6 Otaheite sugar-cane tops.
One open case, marked O, containing 2 Salangore cane-roots.

The tops in the boxes Nos. 1, 2, 3, 4 are packed in their native earth, according to the way in practice here and other sugar colonies, for importation and exportation of sugar-cane tops, and of the best description. Should these boxes be placed in a dry and cool place, most of the tops they contain may arrive in good order, although I would have more confidence in the two open cases if on board they may be kept free from contact with salt water, watered now and then, and filled with earth as the canes grow. By the latter mode the Mauritius cane has been imported here from the Mauritius in 1845. I beg, also, to send two Salangore cane-roots. Allow me to add that all due attention has been paid to the choice and packing of the cane-tops.

Here enclosed I beg to forward the certificate supplied to me by the manager of the estate on which the Salangore cane-tops have been cut and the roots procured.

I have the honor to remain, sir, your most obedient servant,

H. SIMON,

Late Manager of Kream Estate, in Prince Wellesley.

Commodore AULICK,

U. S. Steam Frigate Susquehanna.

PENANG, PRINCE OF WALES ISLAND,
January 16, 1852.

I, the undersigned, manager of the sugar estate called "Otaheite," belonging to Messrs. Brown & Co., of this place, certify to all whom it may concern, that the cane-tops supplied by me to Captain H. Simon, for the United States war steamer Susquehanna, are taken from ripe canes, cultivated here upon the generality of European and native sugar estates, as the real Salangore cane described by Mr. Leonard Wray in his "Practical Sugar Planter."

The two roots are also from the Salangore cane.

JAMES VERMONT.

PENANG, PRINCE OF WALES ISLAND,
January 17, 1852.

SIR: I have the honor to reply to your requisition relative to the Salangore sugar-cane, having made every inquiry regarding that description of cane. I find, from the best authority, that the largest portion of cane now under cultivation in this island and the settlement of Province Wellesley is of that description; and that at Salangore (which is a native Malay State) sugar-cane is cultivated merely for supplying the wants of the inhabitants of that section of the country, and not for the production of sugar as an article of merchandise. I would therefore strongly recommend that the plants which you require should be selected and taken from the plantations of this island and Province Wellesley; and I have employed Mr. Henry Simon to procure and put up, in the best possible manner, six boxes of cane-cuttings, of which he has given a full description in a letter of this date addressed to yourself, which I beg herewith to hand you. Mr. Simon is a practical sugar-planter; and having had the advantage of superintending an estate in this settlement under the direction of the author of the publication entitled the "Practical Sugar-Planter," I have full confidence in his knowledge of the particular description of cane you require, as well as of all other descriptions now under cultivation in the Straits of Malacca.

I have the honor to be, sir, your most obedient servant,

C. C. CURRIER,

Consular Agent of the U. S. A.

Commodore AULICK,

Commanding U. S. Squadron,

East India and China Seas, Steam Frigate Susquehanna.

Letter respecting Wheat brought from the Cape of Good Hope.

U. S. STEAM FRIGATE SUSQUEHANNA,
HONG KONG, *February* 10, 1852.

MY DEAR SIR: I send to your address by my son, an officer of the United States sloop Marion, a box containing about half a bushel of *Cape* *of Good Hope* wheat, said to be of very superior quality. It is cultivated—but in no considerable quantity—in about the latitude of 33° south. I learn from our consul at Cape Town, that a sample of this grain has been tried in one of our northern wheat-growing States, but did not turn out very well, owing, probably, to the too great severity of the climate. It may, however, answer better in the more congenial region of our southern grain States, and I beg the favor of you to cause its distribution accordingly. I would also be much obliged to you if you would send a few samples of it to my brother, Mr. Charles A. Aulick, for himself and his three sons, all farmers, near Falmouth, Pendleton county, Kentucky.

I am, with great respect, yours, &c.,

J. H. AULICK,
Commanding East India Squadron.

THOMAS EWBANK, Esq.,
Commissioner of Patents.

ON CHESS IN WHEAT.

BROOKVILLE, INDIANA, *January* 8, 1851.

SIR: Though not actively engaged in agricultural operations now, I have spent the greater part of my life on a farm, and, whatever others may have thought, considered myself a skilful farmer. Since I have been differently employed, I have always felt much interest in that occupation, and have cast many a delighted look over luxuriant fields and well tilled and productive farms, and have made many an inquiry as to the method of cultivation which had produced such valuable results. I trust, therefore, that I shall not be considered an intruder in this department of science. I am a passionate admirer of good farming. I think that we may always judge with unerring certainty of the character of a man by seeing his farm. If I were a money-lender, which, by the way, I am not, I would ask no better security for a loan than to see the borrower's house and barn in good repair, fences well kept up, fence-corners clear of bushes, wet lands thoroughly ditched, corn free from weeds, and wheat from chess, rye, and cockle. Such a farmer, if he has a neat and tidy wife, is sure to prosper. One who neglects all these never can.

My present object is to state some facts concerning the culture of wheat, in opposition to the belief that wheat will change to chess.

This notion, once so prevalent, has, if I mistake not, lost many of its advocates since the days of better farming have come, and, I believe, will some day be entirely exploded. It is a very convenient theory, though, to cover up the faults of careless wheat culture; and many advocates of it will still, no doubt, be found among those who will not take the trouble to fully test the matter. Much time will be required to wholly disprove the theory. The greater portion of wheat is full of chess, and considerable labor is necessary to separate them. The fields, too, are full of it; for successive crops have fallen upon them, and it has often been sown there. It is known to be a hardy plant, the seeds of which will probably germinate after having lain in the ground several

years. That seeds of many varieties will thus lie in the ground for a long period, and then send forth their plants, is an undisputed fact. For instance, every farmer knows that white clover will spring up abundantly in fields where none has grown or been sown for five or ten years, and where it must have lain in the earth during the whole period; unless we adopt a still more extravagant theory than that which we have been considering, and suppose that not only wheat, but corn, rye, oats, barley, pumpkins, and potatoes, all change to chess. It is a curious fact in point here, that wheat found in the folds of linen enclosing an Egyptian mummy, germinated and grew luxuriantly, though it had, doubtless, been lying there 3,000 years. This fact has been several times published. I am clearly of opinion that if no chess was in our fields, and none was ever sown in them, or carried there by birds or other animals, we would never again hear of such a change as of wheat to chess, even though all the seed sown were shrivelled, (as was the case in 1849,) or sown on the top of the ground, or injured by a severe winter, or pastured off in the spring—all of them supposed to contribute to this result. I will state some of the facts which produced in me such a conviction of the truth of the above opinion, that conclusive testimony alone could change it.

It is now probably 15 years since my father determined to raise wheat alone, instead of wheat, rye, chess, and even cockle, as he and his neighbors had been doing. The rye, being taller than the wheat, was easily destroyed by cutting it out before harvest, and the cockle was likewise soon overcome. As to destroying the chess, the neighbors laughed at him, saying that the first hard winter would again change the wheat to chess, and his labor would all be lost. Nevertheless, he undertook the experiment. I was then a youth at home. We picked the seed carefully, head by head. Lest a single grain might have got into it, we run it two or three times through a fanning mill containing a good screen, each time entirely separating the screenings from the seed. We then sowed it on the cleanest ground that we had. We went through a similar process the two succeeding years. Whenever a head or grain of chess was found in harvesting, threshing, or winnowing the wheat, it was carefully pocketed, carried to a fire, and burned. By this time it was almost perfectly clear of the noxious weed, and would have been entirely so, I have no doubt, had there been none of the seed in the ground. After this, it was only necessary to screen the seed well in order to secure at harvest a crop of almost pure wheat. Several years have passed since then, and I think I may safely say that not a grain of wheat has changed to chess on that farm, though it has been exposed to all the casualties that are commonly supposed to produce the change. I will even venture the prediction that not a grain ever will change. It matters not what field has been sown, what the circumstances of sowing, what the character of the winter may have been, what casualties may have befallen it—such as cattle pasturing it, or fly eating it—the result has been invariably the same; as far as chess was concerned, almost entire freedom from it. Our neighbors, seeing the success of the experiment, have adopted a similar practice, and with like result; so that the opinion, once generally entertained, has now few advocates among them, or in the adjoining counties.

I have detailed this experiment at considerable length, not merely for the purpose of disproving what I conceive to be an erroneous opinion, but for the beneficial effect its disproof would have on careless farmers. Many who now raise from three to ten bushels of chess per acre would, if they did not believe this pernicious doctrine, soon raise as much wheat in its stead. It will take some time, as well as labor, to rid old farms of this unprofitable weed. But three years will more than repay both—in the larger yield of wheat, and the better quality of flour.

Besides the facts which I have given, I will say a few words by way of argument of the question. The theory is contrary to nature. We do not find that other plants change. Then why should this? Different varieties of the same plant intermix; but the seed of one plant does not produce another distinct and altogether different from its parent plant. It is just as reasonable to suppose that chess will change to wheat; yet we never hear of such a change as that. If there are changes, why are they not mutual? Because the laws of God forbid it, which laws are written, not only in the works of nature around us, but also in the book of Revelation, which speaks thus: "The herb shall bear seed after its kind, and the fruit tree after its kind." Again: "Do men gather grapes of thorns, or figs of thistles?" And again: "A good tree cannot bring forth evil fruit; neither can a corrupt tree bring forth good fruit;" or, to change the terms, wheat cannot bring forth chess; neither can chess bring forth wheat.

Chess often grows in meadows, from which it has been supposed by some that timothy will also change. The one change is just as likely to take place as the other; but is it not most strange, apart from all other considerations, that two plants, so different as wheat and timothy, should each change regularly into another and the same plant? If the ground was clear, the notion that timothy changes would soon be exploded.

Chess is probably a hardier plant than wheat, and thus flourishes where wheat has been frozen out, or, from any other cause, has not grown well. It seems to commence its growth later in the spring, so that where the wheat is good, it is choked, and makes little show; but where the wheat has been injured, the small stalks spread into large stools, and produce abundantly. The same result follows where the seed sown has been partially picked up by birds, or left uncovered and perished.

Such a change is contradictory to all known chemical principles, and as inconsistent with reason as that a walnut tree should bear oranges, or a fig tree produce oysters.

Yours, respectfully,

JOS. BRADY.

Hon. Thomas Ewbank,
Commissioner of Patents.

TRIPOLI IN ALABAMA.

Talladega, Alabama.

Sir: Supposing it desirable that every resource of our great republic should be developed, I have thus intruded on you, for I do not know

whether mineralogy is embraced in the Patent Office Reports or not; but if it be an intrusion on your business, please pass it by, and impute it to ignorance. I have sent you a small specimen of what I suppose to be *tripoli*, hitherto unknown as a native of the United States—at least so far as I have learned. I have called it tripoli, though it may be some other mineral; for I do not profess to be well learned in mineralogy. It is called chalk by the common people, and used as such, and is found in a cave of what I suppose to be, in mineralogy, called mountain limestone. The geological character of this region is rather hard to be understood, but I believe its formation is what we call primitive, or plutonic, though not far from newer formations. This cave is situated in Talladega county, Alabama, one mile east of the Coosa river. A few miles west the coal fields set in, and continue in a western direction from fifty to one hundred miles. This coal formation is supposed to be immense, and is of good quality. Fifteen or twenty miles south there are immense quarries of fine white and variegated marble, and a quarry of lithographic stone, (*very fine.*) My limits will not admit of giving a mineralogical or geological history of this region; but it abounds in valuable minerals. There appears to be a large amount of this mineral, (which I call tripoli,) and it is easily quarried. Should it prove to be of good quality, we need not import it hereafter.

Very respectfully, yours, &c.,

JOHN HUBBARD.

The Commissioner of Patents.

Smithsonian Institution, *April* 15, 1852.

Dear Sir: The specimen of earth sent by John Hubbard, esq., of Talladega, Alabama, to the Office of Patents of the United States, has been submitted by me to a careful microscopic examination, and was found to be *tripoli* of the finest quality.

I am not aware of the quantity of tripoli imported yearly into the United States, but however small it be, if we have it in our country, let us make use of it; and if Alabama possesses extensive beds of that earth, it might be made of still more general use.

I remain, dear sir, yours, very truly,

C. GIRARD

Thos. Ewbank, Esq.,
Commissioner of Patents.

AGRICULTURAL BUREAU.

The institution of an agricultural bureau by the general government has been a subject of public discussion for years, and is now (as it has repeatedly been) under the consideration of Congress. The legislatures of several States have passed resolutions in favor of its organization, and so have agricultural societies in various sections of the Union. Agricultural writers have inculcated its importance, and practical men have repeatedly urged the necessity of it in their communications to this Office.

Presidents Taylor and Fillmore have followed the example of Washington, in calling the attention of Congress to the subject. All that has been done towards carrying these views into effect is the employment of a temporary clerk in the Patent Office, whose salary, and the cost of purchasing and distributing seeds, &c., have been borne by the Patent Fund.

While some object to a bureau for the promotion of agriculture on constitutional grounds, and contend that every great industrial interest of the country has equal claims upon Congress, others are averse to its establishment from a belief, or fear, that it would become more or less subservient to political and party purposes. There is, however, an institution already organized by Congress to which no such objections can apply: it is national in its character, purposes, and location; it possesses the requisite means and appliances—funds, buildings, a scientific corps, library and apparatus; and would seem, therefore, peculiarly adapted to prosecute one of the most important purposes of a bureau—a purpose in strict accordance with the will of its founder. The design of Smithson, as evinced by his employing the comprehensive and familiar term "*knowledge*"—not *science*—in his will, and by his selecting the most practical of all people as his trustees, was to add to and spread abroad the elements of material civilization—not solely to cultivate the higher or abstract sciences, for which philosophical associations abounded, and abound. With Franklin, he estimated science according to its practical value; and the sentiment is becoming more and more that of the enlightened world.

The propriety of establishing in the Smithsonian Institution a department of Agricultural, and one also of Mechanical science, with suitable appropriations, to aid in working out *the great practical problems of the day*, is respectfully suggested for the consideration of Congress. In this institution every citizen has an interest, and upon it a claim to all the information it can impart. To it might be referred the analysis of ores, soils, fertilizers, and vegetable products, together with propositions for the increase of speed in vehicles for traversing land and water, the application of electricity and the gases as motive agents, the extension of known materials to new manufactures, the evolution of new principles and processes, and, in a word, for everything calculated to meet the progressive demands of agriculture and the arts. To it the Patent Office might be authorized to refer, for experimental proof, claims for patents involving doubtful points in chemistry and natural philosophy, &c.

By thus identifying itself with the active agents of modern progress, by taking up new and important problems in agricultural and mechanical science, and giving right directions for their solution, its benefits would be felt throughout the length and breadth of the land. It would increase and diffuse, not merely interesting information among savants, but substantial and fruitful knowledge "among men," and men of all climes; for it is idle to suppose that the discovery of any valuable fact in practical science can now be held for the exclusive benefit of one people: it would be rapidly proclaimed in every civilized section of the planet, and credit would be returned to the source whence it emanated.

The epoch of vegetable chemistry is but opening; yet it already offers a prospect than which one more varied and attractive never invited the attention of philosophers, or promised higher honors to discoverers. We have as yet done but little in this prime department of research, although it is fraught with novel elements of national wealth and of national glory. Probably the greatest of human achievements for a century to come are to be made in it—greatest, as regards sublimity of discovery, and magnitude and beneficence of results.

The successful efforts of MM. Naudin and Lecoq in taming the hitherto intractable thistle family, and rendering them fit for human food, are examples of what is already being accomplished in this branch of research—one that will afford employment for the highest intellects, and reward the labors of enterprising agriculturists through all coming time.

"While M. Naudin hopes to produce a thornless thistle for the better nourishment of four-footed beasts, M. Lecoq places a thistle upon his own table and eats it himself, thorns and all. He entitles his letter read to the Academy, 'Two hundred, five hundred, or even a thousand new vegetables, *ad libitum*.' He had noticed the instinct of the ass invariably directing him to the thistle-bed; and, confident that that serrated plant possessed some precious qualities that are not generally acknowledged, he took a few specimens of the tribe under his care, cultivated them carefully, and finally turned out 'a savory vegetable with thorns of the most inoffensive and flexible sort.' Continuing his experiments, he finally tamed every individual member of the fierce family of thistles—the Hercules thistles, *Cirsium eriophorum*, the *Heracleum spondylum*, and other redoubtable individuals. Encouraged by his success, he undertook the mollification of several tyrants of the vegetable kingdom more ferocious still, if possible, and encountered no serious resistance. In all this M. Lecoq claims no discovery, and conceals no secret. His only mode of transformation is to expose to the sun plants that grow in obscurity, and conceal from the solar influence plants that flourish in the open air, and thus entirely alter their nature. He simply employs upon vegetable productions hitherto misunderstood and neglected the most common processes of the gardener's art. The acrid, aromatic properties of cress, parsley, chevoil, &c., are retained by allowing them to grow in the sun; the acridity of celery, on the contrary, is made to disappear by burying it in the sand; the crudity of certain sorts, of lettuce is removed by binding the leaves tightly together, and excluding the light and the air. The entire nature of the plant is thus transformed; and it is by means as simple as these that M. Lecoq has made the thistle eatable, and holds out to us the hope of soon eating dock and pigweed with as much relish as asparagus and green peas. He asserts that by means of overturned flower-pots he can render alimentary all the cruciferous, all the umbelliferous, and all the syrantherous species, and that certain of the most despised and degraded among them will yet claim the place of honor at the festive board."

Inquiries into the forms and structure of coleoptera, algæ, &c., of antiquities, astronomy, language, ethnology, &c., are undoubtedly interesting, and ought to be pursued; but they are not incompatible with equally interesting and important researches into the organisms and means of improving esculent grains and grasses, fruits and roots, and the means of developing new plants for both food and materials of manufactures; nor need they exclude inquiries into the capabilities of domestic animals and their untamed relatives, since the progress of society imperatively demands corresponding advances in all that relate to these essential agents and elements of civilization. Under the influence of ideas now nearly obsolete, savants once shrank from contact with popular processes and pursuits; but barren speculations are no longer preferred to fruitful realities, and the time has gone by when philosophy could not, without a sacrifice of her dignity, take up common things.* A good example, in this respect, has already been furnished by the French republic of 1848, one of the first of whose acts was to found the "*Institut Agronomique National*" at Versailles. A part of the buildings of the palace, and about fifty acres of its grounds, were devoted to this object. A corps of the ablest professors in the country was formed; and "superior instruction" in practical agriculture and chemistry is given. At the laboratory analyses of soils and manures are gratuitously made, and information is constantly imparted to those who may desire it.

Among the professors, one is charged with the department of zootechnie, or everything relating to rearing and improving the breed of animals; another professor has the department of agriculture and mechanics; another that of ruled economy, or the exposition of such laws and principles of political economy as bear upon the functions of the farmer.

Then, as regards mechanical science, France has the "*Conservatoire des Arts et Métiers*," with its museum of models, and laboratory for analysis, where lectures on science applied to the arts, general information upon dye stuffs, metals, &c., &c., are gratuitously given.

So with us let the two grand industrial interests of our republic and of the world be in like manner directly represented in an institution founded for the benefit of mankind at large. Let our agriculturists have their Liebig, and our mechanics have their professors—men selected for their devotion to and extensive knowledge of the arts of industry—to whom they can resort for instruction and for advice in cases of difficulty and doubt.

Of the facts and results obtained by the proposed departments in the Smithsonian Institution, those of immediate or permanent interest might be announced monthly or quarterly in cheap or gratuitous tracts, or they might be embodied in annual reports to Congress, and circulated like other public documents. The benefits emanating from the Institution would thus be greatly augmented, and would be brought more directly within the reach of the entire body of our people; nor could a more consistent employment of a part of the testator's bequest, or one more certain of public approval, be named. It would "increase and diffuse knowledge" among those who are best able and anxious to turn it to profitable account. Pre-eminently catholic in its character and design, there is nothing to prevent the Smithsonian from becoming one of the most cherished institutions of the age.

Respectfully submitted:

THOMAS EWBANK,
Commissioner of Patents.

[* See kindred sentiments well expressed by Professor Turner, of Illinois, in his "Plan for the State University," copied in this Report, p. 37.]

APPENDIX.

The present Report having already exceeded the usual number of pages, only the following communications of those deferred from the Report of 1850 are inserted:

DOVER, NEW HAMPSHIRE, *January* 7, 1851.

SIR: Your Circular sent to me, requesting information on the various branches of agriculture in our part of the State, was duly received. I herewith transmit to you replies to some of the inquiries which have come under my observation and experience:

Wheat.—We do not cultivate wheat much in our part of the State; we consider it an uncertain crop. Some of our farmers, recently, have been sowing the winter wheat, and speak of it as doing very well. I am not able to give much information on that subject.

Corn I consider one of the best crops we cultivate. The middling size eight-rowed early yellow-seed, and the eight-rowed white-flint corn, I believe to be the two best and most profitable kinds of seed. I have planted different kinds of seed—the large eight and twelve-rowed; but this large seed corn takes longer to ripen, and it does not fill out so well—there is too large a space between the rows on the cob; it will not shell out so much, and will not weigh so much a bushel. My method for ploughing and planting is as follows: Plough the sward ground in the fall of the year—say in September; the more grass and second crop you turn under the better; plough deep—say from seven to nine inches: this is of great importance; harrow the ground well in the spring, as soon as the frost is out and it is dry enough to make it mellow and fine; furrow both ways with a small one-horse plough, about three feet each way; put about half a shovelful of fine compost manure in the corner of the furrows for the hill. I consider a small quantity of manure in the hill to be of great importance to the crop. The corn comes up quickly, is strong, and gets an early start. After it gets up about a foot high, the roots get hold of the old sward, and then it will go ahead, if you keep the weeds and grass down. Drop five or six kernels in the hill on top of the manure. If it comes up too thick, pull out at second hoeing. Four spears in a hill are better than more.

I plant my ground in corn but one year in succession, sowing down to grain the second year with hay seed. Good corn land is worth from $50 to $100 per acre.

Cost of raising one acre of corn:

Seed	$0 25
Interest on land	4 00
Ploughing and harrowing	4 00
Planting	3 00
Hoeing	5 00
Harvesting	4 00
Shelling	2 00
Manure	5 00
Cost	27 25

Crop, fifty bushels, at 75 cents per bushel	$37 50
Corn-fodder on one acre when hay is worth $10 per ton	6 00
	43 50
Cost	27 25
Gain	16 25

Oats, Barley, Rye, Peas, and Beans.—Oats I consider to be the best and most profitable crop of grain at this time; yield, from 20 to 50 bushels per acre; price, from 35 to 60 cents per bushel; seed per acre, from two to three bushels. Barley, 20 or 30 years ago, yielded well, and made good feed for hogs and cattle; but for the last few years the crop has fallen off and been very light. Cause unknown to me. Rye, peas, and beans, not much cultivated for market. Hay is the best and most profitable crop we can cultivate for market; yield, from one to three tons per acre. Clover and herdsgrass are the best for market; seed per acre, a half bushel of herdsgrass and six pounds of clover. This, I think, is about the right quantity.

We press our hay in bales from 250 to 400 pounds each, and send to Boston and other markets on the railroad. Price varies from $10 to $20 per ton; common price about $14 at market; average price with us $10.

Hogs.—The middling size white breed, I think, is the best; black hogs are no favorites of mine. Pork-raising for market, in our part of the country, since we have lost the potato crop by rotting, I think is an unprofitable business. We cannot raise pork as cheap as the farmers in the western States. I do not think corn worth more than 35 or 40 cents per bushel to make pork at the price it has been selling for in our markets for the last few years—say from $5 to $6 50 per hundred weight. Grain ground and cooked, I think, is decidedly the best, and should be given to hogs warm in cold weather.

Root Crops.—Turnips, carrots, and beets are all good roots to cultivate as a field crop. I should hardly know how to get through the winter with my cattle and hogs without some kind of roots. I succeed best with the ruta-baga turnip. Sow on old ground, in good condition, that has been cultivated one year; plough deep; harrow and pulverize it well a few days before sowing.

I like the plan best of sowing seeds in hills made by the common hoe—say two feet apart, about the same distance we plant white beans. At second hoeing, thin out all but two or three plants in a hill. Let them stand as far apart as possible. The great secret in cultivating roots is to have them thin enough to grow large; they will not do well if too thick on the ground; yield, from 400 to 800 bushels per acre.

Potatoes.—I cannot speak quite so well of potatoes at this time. Until within a few years they were considered to be one of the best root crops we cultivated, both as to home consumption and market value. We depended very much on them for fatting our beef and pork; but within the last few years the disease has taken hold of them and almost entirely destroyed the crop. I have not seen anything written on the subject to satisfy me as to the cause of it. Some have thought the rot was owing to the old seed, that the potatoes had been planted too long and had run out; but I am satisfied that is not the case. One year ago last spring, I sent to Buffalo, New York, and obtained a paper of potato seed—about a teaspoonful, with directions how to cultivate them. I sowed them in a hot-bed early in the spring. When the plants got to be three or four inches, I transplanted them in my garden, one plant in a hill, about two feet apart; hoed and cultivated them the same as other potatoes, and, to my surprise, the crops grew quite large, and at harvest time I found almost all kinds, colors, shapes, and sizes, from a pea to a turkey's egg; yield, about one and a half bushel. When I took them out of the cellar last spring to plant, I found at least one half of them as diseased as any I had in the cellar. I planted, this last spring, those that were sound, and at harvest time in the fall, I found them almost all rotten. I think we shall have to give up cultivating potatoes at present, for it has been an unprofitable business the last four or five years in this part of the country.

Fruit Culture is having increased attention. Apples and pears I consider to be a very profitable crop for market, and for feeding hogs and cattle. Peaches, plums, and grapes do not succeed so well with us.

Very respectfully,

THOMAS W. KITTREDGE.

COMMISSIONER OF PATENTS.

SOUTH BARRE, VERMONT, *January* 1, 1851.

SIR: Having received one of the Circulars from your Office, the object of which is to collect information on the various branches of agriculture, I will give you a few facts, to which I have been an eye-witness, and I am confident if they were generally known would benefit mankind.

Clover.—Northern clover is one of the most important crops for seed grass and hay we have. It is a grass which roots deeper, and consequently gets nutriment deeper down, than any other grass here grown. Its leaf is broader, and covers more surface, and it also absorbs more nourishment from the atmosphere than most other grasses, and of course does not impoverish land, in proportion to its value, more than many other kinds of grass.

In the year 1849 the season was very dry, and all crops were very light. I had eight acres of new stocked clover. I mowed it as soon as the grass was ripe, threshed it, and got two bushels of seed per acre. In 1850 the season was very wet, and the clover on the eight-acre piece above mentioned was very tall, intermixed with red-top and white clover, producing from two to three tons per acre. Clover seldom seeds as well the second year as the first. I noticed some seed in this. If I had let it all stand until the seed were fit to thresh, or mowed it all together, and let it lie until the chaff would thresh off, the hay would have been much impoverished, and the labor of handling it, together with the hay which would have been broken and lost in the chaff, would have been a great drawback on the crop of seed. To avoid all this, I took my cradle-scythe, which is four inches wide, and commenced cradling off the tops of the clover, taking off from four to six inches, (a man will cradle one acre per day.) I let the clover heads lie until they were dry, carted and threshed them with one-quarter the labor it would cost to mow and get them in the usual way. They yielded two bushels per acre. I mowed one acre of the stubble, and got one and a half ton of hay, which my cattle and sheep eat well. I then ploughed in the remainder, and shall probably get a good crop of wheat next year.

I will state my method of harvesting maize, (Indian corn,) which very much improves its value as an article of food. As soon as it becomes seared, cut it up, bind it with straw or grass in bundles which one man can handle, and hang it up on a pole, or joist, supported by props, or across a fence. Let it hang about three weeks, or until it gets dry; then husk and put the best ears into a crib, to be shelled when wanted for use.

In the year 1838, a road was laid through my farm three rods wide, on land of a black soil, the hard earth being within 18 inches of the surface. I ploughed the road, also a strip of land three rods wide each side of the road, and then scraped all the valuable soil from the strip three and a half rods wide (enough for the road and fence) on to the adjoining land each side of the road. The next spring I planted potatoes in it, and raised 400 bushels per acre, without manure, (200 bushels being the average yield of the same land without this extra soil,) and it still continues to produce more than the adjoining land. I removed the soil from 15 square rods in a day with one team.

I will now state my method of making the road after this soil was removed. I commenced ploughing in the centre of the road; I ploughed it in the centre four times, (breaking the earth two rods wide,) then ploughed and scraped enough from the ditches to make a good road. It has required but little repair since, and will never need much, from the fact that it was made of hard earth, and there is nothing but hard earth within the bounds of the road to repair it with.

In 1846 I invented and put in operation an implement consisting of three rollers, or drums, for the purpose of rolling land in summer and roads in winter.* I have used it for four years past, and it has exceeded my most sanguine expectations in regard to its utility. One span of horses (weighing twelve hundred each) will roll from 20 to 25 acres per day. In winter, when the snow is one foot deep, four such horses will roll a road three miles per hour, leaving the track 12 feet wide, the snow being hard and smooth, and but three inches deep. On Monday, the 23d December, 1850, the snow fell in the vicinity where I live two feet deep, drifting on the road to the school-house one foot, making it three feet deep. On Tuesday we drew the roller over it twice, with three yoke of oxen and one horse, the weather being cold. On Wednesday I trotted my horse (weighing fourteen hundred) over this road, at the rate of eight miles per hour, drawing a sleigh and six persons, averaging in weight 120 pounds each, passing sleighs in perfect safety without breaking the trot, the horse's hoof not indenting the snow more than two inches, and the sleigh not cutting in more than half an inch. I have, in years past, commenced rolling when the first snow falls, repeating the rolling every snow storm, until, in some drifting places, the hard snow has accumulated to the depth of six feet, and have seen loaded teams pass each other as fearlessly and safely as an eagle will sail over our hills.

Another advantage is, that a wheel carriage is enabled, by the use of this roller, to run with ease and safety, enabling teams to cross over hills and vales in the spring, when the snow is melting and the ground is bare in spots. Again, when the snow is going off, it melts gradually, and does not gully the road, as it otherwise would. In 1848, one foot of snow fell in December. I rolled the road from my house to the village, (it being two miles.) Soon after the wind arose and blew the snow out of the road in spots, drifting it in other portions on all the roads in this vicinity. No more snow fell that winter. There was no good sleighing or waggoning on the roads that were not rolled all winter; but on the rolled roads we had both.

The cost of a triple roller here is $15, and I presume there are but few school or highway districts in Vermont, or in any of the neighboring States where snow abounds, which have not team enough to draw a roller. And it would be one of the greatest favors the State legislatures could confer on the people to pass an act requiring them to furnish themselves with rollers, and roll the roads of their respective districts every time the snow falls four inches. The same roller will be sufficient to roll the land for a whole district by putting on a body and a pair of thills to each roller—thus giving you three one-horse rollers.

[*The general nature of the implement, the details of which do not clearly appear from Mr. Thomson's drawing and description, is as follows: Two of the three rollers are placed in a line, on the same axle, four feet apart. The third one is placed some distance behind, and rolls over the space left between the two front ones. The front rollers are four feet long, each, and the rear one five feet. They are all four feet in diameter, and are made in the form of drums; the heads of two inch, and the staves of one and a half inch plank. The machine is loaded as occasion requires.]

In regard to the utility of rolling land there is some dispute. One class of men affirm that more hay will be obtained in a given number of years, if the grass is mown above the stones and ridges, than would be if the stones were removed and the land rolled smooth and mown close. But the dry season of 1849, in our vicinity, has induced many to abandon that theory. The grass did not head out that season, and was only from four to six inches high; consequently, the stone and ridge advocates had no hay for their cattle, while those who removed the stones and rolled the land had enough hay for their cattle, and some to spare.

In 1848 I sowed six acres of oats in one piece, on land of a black soil, with hard earth within 18 inches of the surface, sowing on two and a half bushels of oats per acre. I rolled it all, except a strip two rods wide, through the middle of the piece. It produced 65 bushels per acre where it was rolled, and 40 where it was not rolled. The oats were one week earlier where it was rolled. The roller works well, as hundreds will testify. I am often asked why I do not get it patented. My reply is, if I can see it in general use, and have the privilege of travelling where it has been used, it will be remuneration enough for me.

Respectfully, yours,

JOHN THOMSON.

Hon. Thomas Ewbank,
Commissioner of Patents.

Lafargeville P. O., Town of Orleans, Jefferson Co., N. Y.,
December 21, 1850.

Sir: The most skilful husbandry remains unfruitful without propitious seasons. Unless cultivation is assisted by fertilizing rains, or unless, to use the words of the sacred writer, "He calleth for the waters of the sea and poureth them out upon the face of the earth," the labors and science of the husbandman are vain. Hence, in answering some of the questions of your Circular, the course of the weather being so intimately connected with agriculture as to reward or destroy, in the whole or in part, the labors of the farmer, it may not seem useless or uninteresting to say a word of the weather, as we often experience it in the northern part of this county during the season of tillage and harvest. The land being mostly level plateaux, gradually rising south from the Black river, and descending northerly towards the river St. Lawrence, or inclining westerly towards Lake Ontario, it follows that we are almost surrounded by two powerful water-currents, which seem, by common belief, to act with great force of attraction upon the gathering clouds which come within the power of the current of these rivers, and often expose us to extremes of wet and dry weather. The south part of the county, being surrounded by highlands, east and south, is generally better favored by natural limits, and less subjected to the same extremes; and the clouds brought with the southwest wind from the Lake, after encountering these obstructions to their passage onwards, whirl round, open upon the country by refreshing showers, and thence roll down the Black river. Our springs are variable, and it is not until June that the weather becomes settled. The spring rains have, then, mostly past; it grows warmer—sometimes hot; and showers are often needed. Well, the clouds are gathering, lightning flashes, we hear the roll of distant thunder; the storm hovers around us for a while, as if uncertain which course to pursue; we hope and prepare for a shower; vegetation is suffering. Suddenly the clouds are set in motion, and, descending, follow the current of either river; and some parts of the country only, as they lie near or under the outer edge of the storm, receive a slight sprinkling. It is a common observation that the storm must gather just so thick to overwhelm the current of the rivers; and then we get a succession of rainy days, or a spell of wet weather, as the farmers are wont to call it, followed again by another spell of dry weather; and were it not that during those often long intervals of drought we were blessed with a copious supply of the dews of heaven, all our hopes would nearly be blasted. Notwithstanding this local contingency of the seasons, we have not only seed time and harvest, but generally bountiful crops. Could we have our rains equally divided at reasonably short intervals, this would be one of the most productive regions of the world. To guard against these irregularities of the weather, we find it beneficial to plough deep, and to sow as early as the season will admit. By early sowing, we think, the plants get a good start before June, and, covering the ground, keep it from the drying influences of the sun and lessen evaporation; and by deep ploughing and mellowing the ground, besides promoting vegetation, the ground easier imbibes the rains or dews, and is better enabled to free itself from what might be superabundant. This year we had a long wet May, and crops were mostly got in late. This was followed by dry weather till the end of June, and made us fear a repetition of last year's drought. Then commenced a succession of storms of rain, wind, and hail, in some parts, which lasted during the season, causing a great growth of straw, laying most crops flat down to the ground, so that nothing but the scythe could be used, and perplexing and protracting the haying and harvesting to an unusually late time, and at nearly double the usual amount of labor. We have, however, had a good yield of all crops grown here; but I do not think the grain has generally so well formed and filled as otherwise, owing probably to the heavy straw and the many rains, keeping the heads down.

Corn has come in unusually good and heavy.

Potatoes were never more luxuriant in growth of tops, and the greatest crop was expected, when the rot made its appearance, and I regret to say that about one-half of the crop, at least, was affected, and mostly lost.

A few patches of winter wheat were raised, and what little was grown proved good, the midge doing very little or no damage. Our farmers here think that the only remedy against the midge is to stop raising wheat, or, to use their own words, to starve the weevils out. I think, myself, that this is the only safe remedy, unless we could procure such spring or winter varieties as will, by early or late sowing, grow in a manner to be out of danger during the short period of existence of the destroyer. The fact is, that since we have left off raising the old-fashioned varieties, the midge has already greatly diminished, and is expected entirely to disappear. I hear of a farmer in St. Lawrence county who raised, this year, a great crop of winter wheat, said to be of the Soule variety, which was harvested and threshed in July, without any damage from the midge. I was shown some of the wheat—a beautiful, white, plump berry; and, if the story proves true, this would be the winter variety suited here; but as long as the Black Sea spring variety will not degenerate, escape the midge, and readily sell at 80 cents the bushel, there cannot be great inducement here to raising winter wheat for one dollar.

In a former communication I have given the average yield of the several crops raised here per acre, and as to the quantity of seed to be sown per acre, though there seems to be a difference of opinion among practical farmers—some using more, some less seed. I have always had reason to be satisfied with sowing the quantities of seed set down, per acre, for the several crops in that same communication, excepting, when seeding down in the spring, I prefer sowing half a bushel less per acre, to prevent the grass and clover from being smothered by a too great growth of straw.

Peas are cultivated here as an alternate crop, to loosen, improve, and mellow the soil, for which, by completely shading the ground, they are peculiarly adapted. I have no doubt that worn-out lands might be reclaimed by ploughing a pea lay under; but unless clover is higher than $6 the bushel, it would be considerably more expensive; and upon the whole, where clover can be had, and will thrive, it is much preferable.

As fertilizers of meadows, drawing barn-yard manure in the fall on the highest knolls of the meadow, and then spreading it evenly, has been considerably practised within a few years, and I have myself derived great benefit from the practice. By this management those higher grounds run into a heavy sward, the wash, if any, settles, and enriches the lower parts of the meadow; and where the year previous but a scanty herbage grew, I generally cut, after thus manuring, a good, heavy swath, equal to any in the meadow; and if this process is coupled with the sowing of plaster, the spring following, the plaster will have a better effect in increasing the quantity of hay grown. Our meadows average from one to one and a half ton of hay per acre—sometimes two tons, on the best meadows. It costs us, per acre, from $2 to $3 to cut and secure the hay; and the common price of hay being $5 the ton, leaves the remainder as profit. The seeds used in laying down meadows are timothy and clover, and red-top on lowlands. Clover, however, seldom lasts over one winter, when it gradually runs out.

Dairy.—In cheese-making I have no experience. The prevailing opinion is that cheese dairies give less work and are more profitable. Whether this is actually so, I am unable to say. The fact is, that most dairies here have gone from butter to cheese-making. On comparing notes, however, with the yearly returns of cheese dairies where an equal number of cows were kept, I have uniformly found that there was, all things considered, little or no difference with the same yearly returns of butter-making on my farm, and that the difference in the profits altogether depended on the prices butter and cheese commanded in market. Good dairy cows can be bought here at from $12 to $15 in the fall, or from $20 to $25 in the spring. Milking qualities do not belong to any particular breed, and may be found, in my humble opinion, in all crosses; and even our natives often make excellent dairy cows. Allowing the cows to yield from 150 to 175 pounds of butter, and from 350 to 400 pounds of cheese, during the season, and taking the highest yield to establish estimates upon, we will arrive at the following results:

25 cows, at $20		$500 00
90 acres of land, at $20		1,800 00
Dairy utensils, &c.		75 00
		2,375 00
25 cows, at 175 pounds butter each, at 15 cents		$562 50
Drawn skins, (say,) worth		10 00
Skim milk, per cow, $2		50 00
		622 50
Deduct interest on $2,375, 12 months	$166 25	
Deduct expenses of cutting hay, making butter, &c.	120 00	
		286 25
Profit		336 25

The dairy being a cheese dairy, deducting $1 per cow for skim milk, the result will be in favor of butter if cheese sells at $6 per hundred, and in favor of cheese if it sells at $7 per hundred in market.

My cows are regularly milked twice a day, at equal intervals, evening and morning. The dairy room is a cellar, 28 by 38 feet, stone walls two feet thick and seven feet high, with windows and doors to ventilate at all times when the temperature of the air outside will allow. The cellar is kept at the temperature of 60°, as near as possible, being guided by a thermometer in and outside the cellar. The cellar is kept clean and dry, (the drier the better,) and should remain free from anything that may communicate an offensive flavor to the milk or cream. The milk is strained in tin pans, filled to about eight quarts to a pan; these pans are set in movable racks, or frames, on two slats, each frame having seven tiers of these slats on each side of the frame, each holding ten pans, and each tier about five inches, or the height of a pan, apart. Thus each frame or rack holds 140 pans. On each side of these frames, from 12 to 14 feet long, and level with the first tier of slats, there is attached a projection a little over two feet from the floor, wide enough for two slats, and answering as a table to set the pans on when the milk is to be strained or skimmed. Here the milk remains from 30 to 36 hours, when it is skimmed, and shortly afterwards churned. The churning is performed by dog-power, which being more uniform than when done by hand, the butter comes harder and of finer grain. The churn used is a crank-churn. As soon as the butter has come, it is taken out of the churn, washed clean with cold, hard, well water, till the water leaves the butter as clear as when pumped from the well. It is then salted with a little over half an ounce of salt to a pound of butter, and the salt used is common New York salt, dried, made fine, and sifted. We never have suffered any inconvenience or damage from the use of it as above prepared. The butter, after being thus salted, is carried to the cellar, where it stands about 12 hours, or sufficient time for the salt to dissolve, when it is worked over, the clear brine extracted, and packed down as firmly as possible, by kneading with the hand, to make it one compact mass. (The tubs used are made of the heart of the wood, generally sound white ash.) These tubs hold 100 pounds of butter, and weigh from 11 to 14 pounds the tub. Previous to receiving the butter they are soaked a few days with a strong brine, made of salt and saltpetre. When the tubs are filled, the butter is covered with a wet cloth, and this cloth is covered with a layer of about an inch of salt, made moist, or paste-like, with water. The tub is then covered, and remains till the butter is taken to market, when the salt is taken from the cloth and the covers strapped. The price of butter ranges from 14 to 15 cents the pound; that of cheese from $5 to $6 per hundred.

In rearing *neat cattle* very little can be made, except, perhaps, turning off and converting into beef such loose fodder and hay as cannot very well be sold off from the farm, and giving the benefit of the manure. Manure being money on the farm, if no great profit is derived from raising neat stock, it can occasion no great loss. If well kept during our long winters, neat cattle will consume at least three tons of hay per head till they are three years old; and this, besides loose fodder, which, to say nothing of summer keeping, and putting hay at $5 per ton, and selling three-year-old cattle at $15 a head, is no money-making affair.

The growing of *wool* is not thought very profitable by our farmers. To illustrate this, they say 100 sheep will require 15 tons of hay, which, at $5 per ton, makes $75, for winter keeping; to this add $5 for washing and shearing 100 sheep, which is low; add, also, the summer keeping, which cannot be less than $1 25 a week, for six months, $30, making a total of $110. Add interest on cost of sheep, and you find the sum of $117. Now, then, most flocks will not average over three pounds of wool, or 300 pounds for 100 sheep, which, at 25 cents per pound, would give $75; to this add increase on flock of 100, say one-half, or 50, at $1, and the result being $125, the profit, if I am right, appears very small, indeed. Taking another view of the case, the result will be as follows:

36 acres, at $20		$720 00
100 sheep, at $1		100 00
		820 00
100 sheep, by 300 pounds wool, at 25 cents		$75 00
Increase		50 00
		125 00
Deduct interest on $820	$51 10	
Deduct washing and shearing	5 00	
Deduct cutting hay and taking care of	50 00	
		106 10
		18 90

One ton of hay is supposed to make about 14 pounds of wool; and if this be true, allowing the remainder of the yearly wool to be grown in summer, the bare wool-growing, at 25 cents the pound, would be, were it not for the increas of the flock, a rather unprofitable business.

Although the foregoing chapter on neat stock and sheep may not appear flattering as to profits, well regulated farms should not be confined to one single branch of farming, unless peculiarly doomed to it by nature; and where a mixed husbandry is practicable, there being no farming without manure, and no manure without stock, the farmer will find room, food, and profit for everything on the farm, and the whole will ultimately concur to balance, by large profits of one kind, the apparent small returns of another kind of husbandry.

About *potatoes*, I dare not say one word. The raising of this delicious and healthy edible has become so precarious by the mysterious disease that hangs over the crop, that the yield and cost of production per acre are uncertain, and the wisest know least what mode of cultivation is now best adapted to insure success and preservation from the rot.

On the subject of *hogs*, I must say that we make excellent pork in Jefferson. Farmers have not been slow in introducing the best breeds—such as the Berkshire, Essex half-black, the Woburn, and Suffolk, which are generally the varieties, and their crosses, found in the hog-yards. These varieties have fine flavored meat, are of a quiet disposition, fatten easy, some of the small-bone kind best for home consumption, and the larger or more raw-boned hogs more profitable for the barrel or market. The quantity of corn required to make 100 pounds of pork is a hard question, and one which I am now unable to answer. But I must amend what I stated in a former communication about the grinding of grain for food, as I am now convinced that there is a decided gain in the grinding of all grain, and then cooking it, for food, excepting peas, which may, perhaps, as well be cooked without grinding. We cannot make it profitable here to make pork for $5 a hundred, when corn and peas readily sell for 50 cents the bushel. Our pork, at that price, to remunerate, must depend on the dairy slops, and very little grain. I have carried to market, this year, pigs of the Berkshire breed, with a mixture of Essex half-black, which, fattened as above, and at six months old, weighed from 270 to 289 pounds, and sold for $4 75 the 100 pounds.

We have in this county all the elements of a fertile soil—an inexhaustible compound of silicious, calcareous, and aluminous matter, together with the primeval humus. To make arable land, it should be the study of the husbandman to keep all these matters mixed up in due proportions. The first three substances of the compound alone would become barren without a fair admixture of the latter; and this the humus or manure wears easier and sooner away by constant ploughing and cropping than the three former. It becomes the duty of good farming not only to keep the soil well stirred by deep and good ploughing, to retain and mingle a fair proportion of these three first, but to keep the soil also well and often supplied with a due and rich proportion of the latter. Science and experience teach us that this can only be done by a judicious rotation of crops and the bountiful application of manure, when the land is kept under the plough. Hence manure-making should be the first trade of the farmer; and notwithstanding great improvements have already been made in the making and preserving of the manure made on the farm, there is no interest of the farm that requires and deserves more the continued attention and all the skill and care of the farmer.

All the stock of the farm is mostly kept in stables, or in yards, under sheds. The dung made in the stables is thrown in heaps outside of the buildings, where often it remains to be leached by the drippings of the roofs, or otherwise washed, and loses a good share of its virtues. The manure made in the yards, whether on a slope or on a level, unless collected and drawn out early in the spring, or stacked in heaps in the yard until it can be drawn out, is also left more or less exposed to the same deteriorating and wasting influences of sun, wind, and rain. The yards, whether on slopes or levels, become very muddy, and are rendered at times almost impassable, by the constant tramping of heavy cattle in the spring and fall, though ever so deeply littered with straw, or other refuse matter—so much so that they are dreaded by man and beast, and are very uncomfortable until winter sets in and freezes them up. To obviate all these defects, I would propose to dig cellars four, five, or more feet deep, and seven, eight, or more feet wide, the whole length outside of the stables; to have the floors of the stables so constructed to convey all the stale into the cellars, which should be made tight on the inside by well-built walls laid in water-lime mortar, and covered by a roof, and fenced outside by posts and bars to keep cattle from falling into them. All the manure made in the stable, being thrown into these cellars, would thus be preserved and protected. Next, I would conduct, by good eave-troughs, the rain-water of all the roofs out of the yard. I would then slope my yard by the plough and scraper, if the shape of the ground required it, from the buildings towards a cellar, to be dug the whole length of the yard on the opposite side of the buildings, making it of such width as would make it handy to remove the dung from it on either side. This cellar should be covered with a roof, to rest on stone pillars, or posts, about six or seven feet high above the ground, and be surrounded by a fence of bars and posts. The wash of the yard should be made to run into this cellar, or manure-house, and yard. Next, I would harden the bottom of my barn-yard by paving, flagging, or planking it; and the litter, when sufficiently worked into manure in the yard, could then easily be scraped, from time to time, to this manure shed, there to remain under cover until wanted. In this manner the manure would all be saved in its dry and liquid state; the yard would never be poached up, and become a hole of mud and mire, without bottom, unpleasant and injurious to man and beast; and the outlay would soon pay by the quantity and quality of the manure made; and it would certainly not cost half the labor to draw it out when wanted.

I cannot well close this communication without saying a word of the establishment of * * * at Albany, who, by their ingenious labor-saving implements, have well deserved of the farming community. I have had in use these three years a corn-planter, or seed-sower, of their make and invention. I have always regularly planted eight acres a day with it, the machine being drawn by a horse. It is equally well adapted to sowing small seeds—as onions, carrots, beets, ruta-bagas; and I consider it a valuable implement on the farm. I have now in use their newly-improved railroad horse-power, and, with the thresher and separator, it is the most economical and profitable machine that

I am acquainted with; and the cleaner, which they have recently added in lieu of the separator, has crowned their efforts in presenting the farmer with a threshing establishment, and a power to operate it, that can be second to none in efficiency, durability, economy, and comfort for man and beast, whether in the field or on the barn floor. The Michigan sod and sub-soil plough, which has been brought into my neighborhood, has given satisfaction to those who have used it, and will prove a valuable acquisition to the more thorough tillage of the land.

Another implement which has been recently used in this country is the independent horse hay-rake; and it is said by those who have used it, and those who have seen it work, that it will eventually supersede the old-fashioned revolving one.

Last, but not least, must I notice the steel cultivator teeth now used in the drag, or cultivator. Nine of these teeth are put in a triangular drag—four teeth in the side pieces, about 18 inches apart, and one tooth in the middle piece, and between the two first teeth in the side pieces, and about 12 inches each way between them, to work and stir the ground about six inches from centre to centre of each tooth. With this drag on sod turned over in the fall, or other fall-ploughed land, the land can be brought in a condition to receive the seed, and fully prepared much earlier in the spring, and before the plough can often be worked to advantage, being efficient in its operation, and mellowing the ground at one turn better than any implement formerly in use.

I remain, sir, very respectfully, your obedient servant,

JOHN N. ROTTIERS.

Hon. THOMAS EWBANK,
Commissioner of Patents.

SALEM, WASHINGTON COUNTY, N. Y.,
January 11, 1851.

SIR: Your Circular of the past year, containing numerous interrogatories, was handed to me by Mr. King, to whom it was addressed, for reply. I propose confining my reply to a single interrogatory—that which embraces *the curing of Pork Hams.*

When hams come first from the cutting-block they are usually jagged and ill-shaped. Saw off all superfluous shank, and trim the whole smoothly.

Formula for curing 100 *pounds.*—Take 4½ lbs. (four and a half pounds) ground rock-salt, 4 oz. (four ounces) saltpetre, and 4 lbs. (four pounds) brown sugar. Mix the salt and saltpetre, and with it thoroughly rub each ham all over, powdering it with the mixture, and pack down in a tight, clean cask, sprinkling over each layer its due proportion of sugar. (A molasses cask answers well when there is meat enough to fill it.) Head the cask tightly; and after four days commence rolling it briskly back and forth, so that the surface of each ham may be wet with the brine which shall have been spontaneously produced. Repeat the rolling at least three times a day (and the oftener the better) until the brine is wholly absorbed, when the meat is ready for the smoke-house.

Upwards of forty years ago my father adopted the plan of dry-curing, as it is called, substantially according to the above formula, using at first six (6) *quarts* of fine salt to 100 pounds of meat. For 20 years I have cured my meat in this way, gradually reducing the quantity of salt from six (6) *quarts* down to four and a half (4½) *pounds*, and with entire success in preserving it through the summer, excepting in one instance, when six pounds salt were used; but it was undoubtedly impure. Less than four and a half pounds pure salt to the 100 would probably preserve meat from taint, but would be found too fresh for the general taste.

If it were practicable at once to force mechanically as much salt into fresh meat as would preserve it, it would seem that such curing would be philosophically perfect. Its juices all preserved unchanged, the meat would be soft, palatable, nutritious, differing in no desirable quality from the same article when fresh. If this be so, then the nigher we can come to it in curing, the more perfect is the process.

Curing by the formula, each hundred pounds of meat will, in the course of four days after packing, make about five quarts of brine, showing that *meat parts with its juice* (albumen) *as a first step in the process of curing.* This enables us to account, rationally, for the hard, junk-like character of the lean, both of pork and beef, when cured in common pickle, (strong salt and water.) A small portion only of its juices thus extracted and mingled with the brine in which it is immersed is taken back into the meat whence it came and where it belongs—its place being mainly supplied by the hard mineral. We use the same formula for curing beef, also, excepting that we allow only half the quantity of sugar.

I, and my brother farmers generally, use salted meats the year round. Independent, then, of all commercial considerations, the curing is a matter of universal interest among us. The fat broadside of a hog, cured with pure coarse salt and strong pickle, may be safely left to take what it needs, and it will take no more. But not so with the *lean*—with hams, shoulders, and beef: their good flavor is mainly destroyed, their nutritive qualities materially impaired, and their value as food in both ways diminished. Let the farmer, then, take the little extra pains required by the above formula, and he will find himself paid ten-fold in well-preserved, palatable, nutritious food; and there is no man in the world who more needs such food or who better deserves it.

JOHN McDONALD.

Hon. Thomas Ewbank,
Commissioner of Patents.

Upper Pittsgrove, Salem County, New Jersey.

Sir: Your Circular of inquiries was handed me by my father a few days since, accompanied with the request that I would reply to it. Therefore, in accordance with the request contained therein, I herewith proceed to transmit you what little information I possess in relation to the condition of agriculture in our portion of the State. My reply must necessarily be confined to but a few of your inquiries, as the cultivation of many of the articles mentioned is almost entirely unknown in this district.

The condition of agriculture is rapidly advancing, and the spirit of improvement is evidently abroad. The farmer, of late years, has become awakened to the importance attached to this branch of national industry. A society for the promotion of agriculture, and other industrial interests, has been established in our community, under the name and title of the "Salem County Agricultural Society." Scarcely two years have elapsed since the practicability of establishing something of this order was first suggested by a number of our most enterprising farmers; and the consequence has been, during that period, a goodly number of members have been enlisted in its cause. The society, therefore, having been organized under these favorable auspices, has proceeded thus far with surprising success, and at its first annual exhibition, held October 3, 1850, it surpassed the most sanguine expectations of all who gave it a visit—thus proving that perseverance in this most noble and exalted cause will in a very short period enable our portion of "little Jersey" to stand on a basis of equality with any State in our Union.

With these preliminary remarks, I will proceed to answer, as briefly as possible, your inquiries in regard to our great staples—wheat, Indian corn, &c. There has been a great increase in the production of these articles within the last ten years, both in the quantity raised per acre and in the amount of land cultivated.

The variety of wheat most cultivated in our locality at present is the Mediterranean. Formerly, the white smooth-head was considered to yield more to the acre than any other; but upon the introduction of the Mediterranean, it was almost entirely abandoned. This species will produce from 15 to 25 bushels per acre; average, 20 bushels, should the season not prove unfavorable. Placing the average, therefore, at 20 bushels to the acre, which may be safely relied on in an ordinary season—the ground having been judiciously prepared and seeded—the cost of production, valuing the land at $55 per acre, I estimate as follows:

Interest of $55 at six per cent.	$3 30
Ploughing twice	2 00
Harrowing thoroughly	40
One and a half bushel of seed, at $1 25 per bushel	1 87½
Harvesting	75
Threshing and cleaning	1 25
Drilling in	50
Cost of manure, with expense of manuring	6 00
	16 07½

The average product having been placed at 20 bushels per acre, I make the the cost of raising one bushel to be a fraction over 80 cents. This is a pretty correct calculation. We generally finish seeding before the 1st of November, and harvest about the 1st of the following July. You will perceive, in my estimate of the cost of production, that the quantity of seed used to the acre is one and a half bushel. If the wheat is drilled in, this quantity is sufficient; but where the grain is sown broadcast a little more is required, as many of the seeds cannot be covered, and must be left exposed upon the surface either to perish or to be picked up by the fowls of the air.

The rotation of crops is different among different farmers, and even the same farmer frequently adopts different systems—sometimes preferring a crop of oats after corn. The oats having been harvested, the ground is prepared for wheat, which latter is succeded by grass, (generally by timothy and clover combined,) which having been cut two years in succession in its turn, the sward is again broken up for corn. At other times, after the corn has been sufficiently "tended," grass is sown, which, when sufficiently advanced for the purpose, is turned under, as a green manure for a wheat crop. Many turn under grass of two years' standing, and sow with wheat. This plan of "green manuring," as it is styled, from numerous experiments performed in this county, appears to succeed admirably. Good wheat will sell readily in our community at $1 12½ to $1 25 per bushel, at almost any season of the year.

Corn.—The average product of this staple may be stated at 45 bushels per acre—many farms yielding from 60 to 90 bushels to the acre. The cost of production is as follows:

Interest of $55 at six per cent.	$3 30
Ploughing once	1 25
Harrowing	25
Preparing and planting	75
Cultivating	1 75
Manure and its application	4 17
Husking and threshing	1 12½
	12 59½

Cost of production, per bushel, 28 cents. In making the estimate I allow $4 17 for manuring, as that is one-third the cost of ten loads of marl applied to the grass which preceded the corn. The value of the fodder will more than meet any deficiencies I may have made in the calculation. Upon the whole, I think that 28 cents per bushel as the cost of production may be considered a safe estimate. Price of corn in 1850, 65 cents per bushel.

Oats.—In regard to this crop I have but a word to say. The average yield is about 25 bushels per acre; quantity of seed used, two bushels.

Hay.—Clover and timothy combined form our best hay. These grasses are sown in the quantities of four quarts of clover and two of timothy seed to the acre. After a good dressing with our best and most valuable fertilizer, *marl*, we may depend upon cutting at least two tons of first-rate hay per acre; and, in numerous instances, an acre will yield a burden of two and a half, three, and sometimes even four tons. This crop depends almost entirely upon having sufficient moisture in the soil and a good coating of marl. The effects of the marl will show to the very inch for several years after its application. In speaking of manures I shall say a few words on this most valuable fertilizer.

The cost of growing hay per ton is very nearly as follows:

Interest of $55 at six per cent - - - - - - -	$3 30
Ten loads of marl, at $1 25 per load, $12 50; one-third of which is	4 17
Cost of seed and seeding - - - - - - -	1 00
Cutting and making - - - - - - - -	2 00
	10 47

Cost of growing, per ton, $5 23½. The cost of making the first crop of hay is $12 50, two-thirds of which I allow for the two crops of grass, and the remaining third for the crop of corn following. This is about a fair division of the cost of marl used. Its effects will continue for years.

Sheep and Wool.—Is wool-growing profitable? The following calculation will show for itself. The cost of rearing 100 sheep is about $87 50 per annum. Thus:

Wintering, per head, 62½ cents - - - - - -	$62 50
Summer pasturing, per head, 25 cents - - - - -	25 00
Whole cost of 100 sheep per annum - - - - -	87 50

Average quantity of wool produced per head, two and a half pounds, making 250 pounds; value per pound at 31 cents - - -	$77 50
Seventy-five lambs, at $1 50 per head - - - - -	112 50
Value of manure manufactured - - - - - -	25 00
	215 00
Deducting the cost of rearing - - - - - -	87 50
We have clear profit - - - - - - -	127 50

Root Crops are very little cultivated by our farmers, except a sufficient quantity for their own consumption. The average yield per acre of turnips is probably somewhere between 300 and 400 bushels.

Irish Potatoes.—Average yield per acre, 150 bushels. The disease so much complained of around us seldom affects this crop in our locality to any great extent. The reason why, I am unable to account for. May not this disease depend upon some principle existing in the atmosphere deleterious to the proper respiration or nutrition of the plant? I merely make the suggestion.

The cost of production is about 18 cents per bushel. The mercers are considered by many to be the most profitable variety. However, different opinions exist in regard to this.

Manures.—I desire to say a few words concerning guano and marl. These two materials may be denominated, emphatically, the "farmer's gold dust." Either of them is decidedly a very powerful fertilizer, and it is almost impossible to make a preference between them. Guano, I think, is rather more powerful, and of course superior in its primary effects; but its impression is not near as permanent as that of marl. However, we possess at present the advantages of obtaining both, and consequently can apply each in accordance with our opinion as to the most judicious manner. Their right application to crops is of the utmost importance. Guano we generally apply for a wheat crop; it is, however, equally as profitable upon corn. But to wheat it appears to be admirably adapted, producing the most luxuriant straw, well filled with the largest and plumpest grains. After the ground has been duly prepared, the guano is sown broadcast, in the quantity of about 300 pounds to the acre, previous to seeding. Marl is best adapted to grass. Applied in the quantity of about 250 bushels (or ten loads) to the acre, it will produce a most luxuriant burden. It is evident, from the long use of this fertilizer, that it cannot be surpassed by any other manure. It should be applied during the winter season, evenly spread over the young grass, in the quantity above mentioned. Its fertilizing principle evidently consists of potash, as will be seen from the following analysis of a specimen taken from a pit near Woodstown. The specimen consists of green sand, clay, and a trace of carbonate of lime. Thus:

One hundred parts afford—

Green sand - - - - - -	88.28
Clay - - - - - -	11.72
Carbonate of lime, (a trace.)	
	100.00

From a number of analyses of green sand, selected from different localities throughout the State, it would seem that the mineral is not quite uniform in its composition, but exhibits slight variations in the proportions of its principal constituents. The constituents of the green sand, of the specimen above referred to, are as follow:

Compositions, one hundred parts—

Silica - - - - - - -	48.45
Alumina - - - - - -	6.30
Protoxide of iron - - - - -	24.31
Potash - - - - - -	12.01
Lime, (a trace.)	
Water - - - - - - -	8.40
	99.47

For further information in regard to this fertilizer, I would refer the reader to the "Final Report on the Geology of New Jersey, by Henry D. Rogers;" (page 200.)

Your most humble servant,

M. JOHNSON, M. D.

Hon. Thomas Ewbank,
Commissioner of Patents.

Wheeling, Ohio County, Va., *December*, 1850.

Sir: I received a Circular from the Patent Office some time since, and, being desirous at all times of communicating whatever information I may possess, whether new or practical, upon any subject connected with the cultivation of the soil, or rearing live stock, shall endeavor to answer, in a discursive manner, some of the interrogatories in relation to *Sheep husbandry.*

The leading question under the head of sheep and wool—"Is wool-growing profitable?"—can only refer to this description of stock when well managed, receiving the light but necessary attentions during the grass seasons usually bestowed upon them by flock masters, and the preparation of ample supplies of food for their consumption during the winter months.

Sheep, like all other domestic animals, remunerate their owners just in proportion to the care that is bestowed upon them, and the judicious application of the food they consume, and its adaptation to their necessities. In endeavoring to obtain as large a supply of wool as is practicable, regard should be had to good condition. High feeding on grain should at the same time be avoided, as it renders the wool harsh, and the yield is not in proportion to the cost.

The merinos or Saxon sheep are generally kept in this section of country, and are preferred to the coarse-woolled sheep. They bear confinement in large flocks better than any other breed. They also produce as much wool in proportion to what they eat. Their food is the same; nor are they more dainty in their appetites than the native stock. Their mutton, when fat, is excellent, being tender, juicy, and of fine flavor, when well cooked. This race of sheep, consequently, from the known value and extensive consumption and high price of their wool, together with the good qualities of their mutton, highly recommend themselves to all classes of farmers. They are also peculiarly fitted for the improvement of lands injured by cultivation in the southern States; and, from experiments recently made in the interior of Virginia, it is no longer to be questioned that they will thrive and be profitable in such situations.

The mountain or rolling lands of the southern States will doubtless in a short time yield a handsome revenue in wool, as a shepherd with his dog could keep a large flock of sheep during the growing season at comparatively little expense. Such has been the custom with the wool-growers of this vicinity for many years, the sheep being brought home for the winter.

The prepossessing appearance of sheep farms is much owing to their destroying the weeds and bushes, and to the beautiful sward produced by the minute and equal distribution of their manure over its surface.

Sheep will fertilize, more readily than any other stock, the hill tops, from their habits of seeking the highest land to lie on at night.

There are, however, some other points worthy of mention in connexion with this subject. Merino or Saxon sheep are more readily confined in fields than the native stock, and require much less outlay in fencing than is necessary upon farms where horses or cattle are kept. This, where timber is scarce upon cultivated farms, is a very important consideration.

In this section there are immense quantities of manure made by feeding the sheep durin the winter season under barns or other shelters, which are well littered with straw, both for the cleanliness and health of the sheep and for increasing the amount of manure. It is left under shelter until the following summer or fall, when it is hauled out upon the grass-lands designed for corn the next season, or spread and ploughed under for wheat when necessary, or to top-dress meadows. This manure is of course very strong from the little exposure to which it has been subjected, and, being dry, is easily hauled out.

The winter feed of sheep in this region, embracing Ohio and Brooke counties, in Virginia, and in the adjoining counties of Ohio and Pennsylvania, where hundreds of thousands of sheep are kept, consists of hay, sheaf oats, corn, and corn-fodder, and what grass may remain upon the fields after the proper grazing season is over.

These sheep certainly pay, or other stock would soon be substituted in their stead, as I know of no people who better understand their true interests than those mentioned.

Cattle do well here, and they could soon be introduced more extensively, as this is a fine region for grass; spear grass and white clover being indigenous to it. Timothy and red clover also grow to great perfection.

It is generally believed that a steer costs as much during the year as ten sheep. The sheep produce wool worth from ten to twelve dollars and a half. The profit on cattle is not so great; if it is, I have not found it out. This is the annual yield of the sheep in wool, independent of the increase, which, in a flock of one-half breeding ewes, would be fully 50 cents per head more.

It appears, then, that 100 sheep, 50 of which are breeding ewes, will produce from $100 to $125 for the wool, and 50 cents per head for the increase, (it being about from 75 to 90 in large, and should be greater in small flocks,) or near that sum, valuing the lambs at one dollar per head. This is not, however, a fair estimate of the best flocks that furnish bucks and choice ewes for the improvement of other flocks. The annual sales of stock in such instances will very considerably increase the above estimates.

There being no sheep kept here the entire year on hay, I am unable to state how much wool a ton of hay will produce. It is usual to feed from seven to ten tons of hay per hundred, with some grain. The amount of feed varies with the severity of the winter.

The Saxon sheep spoken of are not the delicate animals some writers of the present day would have us believe, but are as hardy as any stock of sheep which have as yet been introduced here, and are remarkable for the quality of their wool, and the good property, so essential, of producing animals equal, if not superior to themselves. Some samples of wool taken from my Saxon sheep, just before shearing this summer, were handed to Mr. P. A. Browne by Messrs Houston & Robinson, of Philadelphia. The samples grade as below:

Unwashed wool.	Grown bucks,	No. 1	1,250 (inch.)
		No. 2	1,875
	Young bucks,	No. 1	1,850
		No. 2	2,186
		No. 3	2,186
	Ewes,	No. 1	1,875
		No. 2	2,186
		No. 3	2,186
Washed wool.	Ewes,	Nos. 1 and 2	2,186
		No. 3	1,875

The wool-growing interest will be much benefited by Mr. Browne's various examinations,* as they can more readily tell the relative value of their sheep, and where to procure good crosses.

The preceding remarks upon the subject of sheep and wool you can use as you think proper.

Yours, respectfully,

H. W. CHAPLINE.

Hon. Thomas Ewbank,
Commissioner of Patents.

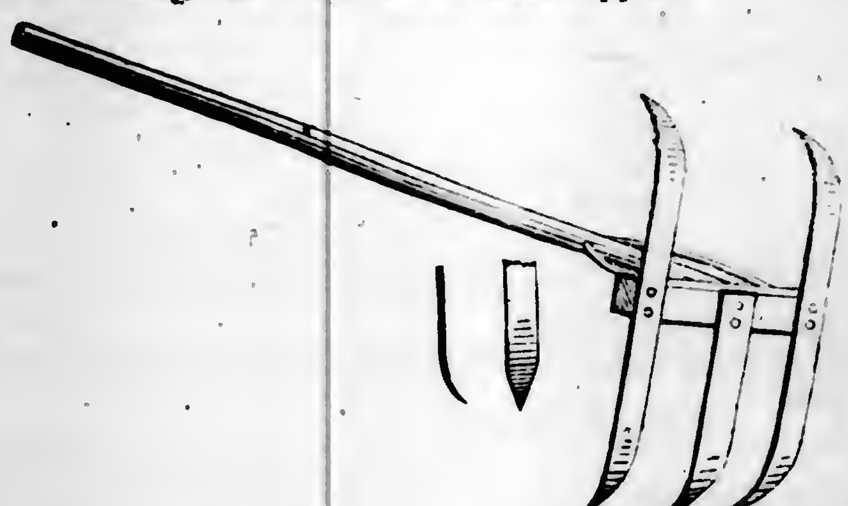
Lafayette, Indiana, *December* 16, 1850.

Sir: In answer to your communication, I would say that I never wrote a piece for the press in my life, and you will please take the substance of my communication, which I will endeavor to make intelligible.

* See Plough, Loom, and Anvil for March and May, 1850.

I will, in the first place, give my mode of transplanting young orchard trees I lay off the ground, and put a small stake where each tree is to stand. I then cut a forked stick of sufficient size, and cut the prongs so that they will measure three feet from point to point. I set one prong where the stake stands, and strike a circle with the other, which will be six feet in diameter, to spade by. I lay the first spit around the hole. If the second spit is good, I merely reverse it; if not, I throw it away, and replace it with good soil. In setting the tree, I raise a little mound in the centre, pressing the tree firmly on the mound, one holding it straight while the other fills up the hole. I do not throw the soil upon the roots in a mass, but carefully press the earth around and into every crevice of each layer of roots, placing the roots, with the fingers, as near as may be, in the same position, as respects divergence, in which they originally stood. I then press the whole firmly with the foot, except three or four inches on the top, which should be left loose and concave to retain and absorb the rain. This completes the setting.

I have next to speak of the after-culture. But I will first describe an implement which I use for that purpose, and which I originally invented for garden culture, but found admirably adapted to the latter use. It simply consists of three spring-steel blades, each one and a fourth inch wide, two of them 18 inches long, one 10 inches long. They are set in a wooden bar, or head, eight inches long and two inches square, fastened with two screws in each blade; they should be two-inch screws. The two long blades are set at each end of the head; the short one in the middle; both ends of the long ones are curved, and one end only of the short one. To this a handle is attached similar to a rake handle. This implement is to be used by a motion similar to raking. It is not to dig or hoe. It can be used to advantage where the ground is too wet for any other tool, for it leaves it in a better condition to receive light and air, which are essential to vegetable growth. The use of the side with two prongs is to run astride of onions, beets, radishes, and all suitable things planted in rows, and also to work anything when the ground is too wet for the three-pronged side, which often happens.



The two small figures represent the front and edge of a tooth.

Some of my neighbors have tried to improve on it by fastening the blades to a thin iron head with rivets. But I prefer my original plan. It is lighter, and easier put in repair.

Thus prepared, I go over my newly set trees just before a rain, and mellow the ground from four to six inches deep, the size of the hole. I can thus go over 200 trees every hour with ease. If the rain should be very heavy, I go over them again as soon as the ground is sufficiently dry to break the crust formed by the rain, which is very detrimental to the growth of anything. Thus

I proceed until about the 15th of July. After that I leave the ground undisturbed; for, if continued, the trees would continue to grow until frost, and would be liable to be killed by the winter. If the weather should be dry, I go over my trees once a week, and mellow the ground as deep as I can each time. If wet, and the rains are heavy, I go over after each heavy rain and break the crust. Under the above treatment, there is no need of mulching, and they will make a much better growth than mulched trees. Some may think all this too much trouble. I have tried every way, and I now practise this way exclusively, and never intend to practise any other way.

A word on the position in which trees should be set: Some people are very particular to have a tree set in the same position in which it grew in the nursery. I never found any difference in that respect. But it is very important that some trees should stand in a certain position—a fact, I believe, which has not been noticed by writers on horticulture. A great many trees are crooked and curved in their stems. The crooks and curves incline to an angle of from 10 to 45 degrees. If these inclinations are set to the south, the intense rays of the summer sun scorch the sap. The sap, thus scorched, has an offensive smell, which attracts the borer, which soon reduces the whole south side of the tree to powder in these inclinations. Thus from 10 to 15 per cent., or more, of young orchard trees are destroyed, which might be prevented by observing the above rules.

A word about how nursery trees should be raised: Some nurserymen boast that all their trees are grafted in the root. The common practice is to graft or inoculate the trees from 4 to 12 inches from the ground. This may be the most convenient for the nurseryman. But this practice and root grafting are both wrong, unless for dwarfs. All kinds of trees should be grafted or inoculated where the head is to be formed, because seedling stocks are more hardy than the cultivated varieties; much more so, in general.

The thermometer, in 1843, stood a whole day (the day perfectly clear) at zero; the snow about ten inches deep, and the ground soft. The consequence was, that all my sweet cherry trees that were inoculated low were killed, while the seedling stocks were not injured. A great many large apple trees (root grafted) suffered the same fate; and so of all other fruits—proving the seedling stocks to be much hardier than the grafts. Sweet cherries should be highly worked in particular, they being more tender than any other hardy fruit. When the snow falls deep, and the ground is soft, it should be removed from around fruit-trees until the ground is frozen, to prevent the disaster that happened to me in 1843. The philosophy of it is this: When the snow is deep, and the ground is not frozen, a circulation of sap is kept up in the roots consequent from the warm bed of snow; this, meeting with a low temperature in the clear sunshine—the rays of the sun reflecting from the snow—raises a degree of heat in the focus of those rays to permit the sap to pass up four or five inches above the snow, which freezes in the absence of the sun; thus, the tree is killed as far as the reflection of the sun can reach. Such trees as apple, peach, pear, plum, and sweet cherry, are generally killed all round. While the nurseryman continues thus to work his trees low, the farmer will continue to have vacancies in his orchard. If those who set new orchards will observe the above rules in selecting, setting, and after-culture, they will not have many vacancies to fill. The above mode of culture is peculiarly adapted to the first season; any kind of clean culture will answer afterwards. Let no one presume to continue it beyond the 15th of July; otherwise they may pay dearly for it the next winter. The above is all that is original with me.

Yours, respectfully,

CANADA FINK.

Hon. THOMAS EWBANK,
Commissioner of Patents.

NOTE.

Seeds ordered for the fall of 1852.

In consequence of the late period at which the foregoing Report is issued, an opportunity is afforded of inserting the following letter, that Congress and the agricultural community may know what measures have been taken to provide seeds for distribution the present fall, and what amount of the appropriation for agricultural statistics, &c., has been devoted to that object:

PATENT OFFICE, *September* 16, 1852.

SIR: I have to acknowledge the receipt of your letter of 14th inst., suggesting that I might consult with advantage the "Philadelphia Society for the Promotion of Agriculture" on the annual selection and distribution of seeds. To meet the wishes of agriculturists in this matter, is certainly the most direct mode of accomplishing the intentions of Congress in making the appropriation. Some seeds have been ordered from California, Brazil, Sicily, &c., amounting probably to one thousand dollars. *Two thousand dollars* remain for the purchase of American and foreign seeds; and to the most judicious expenditure of this sum I respectfully invite the attention of the Society. As the money is to be expended for the benefit of all the States, the variety of seeds should include some adapted to the climate of all, and such as will meet the expectations of planters. About four hundred packages will be required for members of Congress, heads of departments, &c., and about as many smaller ones for distribution from the office. These the office will address and forward through the mail. The remainder should be put up in packages, for societies and prominent farmers, and may be addressed by the Society and forwarded to the office to be franked. Thus the responsibility of the distribution, as well as of the selection, will be chiefly with the Society. As Col. Wilder, the president of the United States Agricultural Society, and other eminent agriculturists, are attending the Pomological and Horticultural Convention now holding in your city, I would respectfully suggest that they also be consulted. I need not say that the seed should be fresh, of the first qualities, and put up in the best manner. They should be ready for distribution from the office by the beginning, and not later than the middle, of February. Each package should have its contents printed on it, and each paper the name of the seed it contains. "Seeds from the United States Patent Office" should also be printed on every paper and package.

The purchase and preparation of these seeds are left with your Society, and the bill or bills, when approved by your Society or a committee, will be promptly paid by the office. If the Society approve the suggestion, the following words might be printed on each package: "Selected for the Patent Office by the Philadelphia Society for the Promotion of Agriculture."

T. EWBANK.

ISAAC NEWTON, Esq.,
Philadelphia, Pennsylvania.

Fig. 1

Fig. 2

C. B. Graham's lith. Washington.

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